

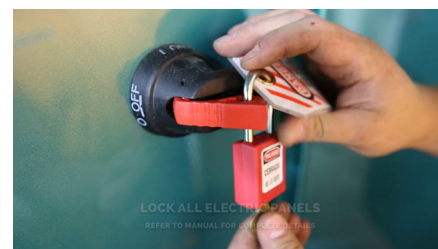
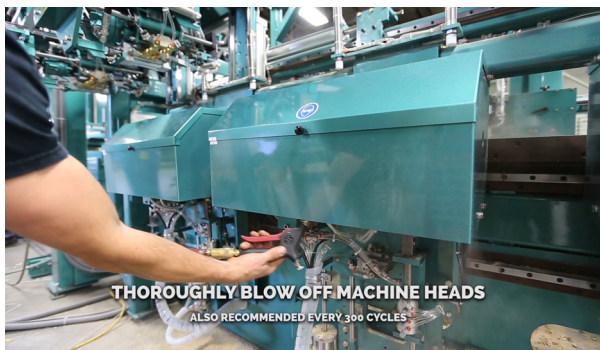


Innovation, Quality & Honesty

# 990-Series General Maintenance

## Maintenance Supplement

Published: 3/29/2019



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Manual Part Number: 990\_Gen\_Maint Rev 3

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## Maintenance of 990-Series

This document describes preventative maintenance steps for this *machine*. The content is geared to guide technicians to keep a regular maintenance schedule for your KVAL machine. Keeping your KVAL machine maintained is an important piece for successful operation of your door production process.

## Lockout Tagout Procedure



This policy is required by OSHA regulation 1910.147 and Cal OSHA'S SB198 ruling of July 1991.

Use the following lockout procedure to secure this machine while it is powered down. During a lockout, you disconnect all power and shut off the air supply. Be sure to use the tagout guidelines noted below.

### Pre-Steps Before Lockout Tagout

Inspect



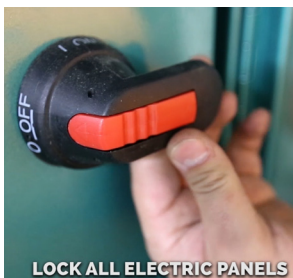
1. Evaluate the equipment to fully understand all energy sources (multiple electrical supplies, air supply and pressure, spring tension, weight shifts, etc.).
2. Inform all affected personnel of the eminent shutdown, and the duration of the shutdown.
3. Obtain locks, keys, and tags from your employer's lockout center.

### Lockout Tagout Power

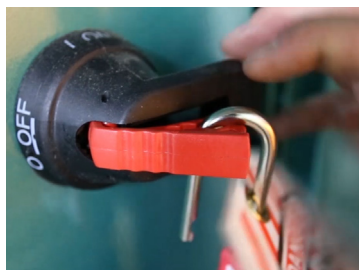
Power



4. Turn off machine. [See Chapter 2](#) for power down and power up procedures.
5. Turn the disconnect switches on **ALL** electrical and frequency panels to the OFF position. Then push the red tab to pop it out. Place a padlock through the hole. Place your tag on the padlock, as per the tagout guidelines below. (see illustration below).



Turn Switch to the  
OFF position



Insert Lock into hole.



Lock and Tag out

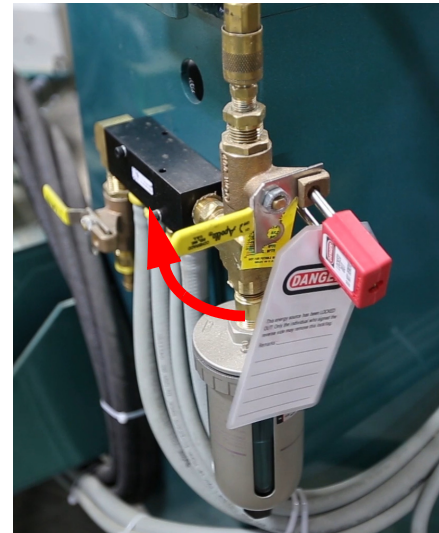
**Note:** When multiple people are working on the machine, each person needs to have a lock on the handle in the extra holes provided.

## Lockout Tagout Air Supply



6. Turn all air valves to the OFF position and place a padlock through the hole (see illustration below).

**NOTE:** Place your tag on the padlock, as per the tagout guidelines.



### Start Maintenance

7. Once the locks and tags are in place and all personnel are clear, attempt to operate the machine to ensure equipment will not operate.
8. Maintenance or repairs may started.

### Post Maintenance Steps

9. After maintenance is completed, the person performing the work must ensure all tools, spare parts, test equipment, etc., are completely removed and that all guards and safety devices are installed.
10. Before removing the locks and tags, the person who attached them shall inspect the equipment to ensure that the machine will not be put in an unsafe condition when re-energized.
11. The lock and tag can now be removed (only by the person(s) who placed them), and the machine can be re-energized.
12. The tags must be destroyed and the locks and keys returned to the lockout center.

## Maintenance Schedule

KVAL recommends the following maintenance schedule to ensure that the machine operates properly. Cycles refers to the quantity of processed doors. Cleaning curtains build up of sawdust and grime which causes issues with the operation of the machine. Inspecting, finds issues before they become problems. Lubricating decreases wear and keeps this machine running smoothly. Refer to sections following these tables for further description of the maintenance steps.

**Note:** The steps in the tables below are designed to perform maintenance on a production line. Some of the steps may not pertain to all machines.



Prior to performing any maintenance, repairs, cleaning or when clearing jammed debris, you must disconnect, tagout, or lockout the electrical and air pressure systems. This should be done in accordance with applicable state and/or federal code requirements



To view a video of the maintenance process, visit the KVAL website. Select the Video Tab to view videos.



<http://www.kvalinc.com/>

300 Cycles	
Clean	Use pressured air to blow off dust and debris on entire machine
Clean	Blow out dust collection cans

600 Cycles	
Inspect	Air Pressure Gages. Adjust, if necessary, to the proper PSI located on the label. <b>(Adjust only if Trained in Maintenance)</b>
Inspect	Inspect Air Filter Water Traps. Empty if necessary
Inspect	Inspect the Tooling for wear, (Drill Bits, Cutting Tools, Screw Driver Bits)
Lubricate	Lubricate the inside of the Hoppers with a light coat of dry silicone spray.
Clean	Empty All Dust Collection Units



3,000 Cycles	
<b>Inspect</b>	Inspect feed belts for proper tension or damage.
<b>Inspect</b>	Inspect screw drop tubes for kinks, cracks or wear from rubbing. Ensure tube clamps are tight.
<b>Inspect</b>	Inspect all photo eyes secure and tight.
<b>Inspect</b>	Inspect all limit switch arms for tightness or breaks
<b>Inspect</b>	Inspect split shells and screw receivers on six shooters for cracks or breaks. Replace if broken.
<b>Inspect</b>	Inspect all airlines for kinks or rubbing.
<b>Lubricate</b>	Refill all lubricators. Replace fluid if milky or discolored. Use ab ISO 32 standard hydraulic oil (KVAL PN:SYS-LUBEG).
<b>Lubricate</b>	Grease ball screw bearings (if applicable). <a href="#">See "Lubrication Schedule" on page 3-17.</a>
<b>Clean</b>	Clean all bearing shafts with clean, dry cloth.

12,000 Cycles	
<b>Inspect</b>	Inspect chains for proper tension or damage
<b>Inspect</b>	Inspect all air cylinders for air leaks. Replace if seal is leaking
<b>Inspect</b>	Inspect hydraulic lines for loose fittings, leaks and cracks.
<b>Inspect</b>	Inspect ball rail shafts for pitting or abrasions.
<b>Lubricate</b>	Clean and lubricate all slides and cylinder rods with dry silicone spray
<b>Lubricate</b>	Lubricate all bearing shafts and hex shafts with silicone and clean rag.
<b>Clean</b>	Clean inside hopper with WD-40 and a 3M Scotchbrite <sup>®</sup> pad. Wipe dry with a clean dry rag

72,000 Cycles	
<b>Inspect</b>	Inspect all nuts and bolts for tightnesses Tighten is necessary.
<b>Inspect</b>	Check that there is a smooth transition with a door feeding into and out of machine.
<b>Back-up</b>	Backup computer software.
<b>Clean</b>	Wash filter and lubricator bowls with soapy water.

## 300 Cycle Maintenance Steps

Follow Lockout Tagout procedures.

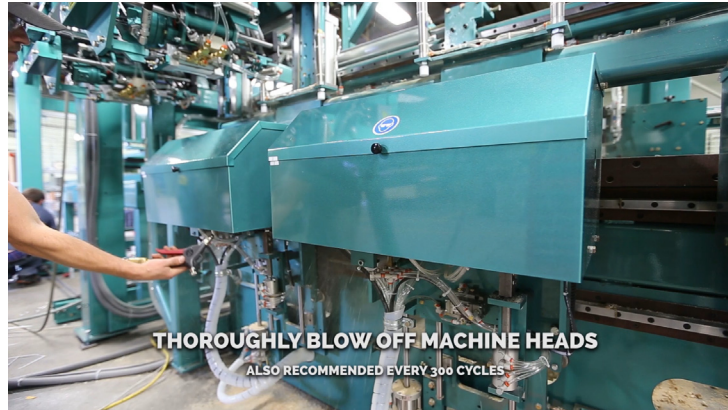
### Clean, Clean, Clean!

Sawdust and grime build-up can cause issues with the operation of the machine.

Use pressured air to blow off dust and debris on **entire machine**. Use a clean rag to clean areas not affected by pressurized air.

Also blow out any dust collection units.

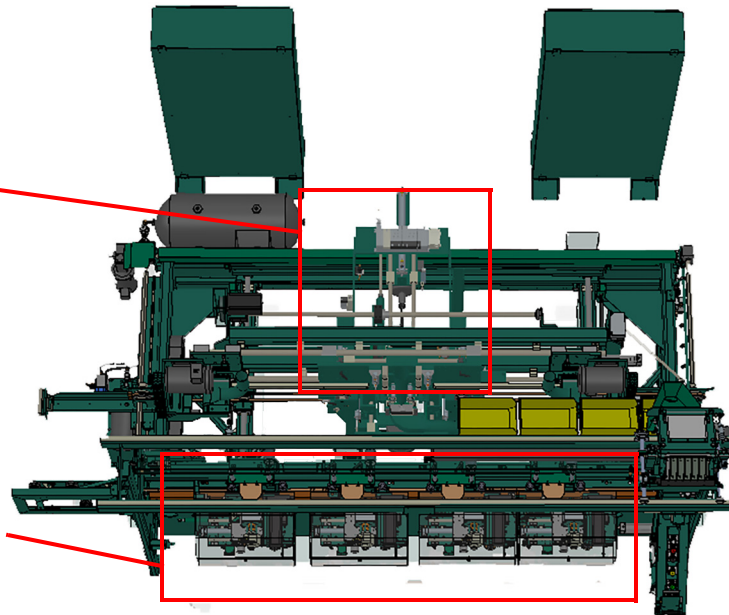
Check vertical bearings for loose screws. Loose screws could cause bearing damage.



### High Dust Accumulation Areas

**Lock Bore Area:**  
build up can occur  
and stop Bolt drill  
from extending.

**Front Section:**  
Underneath Car-  
riage Heads  
Jamb Clamp area.





## 600 Cycle Maintenance Steps

Follow Lockout Tagout procedures.

### Check Air Gauges and Inspect Water Traps

Air Pressure Gages. Adjust, if necessary, to the proper PSI located on the label. **(Adjust only if Trained in Maintenance)**

Inspect Air Filter Water Traps.  
Empty trap if necessary

Slide locking switch down to unlock twist trap to remove.

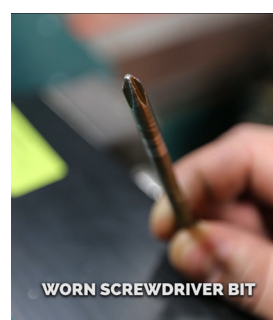
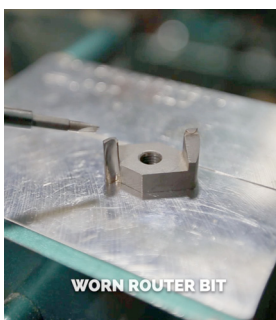
Reverse action when installing trap.



### Inspect Tooling

Inspect the Tooling for wear, (Drill Bits, Cutting Tools, Screw Driver Bits)

See [“Replacing Bits in the Front Section” on page 3-30](#) and see [“Replacing Tooling in the Back Section” on page 3-37](#).



## Lubricate inside of Hopper

Lubricate the inside of the Hoppers with a light coat of dry silicone spray. Lubricate the input to the screw drop hoses. Provides an easier screw drop. Do not over-spray oil.



## Empty Dust Collection Units

Check and empty any dust collection units. Clean any dust filters. Dust collection systems vary from machine to machine. Follow manufacturers directions to empty dust collection units.

Filters

Dust Collection  
Containers

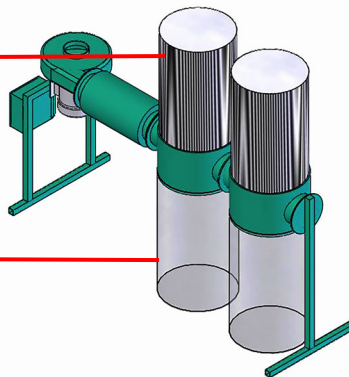


FIGURE 2-1. Typical Dust Collection Unit



## 3,000 Cycle Maintenance Steps

Follow Lockout Tagout procedures,

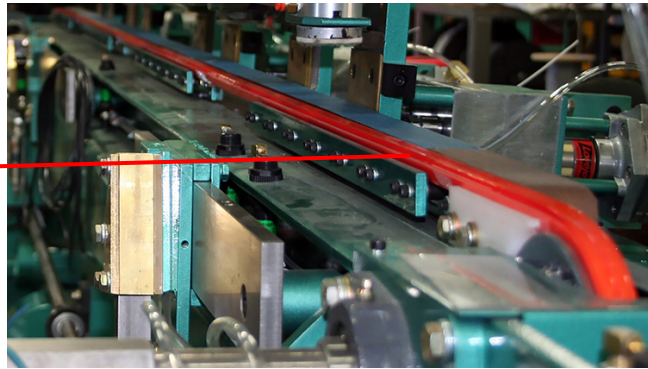
### Inspect Feed Belts

Inspect feed belts for proper tension or damage.

Check belts for cuts and nicks.

Belts can stretch over time. Check for looseness. A rule of thumb is to pull belt, if belt moves too freely, then replace belt.

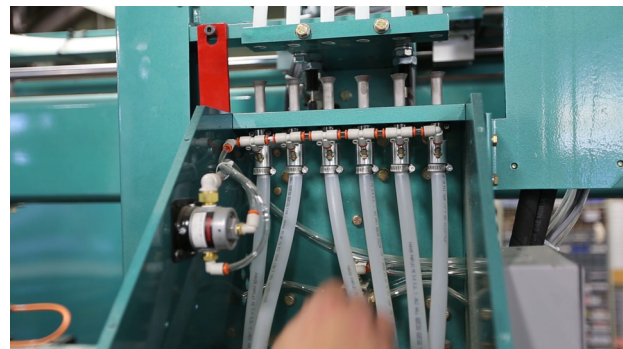
Belts can become slick from use, lessening traction on door. Check belts for slickness or door slippage.



### Inspect Screw Drop Tubes on Six Shooter

Inspect screw drop tubes:

- for kinks
- cracks
- wear from rubbing
- Ensure tube clamps are tight

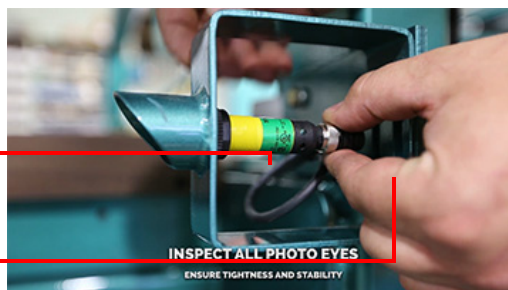


### Inspect all Photo Eyes

Inspect all photo eyes secure and tight.

**Check Nut that  
attaches Photo  
Eye to Machine**

**Check Connection to Photo Eye**

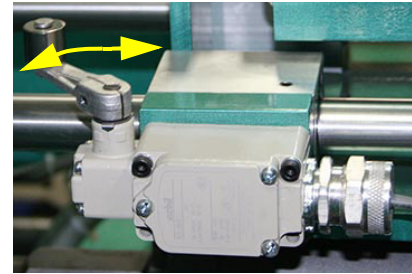


## Inspect Limit Switches

Inspect all limit switch arms for tightness or breaks.

Inspect the switch for cracks in the body and check that the switch arm actuates (clicking sound) when moved to the extreme.

**Note:** Depending on the model of limit switch, the amount of "pre-travel" (amount of movement from the arms resting position) is either 5 or 20 degrees before the limit switch actuates.



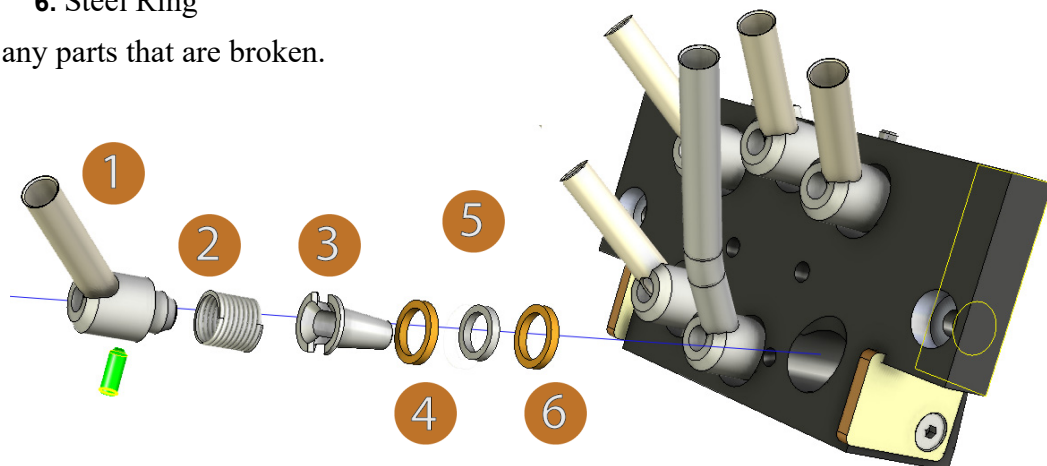
## Inspect Screw Receiver Parts

Inspect screw receiver parts on six shooters for cracks or breaks.

Inspect:

1. Screw Receiver
2. Spring
3. Split Shell
4. Steel Ring
5. Rubber Ring
6. Steel Ring

Replace any parts that are broken.

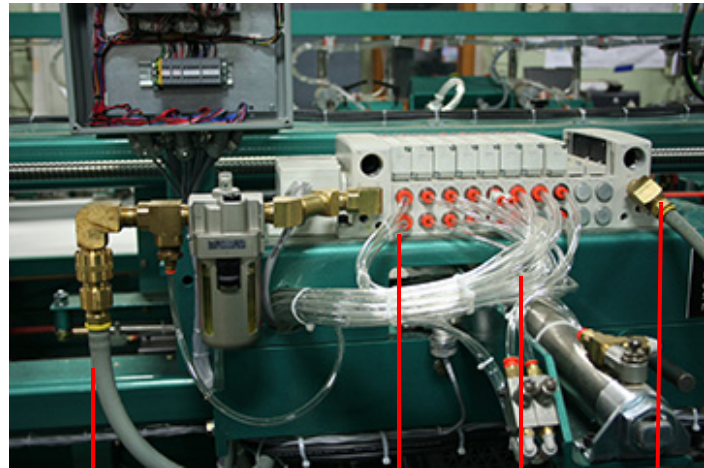


## Inspect Airlines

Inspect all airlines for kinks, rubbing and leaks. Perform pull test on push on hose connectors.

Check all airline connections, assemblies, air valves, and hoses.

Check from source to end assembly.



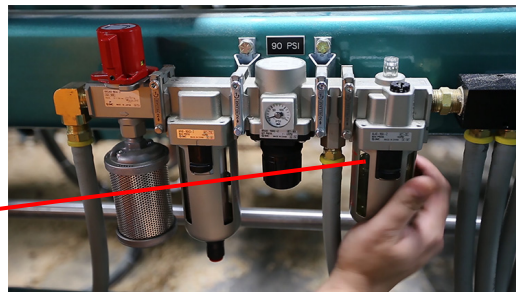
**Check Hoses for kinks and rubbing, manifold connections and Air Cylinder connections.**

## Refill Lubricators

Ensure Air is turned off.

Refill all lubricators. Replace fluid if milky or discolored. Use ab ISO 32 standard hydraulic oil (KVAL PN: SYS-LUBEG).

**Slide locking switch down twist bowl and remove.**



**Refill bowl. Reverse action when installing trap.**



## Grease Ball Screw Bearings

Grease ball screw bearings (if applicable). For a table of lubrication types to use, [Lubrication Schedule](#). For locations to lubricate, [See Grease Ball Screw Bearings](#)

## Clean Bearing Shafts

Clean all bearing shafts with clean, dry cloth.

Spray shaft with silicone oil and clean build up grime and dirt.





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## 12,000 Cycle Maintenance Steps

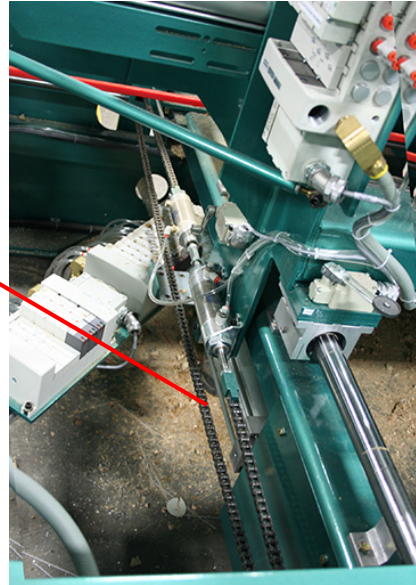
Follow Lockout Tagout procedures.

### Inspect Chains for Proper Tension

Inspect chains for proper tension or damage.

Check for sagging chains. Chains can stretch over time of use.

Check for chain stiffness. Stiff chains do not provide a tight fit over the gears.



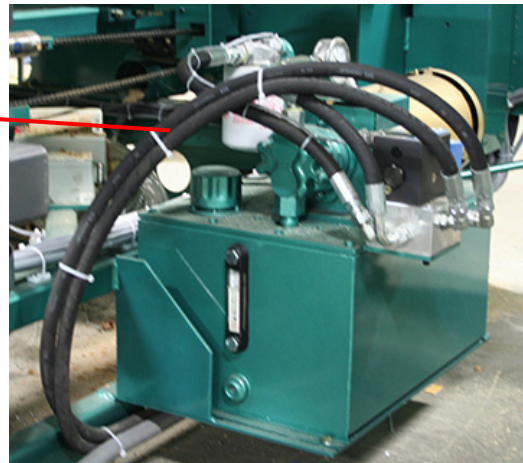
### Inspect Air Cylinders

Inspect all air cylinders for air leaks. Replace the cylinder if seal is leaking. Symptoms include a cylinder not extracting or retracting to the limits. Cylinders not holding their position.

### Inspect Hydraulic Lines

Inspect hydraulic lines for loose fittings, leaks and cracks.

Inspect hydraulic lines from the source to the end assembly.



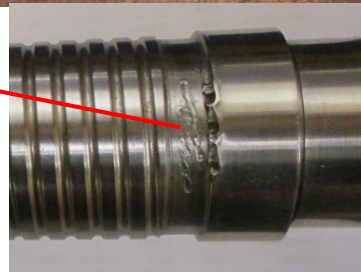
## Inspect Ball Rail and Ball Screw Shafts

Inspect ball rail shafts for pitting or abrasions.

**Example of a Pitted Ball Rail**



**Check Ball Screws for Pitting**



## Clean and Lubricate Slides, Cylinder Rods and Bearing Shafts

Clean and lubricate all slides and cylinder rods with dry silicone spray.

### Clean inside Hopper

Clean inside hopper with dry silicone oil and a 3M ScotchBrite<sup>®</sup> pad (or equivalent). Wipe dry with a clean dry rag



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## 72,000 Cycle Maintenance Steps

Follow Lockout Tagout procedures,

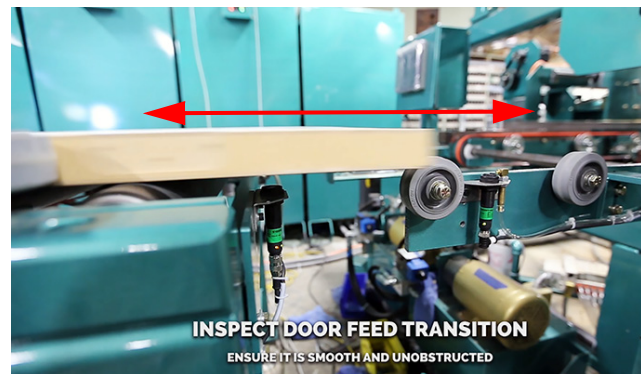
### Inspect Nuts and Bolts

Inspect all nuts and bolts for tightness. Tighten if necessary. Use appropriate tool to verify that the hardware is tight.

### Check Door Feeding Transition

Check that there is a smooth transition with a door feeding into and out of machine.

Feed door in and out to verify smooth transition is repeatable.



### Electrical

Check all connections in each node box and electrical panel. Wires may become loose due to vibration. Check contactors for wear.

### Computer Backup

Backups keep your data archived in case of a rare system crash. Click the Back-Up Icon (**Backup.Bat**) on the Desktop to back up your data. The data is stored in a backup folder (**C:\00-Backup**) in your Windows<sup>®</sup> directory. It is recommended to set up a back-up schedule to save your data on a regular occurrence.

**Note:** It is recommended to back-up to an outside source (server, isolated drive, etc) on a schedule of your choosing.

The KVAL service team would be happy to help. If any questions occur, contact our service team at (800) 553-5825 or at [www.kvalinc.com](http://www.kvalinc.com).

## Wash Filter and Lubricator Bowls

Wash filter and lubricator bowls with soapy water.

- Slide lock down to unlock.
- Twist bowl to remove it.
- Remove filter from Air filter assembly. Inspect and clean or replace if necessary.
- Clean bowls and reassemble.





## Tool Changing Schedule

Changing and inspecting the tooling on a regular basis keeps the door machining process running accurately and efficiently. KVAL recommends using the tables below for reference to change or inspect the machine tooling. **Note:** Depending on Machine or Option, some of these tools may vary.



Prior to performing any maintenance, repairs, cleaning or when clearing jammed debris, you must disconnect, tagout, or lockout the electrical and air pressure systems. This should be done in accordance with applicable state and/or federal code requirements

Hinge Router and Pre-Drill Tooling	
Hinge Router Bit	1500 cycles
Chisels Inserts	1500 cycles
Chip-Out Block	10,000-20,000 cycles
9/64" Pre-Drill Bit	10,000-20,000 cycles
1/8" Pre-Drill Bit	10,000-20,000 cycles

Lock Section Tooling	
Face Plate Router Bit	2,500 cycles
2-1/8" Face Bore Bit	2,500 cycles
2-1/8" Face Bore Bit Inserts	2,500 cycles
Insert Scoring Spur for 2-1/8" Bit	2,500 cycles
Face Bore Chip-Out Block	2,500 cycles
1" Bolt Drill Bit	2,500 cycles

Screw Receiver and 6-Shooter Tooling	
Screwdriver Bits	1,500 cycles
Steel Rings	7,500 cycles
Rubber Rings	7,500 cycles
Screw Receivers	30,000 cycles
Split Shells	30,000 cycles
Springs	30,000 cycles

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## Maintenance NO-GOES

**Do not** perform the following. This machine is tuned and calibrated at the factory. If any of these conditions are changed, timing, accuracy, or **damage** may occur during the machine process.

- **Do not adjust air PSI above or below factory settings**
- Do not adjust any and all flow controls from factory settings
- Do not remove shim stock
- Do not Change or Alter any safety assemblies (E-Stops, Gate Locks, etc)
- Do not Change programs in PLC's or PC's
- Do not Alter Electrical Components

## Lubrication Schedule

KVAL recommends the following lubrication schedule to ensure that the machine operates properly.

**TABLE 2-1. Recommended Lubrication Schedule**

Type of Assembly	Recommended Schedule	Recommended Lubrication Type
Linear Bearing	Every 250 Hours of Machine Operation	Dura-Lith Grease (KVAL P/N Lube EP-2)
Pillow Block Bearing		
Idler Shaft		
Flange Block Bearing		
Ball Screw	Every 80 Hours of Machine Operation	
Tapered Bearing	One Pump 4 X a Year	
Air Line Lubricator	One drop of oil every 2 or 3 cycles Check the lines every week to two weeks Note: Some CNC Machines drop every 5-10 cycles.	Either lubricant listed below is approved to use. <ul style="list-style-type: none"> <li>• KVAL P/N SYSLUBG</li> <li>• Chevron AW Hydraulic Oil 32</li> <li>• G-C lubricants light AW R&amp;O</li> <li>• Mobile DTE 24</li> <li>• Shell Tellus32</li> <li>• Gulf Harmony 32</li> </ul>
Gear Box	Recommended not to Grease	<ul style="list-style-type: none"> <li>• AGMA #8 gear lube</li> <li>• MOBILUBE HD 80 W-90</li> <li>• or equivalent</li> </ul>

## Typical Lucubration Kit

KVAL Part Number: LUBEKIT



## Lubrication Requirements

**Note:** Refer to the machine service manual for lubrication points.

This section describes the parts of the machine that require periodic lubrication, and specifies the lubricants. In addition, it explains how to maintain the lubrication systems on the machine.

If the bearing is equipped with a grease fitting (Zerk Fitting).

The Zerk fitting is basically a valve that opens under pressure to allow lubricant to pass through a channel and be forced into the voids of the bearing. When the pressure stops, the ball returns to its closed position. The ball excludes dirt and functions as a check valve to prevent grease escaping back out of the fitting.

The ball is almost flush with the surface of the fitting so that it can be wiped clean to reduce the amount of debris carried with the grease into the bearing.

**Note:** Bearings without grease fittings have been pre-lubricated at the factory and do not require further lubrication.

**Note:** Make sure to clean excess grease to avoid contact with feed belts, clamping areas, or the door.



**Zerk Fitting**



## Pillow Block Bearing Housings

A pillow block is any mounted bearing where the mounted shaft is in a parallel plane to the mounting surface, and perpendicular to the center line of the mounting holes, as compared to different types of flange blocks or flange units. The type of rolling element defines the type of pillow block.

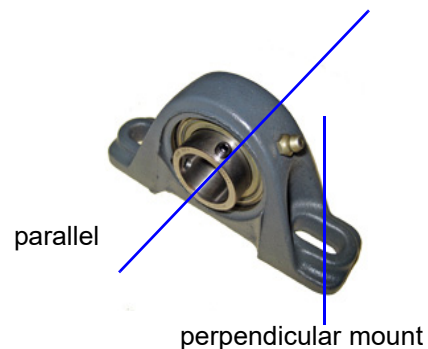
**Opened Pillow Block**



**Closed Pillow Block**



**Hub Style**



### Greasing

Approximately 1 Gram (one pump from grease gun) of Dura-Lith Grease (KVAL P/N: Lube EP-2).  
**Every 250 hours of operation.**

## Flange Bearing Housings

A flange bearing is designed to aid in mounting and positioning. The lip of the flange helps center and align the bearing.

Flanges are also used with bearings on external housings used to mount a bearing unit. A mounted bearing unit acts as a system to position the bearing securely for reliable operation.

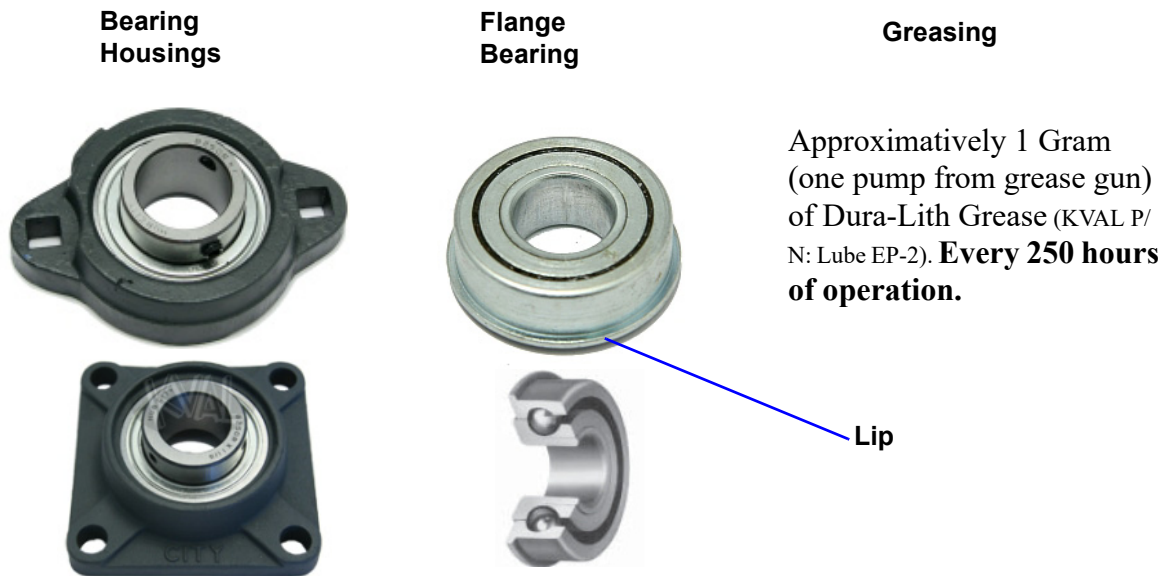


FIGURE 2-2. Flange Bearings

## Ball Rail Bearing

**Ball Rail Bearings** are linear bearings that are attached to positioning rails. In most cases, the bearings are attached to assemblies to move them in the X,Y, or Z direction.

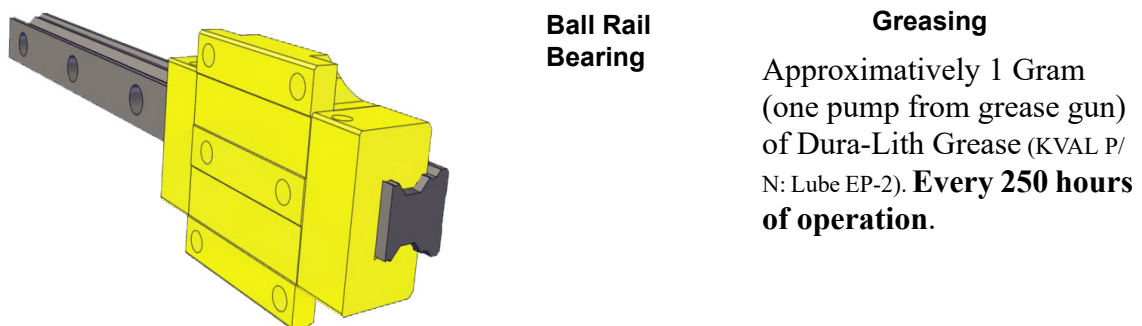


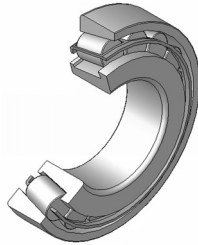
FIGURE 2-3. Ball Rail Bearings

## About Taper Bearings

Taper bearings are used for moving the axes of heavy loads with stability. The tapered roller bearing in combination with lubricants is extremely durable and is used in applications involving rotating axle and transmission shafts.

**Note:** Bearing durability is such an asset that the bearing blocks often require little maintenance for the life of the machine.

Cross Section of  
Tapered Bearing



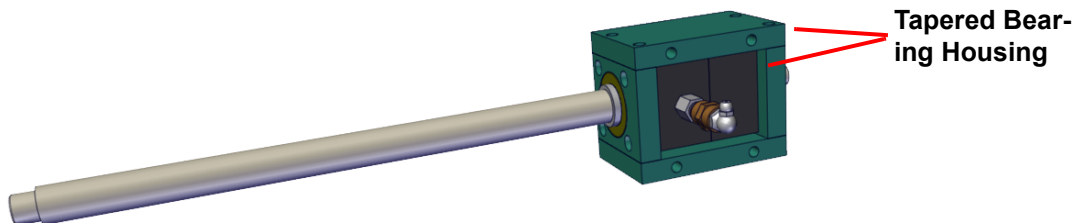
Greasing  
One pump 4 X a Year

Tapered Bearing

FIGURE 2-4. Sample of Tapered Bearing

## Tapered Bearing Housings

The taper bearings differ from other machine bearing assemblies, in that they are in a sealed environment. To identify a **Tapered Bearing Housing**, look at the enclosure and verify there are seals between the screw and the housing.



Tapered Bearing Seals

Approximatively 1 Gram (one pump from grease gun) of Dura-Lith Grease (KVAL P/N: Lube EP-2). **Once a Year.**

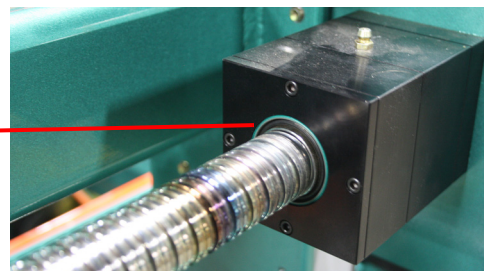


FIGURE 2-5. Tapered Bearing Housing

## Ball Screw Nut

The **Ball Screw Nut** is an assembly with recirculating ball bearings that interfaces with the ball screw. The ball screw drive and the ball screw nut create very low friction coefficients resulting in a smooth, accurate, efficient movement.

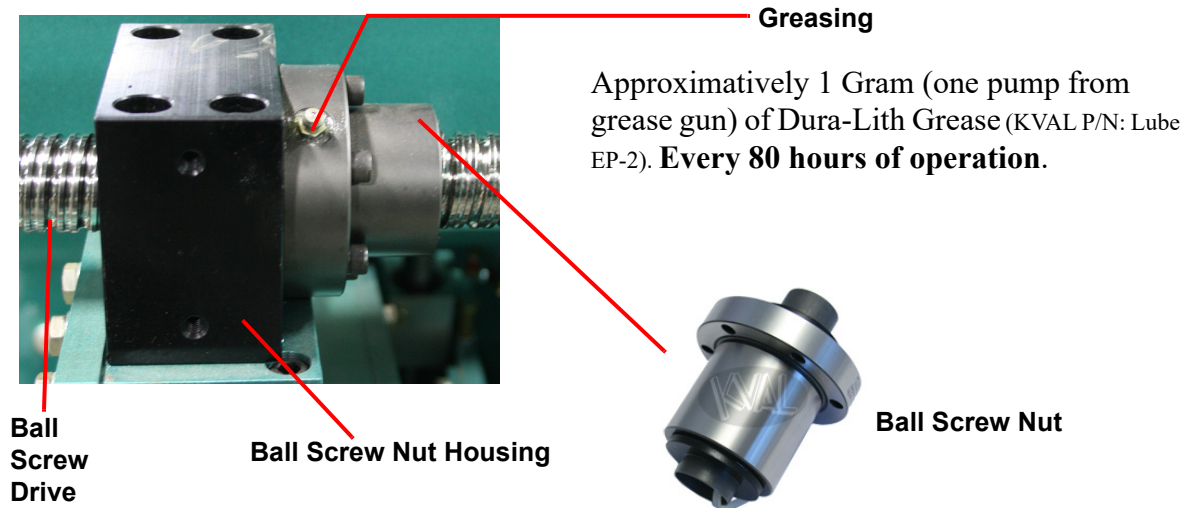


FIGURE 2-6. Example of a Typical Ball Nut

## Ball Screw Drive Assembly

Including the **Ball Screw Nut** other types of bearings may be included on the assembly. The figure below shows a typical **Ball Screw Drive Assembly**.

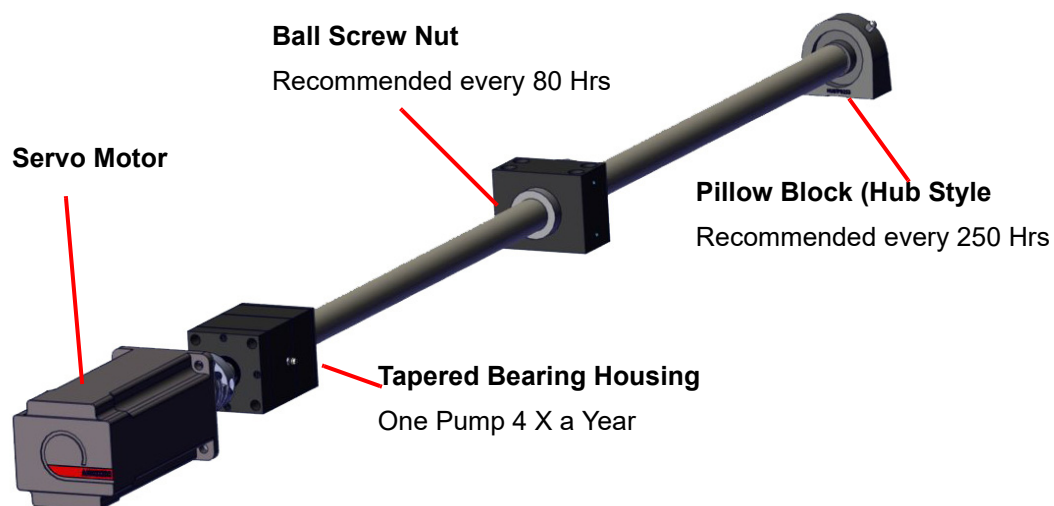


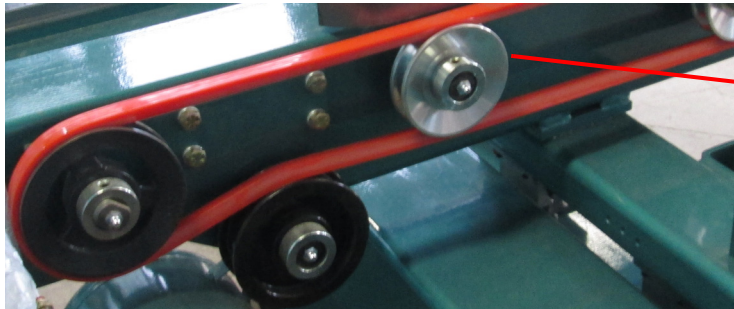
FIGURE 2-7. Ball Screw Drive Assembly



## Pulley and Idler Shafts

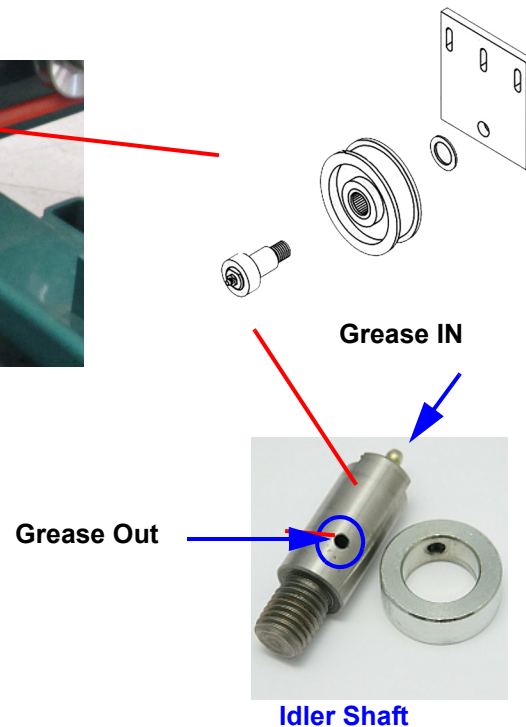
Transport systems on the machine contain pulleys and a belt to transport the door in and out of the machine. Each pulley contains an idler shaft that has a zerk fitting to apply grease. An opening in the idler shaft dispenses grease to the inner diameter of the pulley.

**Pulley in Action**



**Note:** It is important not to overfill the Idler Shaft. Avoid getting excess grease on the belts

**Breakout of Pulley Assembly**



**FIGURE 2. 8. Pulley Information**



## Description of Air Input System

There are two types of air inputs on KVAL machinery. Not all machines have lubricator option installed. Check your machine or Air prints to verify installation.

### Air Input with Lubrication

The air input system takes in shop air and supplies clean dry air (CDA) and lubricated air to the machine. The clean dry air is diverted to blow off nozzles. The lubricator, located after the CDA filters, delivers the lubricated air to valve banks and air cylinders.

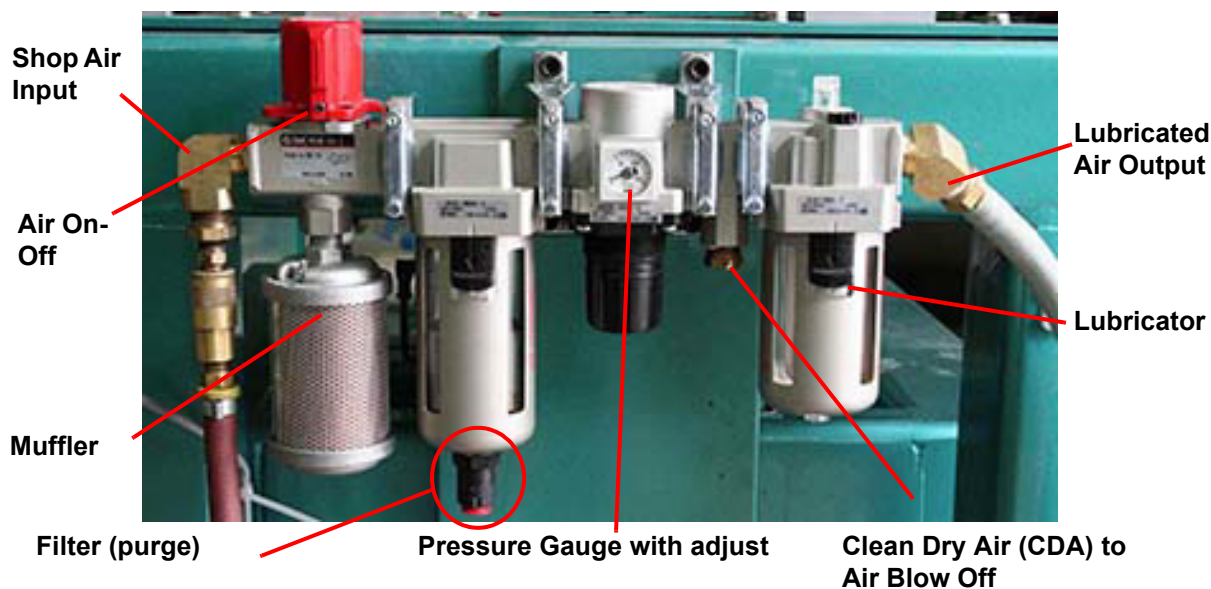


FIGURE 2-9. Typical Air Line Filter and Lubrication System

### Adjusting the Air Line Lubricator

Using the knob on the top of the lubricator, adjust until one drop per every other cycle is used (as observed through sight glass.)

(Sight Glass). When the oiler has run dry, open the knob all the way until flow begins. Once you have a steady flow, tighten knob back down until you have one drop per every other cycle.

Drop will form at end of cane shaped tube visible inside glass.

#### Top of Lubricator



## Priming the Air Line Lubricator

New and used machinery run out of oil from time to time. It is a good practice to check your machine lubricator to insure that it is putting the proper dose of oil in the air lines. Usually 1 drop of oil every other cycle is a good rule of thumb. The approved list of oil for lubricators is as follows:

- KVAL P/N SYSLUBG
- Chevron AW Hydraulic Oil 32
- G-C lubricants light AW R&O
- Mobile DTE 24
- Shell Tellus32
- Gulf Harmony 32

To prime the lubricator, find an air line on the carriage section of the machine that is energized, and disconnect it, allowing the air stream to bleed air pressure away from any persons. Direct the air stream at the machine so you can see when there is an oily film blowing out of the air hose. Repeat this same procedure for the back section and other trouble areas.

It is recommended to check the lines every week to two weeks.

## Air Line Without Lubricator

The air input system takes in shop air and supplies clean dry air (CDA).

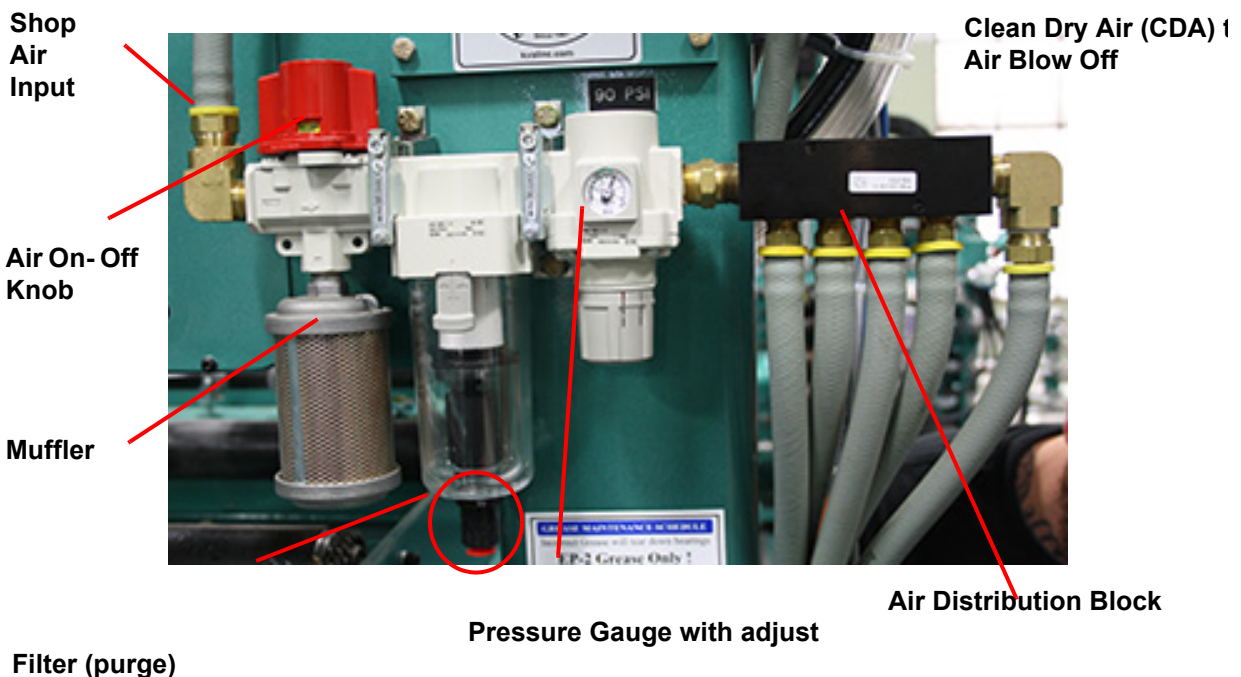


FIGURE 2-10. Air Filter without Lubricators

## Replacing Tooling in the Front Section

### Tool Locations in the Carriage Head (994-X)

#### Caution

This machine is a powerful electro-mechanical motion control system. If servicing this machine follow all safety guidelines Failure to do so can result in damage to equipment and/or serious injury to personnel.



This section describes the steps to change the pre-drill bits, router bits, and chisels in the heads on the front section., shows the locations of the replaceable parts inside the heads

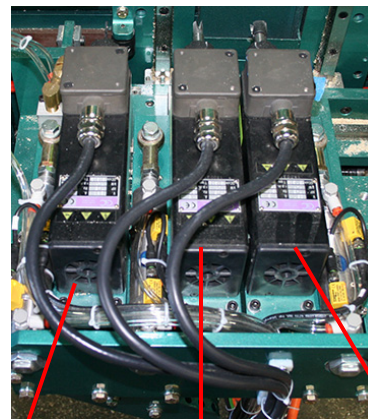
#### Standard



**Pre-Drill:**  
Drills pilot holes for insertion of screws on the jamb and the door

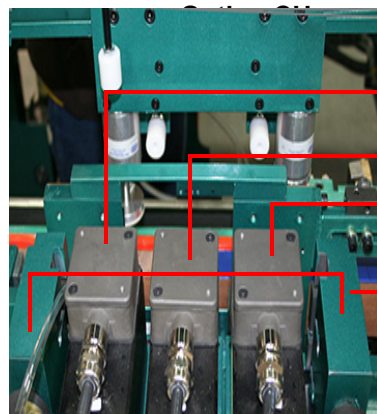
**Router:** Routes the hinge pocket on the jamb and the door

#### Option CR



**Counter Rotate Router:** Router minimizes chip outs on door and Jamb

**Router:** Standard



**Pre Drill:**

**Counter Rotate Router:**

**Router:** Standard

**Chisels:** Two chisels per assembly. Square off Jamb and Door hinge cuts.

FIGURE 2-11. Location of Bits in the 994-X Heads

## Replacing Bits in the Front Section (990-FX)

This section describes the steps to change the pre-drill bits, router bits, and chisels in the heads on the front section, shows the locations of the replaceable parts inside the heads

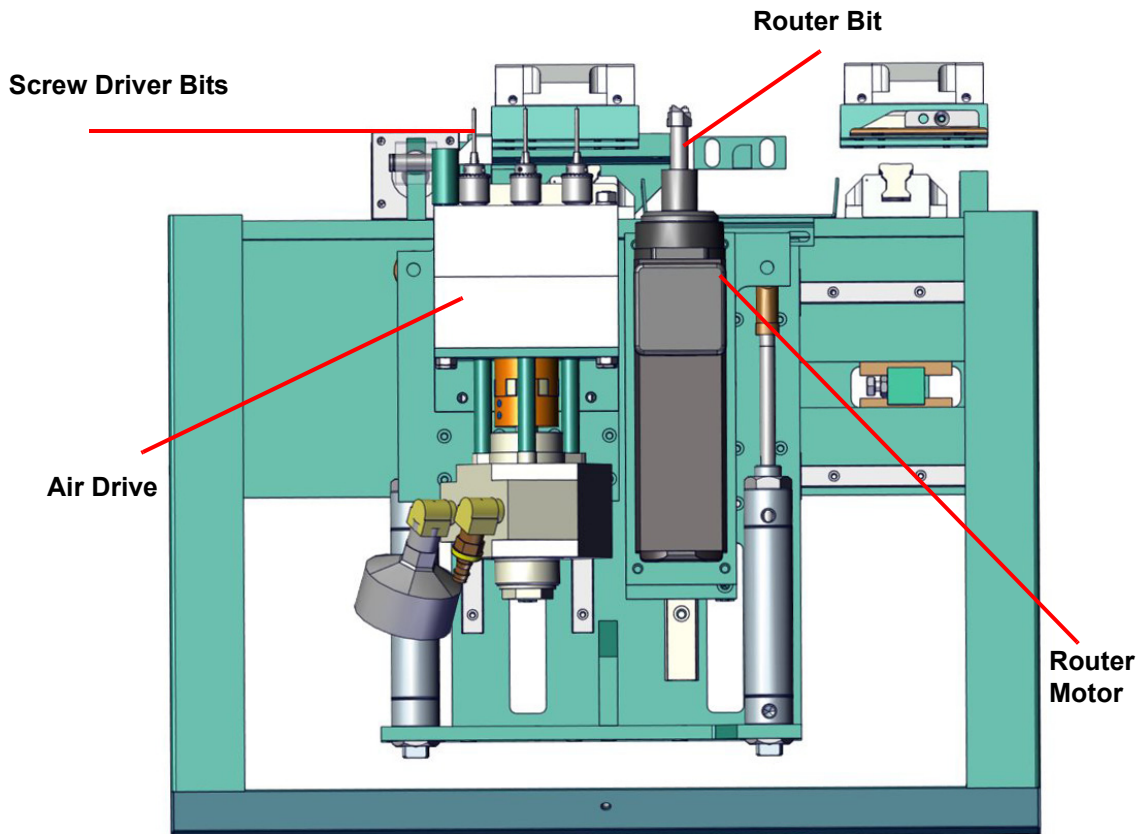
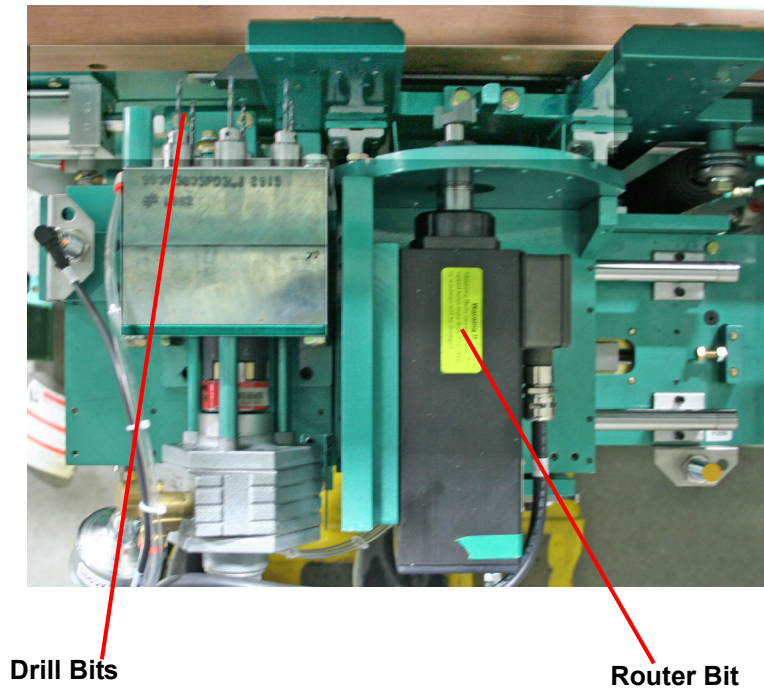


FIGURE2- 12. Location of Bits in the 990-FX Heads

## Tool Locations in the Carriage Head (990-F4/F3)

This section describes the steps to change the tooling in the Carriage Heads and the Six Shooter  
[The Figure below](#) shows the locations of the replaceable parts inside the carriage heads





**FIGURE 3. Location of Bits in the 990-F4 Heads**

---

### How to Access to Bit Assemblies

**Caution:** Before performing this process, turn off all power to the machine. Follow proper lockout/tagout procedures as detailed in the safety section of Chapter 1 of this manual.

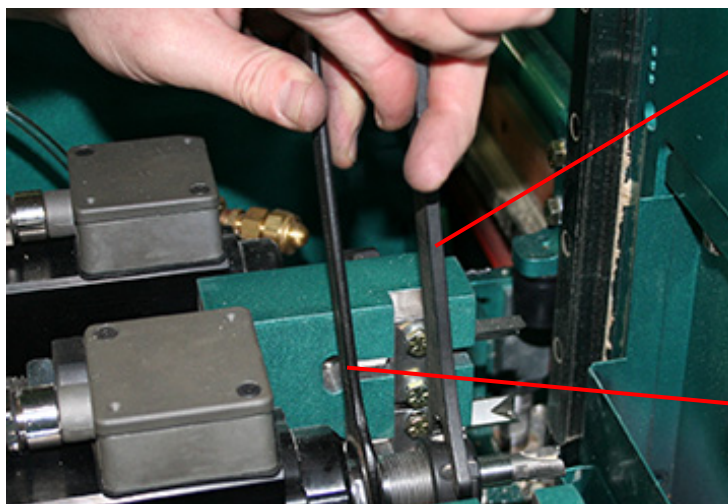
1. Shutdown the machine and follow the Lockout Tagout procedures.
2. Remove the screws from the Top Dust Cover.
3. Lift off the cover to access the assemblies.



### Remove and Replace the Router or Pre-Drill Bits (Point to Point)

**Caution:** Before performing this process, turn off all power to the machine. Follow proper lockout/tagout procedures as detailed in the safety section of Chapter 1 of this manual.

1. Use a 17 mm shaft wrench and a 3/8 "collet wrench to remove the bit on the pre-drill or router assemblies. See Figure below.



**3/ 8 "Collet Wrench  
(PN: PERER16W)**



**17 mm Shaft Wrench  
(PN: WRENCH17MM)**

**FIGURE 2. 1. Removing Pre-Drill or Router Bit.**

2. Inspect and clean collet assembly.

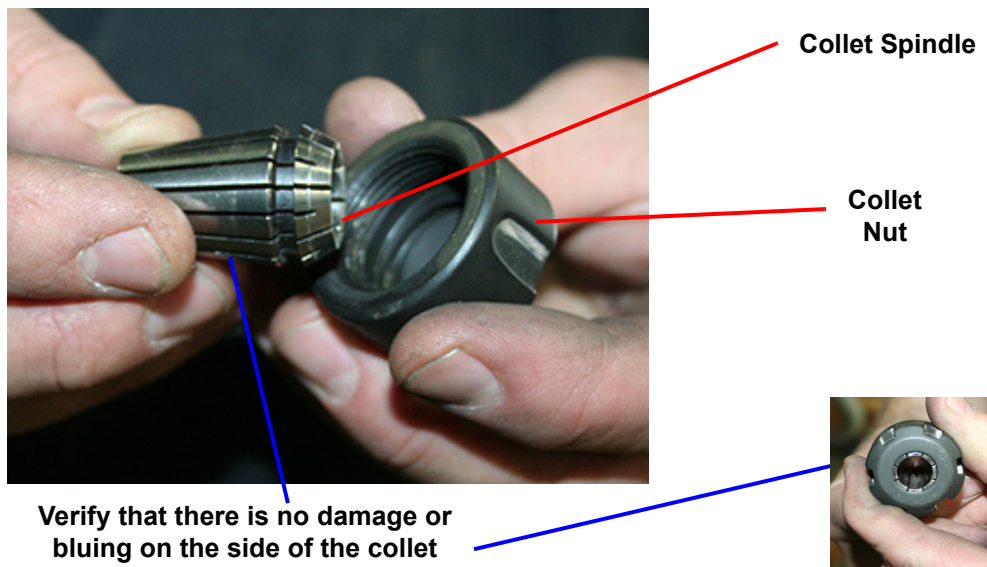


FIGURE 2.2. Collet Assembly

3. Lightly attach collet assembly on drill.
4. Insert the new bit into the assembly.
5. Before tightening the collet assembly, adjust the bit depth. Set the router bit to 1 3/4 " and the drill bit to 2.0" from the base of the collet nut to the tip of the bit. If available, use Bit Depth Gauge (PN 432 C) to set the depth.
6. Lightly tighten and torque to correct value. For torque values, [Collet Torque Values](#)

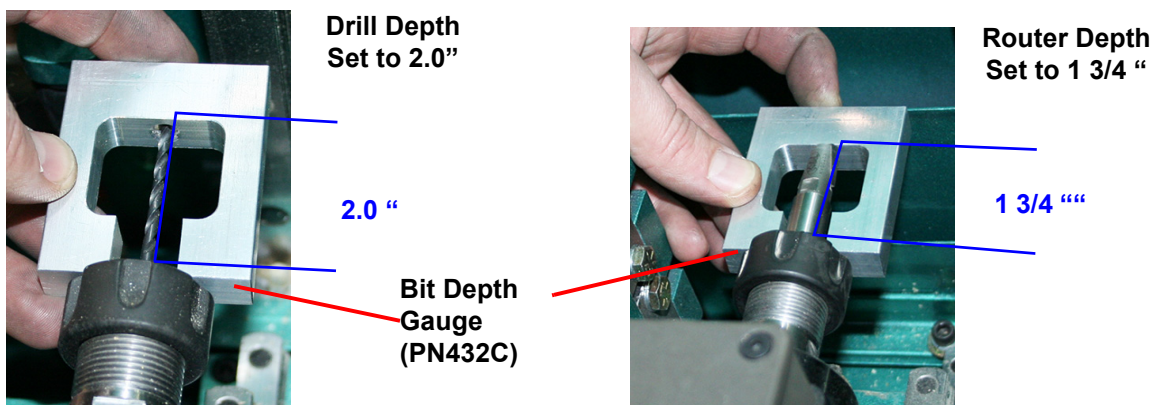


FIGURE 2.3. Setting the Bit Depths

7. Tighten the collet assembly.
8. Inspect and verify the work. Clean the work area.
9. If maintenance is completed, replace dust cover and tighten bolts.

## Remove and Replace the Chisels

After lockout tagout and access has been obtained to the assemblies, follow these instructions to remove and replace the chisels

1. Ensure air pressure is turned off and pull back the head to get better access to the chisel assemblies.
2. Use a 7/16 “wrench to loosen and remove the bracket bolts (2 per chisel) that secure the chisels.
3. Remove the bracket.

**Note:** The bracket has a tight tolerance and is a tight fit. You may have to use channel grips to remove the bracket.

4. Slide the old chisel out of the assembly. Note the orientation of the chisel

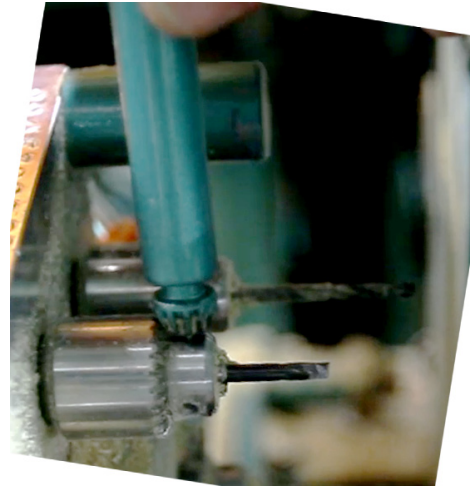
5. Replacing the Chisels

## Remove and Replace Pre-Drill Bits (Block)

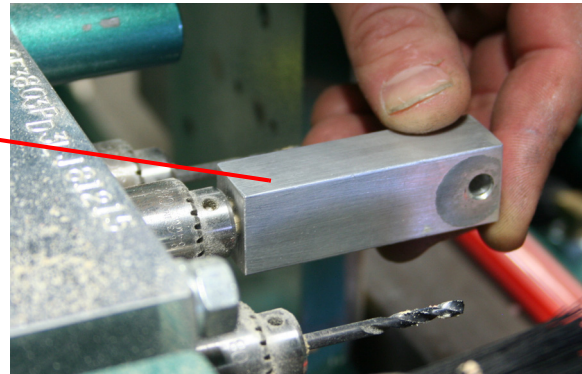
**Caution:** Before performing this process, turn off all power to the machine. Follow proper lockout/tagout procedures as detailed in the safety section of Chapter 1 of this manual.



1. Inspect pre-drill bits.
2. To remove bits, loosen chuck with chuck key (Extended Chuck Key PN:12-00-100 is pictured)
3. Remove damaged or worn bit.
4. Before tightening the chuck assembly, adjust the bit depth. Set the drill bit to 1-3/8" from the base of the chuck to the tip of the bit or use tool 12-00-ZA to set length. (See Figure below)
5. Tighten the chuck with the chuck key.
6. Inspect and verify the work. Clean the work area.
7. If maintenance is completed, replace dust cover and tighten bolts.



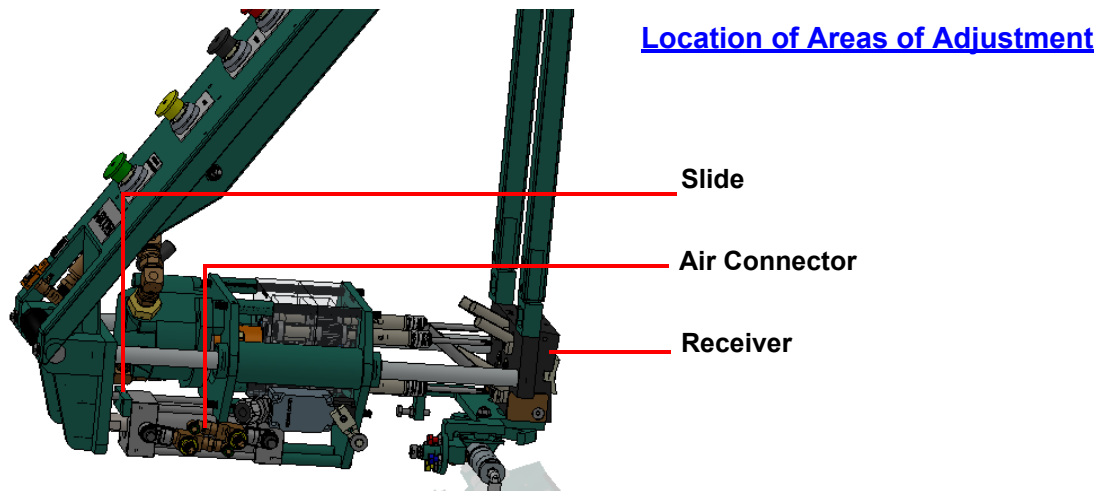
Tool 12-00-ZA. Sets length of Pre-drill Bit



## Remove and Replace the Screwdriver Bits

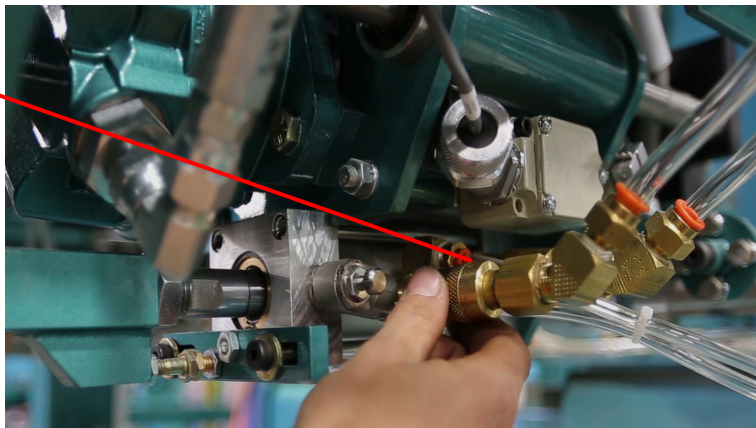
**Caution:** Before performing this process, turn off all power to the machine. Follow proper lockout/tagout procedures as detailed in the safety section of Chapter 1 of this manual.

## Adjust Six Shooter to Gain Access to Receiver Block



1. Disconnect air from Six-Shooter using the air-connect slide valves. Slowly slide the valves back toward you; listen for air to be released.

**Disconnect Air Connect  
to Bleed- Off Air**



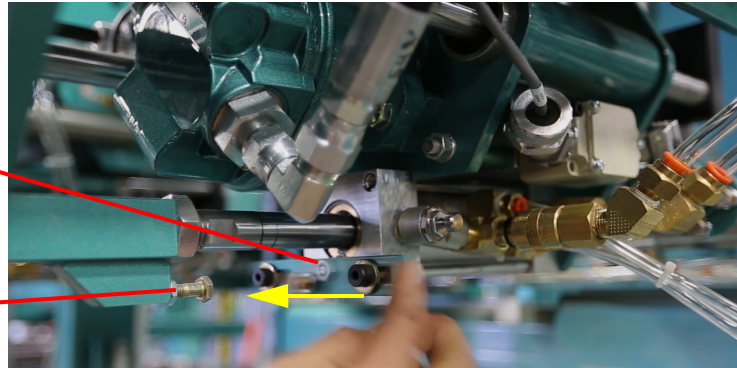
**FIGURE 2. 4. Disconnect Air**

2. Push the Six-Shooter assembly toward the machine-it will move slightly.
3. Locate the back slide near the air valves (see [Figure below](#)); push slide away from you. This bypasses the stop and allows for movement of the Six-Shooter assembly away from the machine

1st: Push the Six Shooter toward the Machine

2nd: Push the Slide away from your to bypass the stop

Stop



Machine

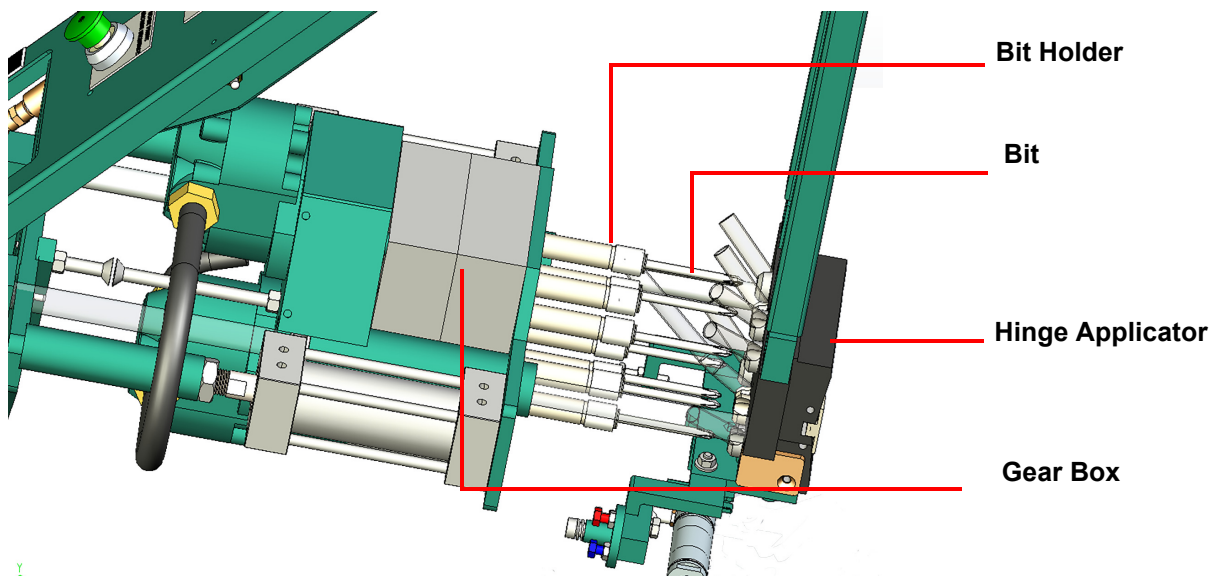
FIGURE 2. 5. Move Slide to Bypass Stop

4. After the slide is moved, **pull the Six-Shooter assembly away** from the machine-it will move about 1½ inch. This provides room for hands to access the screwdriver bit holders.

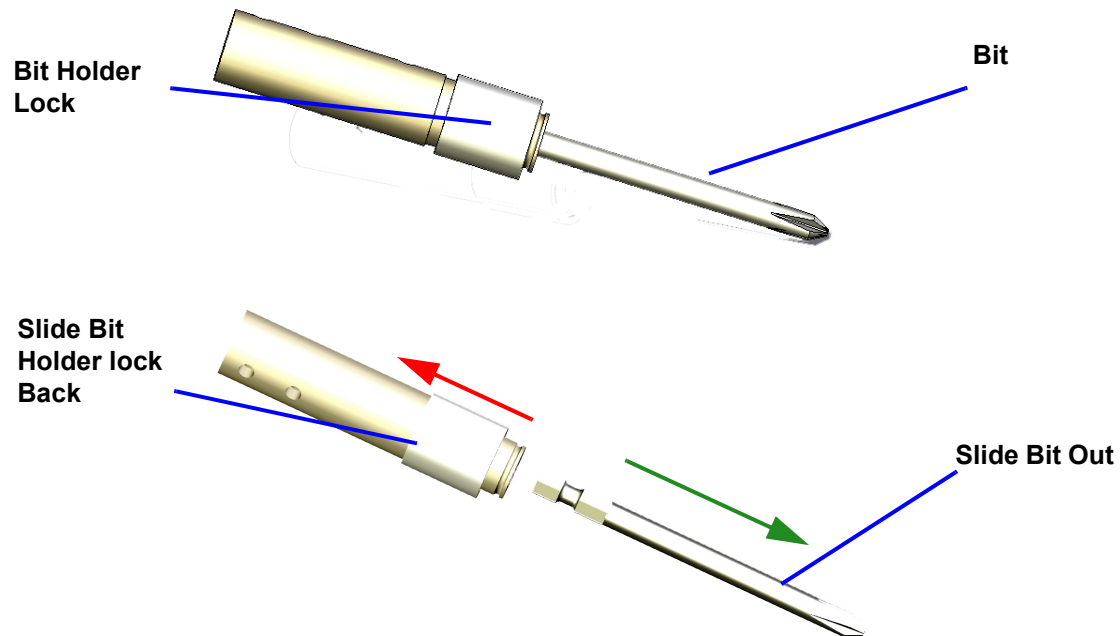
### Remove and Replace the Screw Driver Bits

5. To remove screwdriver bit, push the bit holder (see images) back toward the Six-Shooter assembly and hold: pull bit out of holder

### Location of Driver Bits



### Remove Driver Bits



6. To **insert screwdriver bit**, reverse step 5 above, push bit holder back toward Six-Shooter assembly and hold while inserting new bit. Release holder to secure bit.
7. Move Six-Shooter assembly back toward machine and pull the back slide toward you; then move assembly away from machine to restore assembly to original starting position

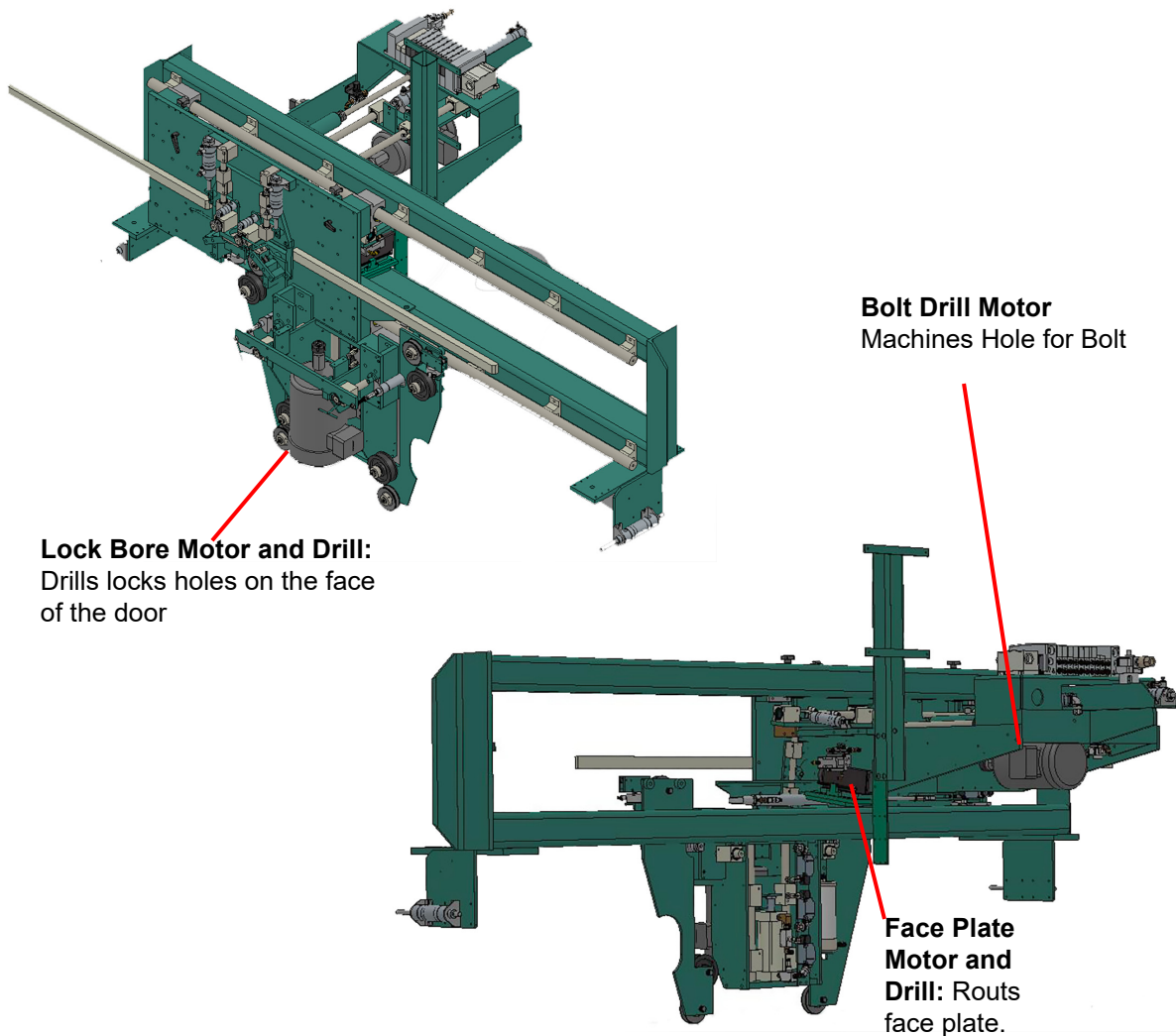
## Replacing Tooling in the Back Section

**Caution:** Before performing this process. Turn off all power to the machine. Follow proper lockout/tagout procedures as detailed in the safety section of Chapter 1 of this manual.

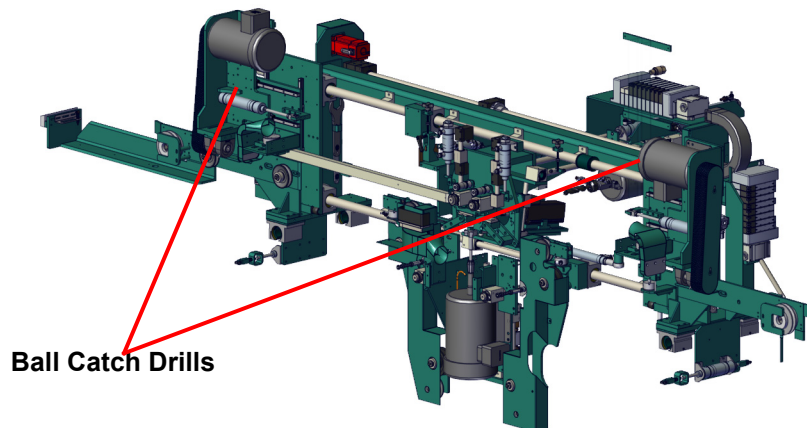
Follow the instructions in this section to change the bits on the Bore Drill, Bolt Drill, and the Face Plate Router.

**Caution:** Before performing this process. Turn off all power to the machine. Follow proper lockout/tagout procedures as detailed in the safety section of Chapter 1 of this manual.

Follow the instructions in this section to change the bits on the Bore Drill, Bolt Drill, and the Face Plate Router.





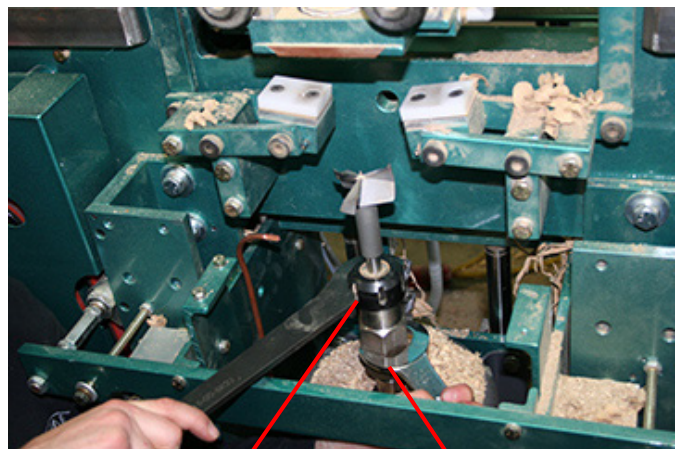


## Changing the Bore Drill

1. Remove Dust Collection Guard
2. Use the shaft wrench and collet wrench to remove the bit on the pre-drill or router assemblies. See photo.

When loosening the collet, it may tighten up, crack again and continue.

3. Inspect and clean collet assembly. .
4. Insert the new bit into the assembly.



Collet Wrench  
(PN: 15-00-ER32)

Shaft Wrench (1 5/8 ")  
(PN: WRENCH026)

5. Before tightening the collet assembly, adjust the bit depth. Bottom out the bit and pull the bit up about 1.4".
6. Lightly tighten and torque to correct value. For torque values, [Collet Torque Values](#)

**Note:** Make sure the arbor is not bottomed out in the back of the motor. If it is, the arbor will not tighten and will damage the collet or other machine parts.

**Note:** The figure shows the cover off for training purposes.



## Changing the Bolt Drill

**Caution:** Turn off all power to the machine. Follow proper lockout/tagout procedures as detailed in the safety section of Chapter 1 of this manual.

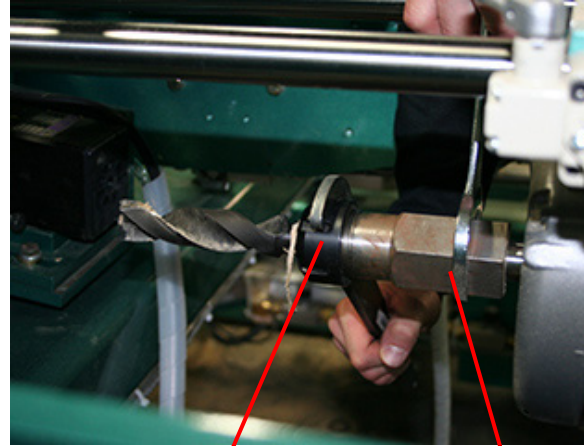
1. Use the shaft wrench and collet wrench to remove the bit on the pre-drill or router assemblies. See photo.

When loosening the collet, it may tighten up, crack again and continue.

2. Inspect and clean collet assembly.
3. Insert the new bit into the assembly.

**Collet Wrench**  
(PN: 15-00-ER32)

**Shaft Wrench (1 5/8 " )**  
(PN: WRENCH026)



4. Before tightening the collet assembly, adjust the bit depth. Bottom out the bit and pull the bit up about 1.4".
5. Lightly tighten and torque to correct value. For torque values, [Collet Torque Values](#)

**Note:** Make sure the arbor is not bottomed out in the back of the motor. If it is the arbor will not tighten and will damage the collet or other machine parts.

## Changing the Face Plate Router

[Remove and Replace the Router or Pre-Drill Bits \(Point to Point\)](#). The motor and bits are the same configuration.

## Collet Torque Values

KVAL recommends torquing the collets. Torquing adds consistency is important for repeatable machining. Follow the torque tool manufacturers method of torquing.

### Recommended Collet Torque Values

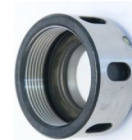


Perske Motor KVAL Part Number	Horse Power	Type Collet	Type Nut	Torque Value	Columbo KVAL Motor PartNumber	Horse Power	Type Collet	Type Nut	Torque Value
PERKNS21-05-2400	0.37	ER16	Mini	18 ft/lbs	COLS55E389-1.5	1.5	ER 20	Slotted	59 ft/lbs
PERKRS35.1-2D	1.00	ER20	Mini	20 ft/lbs	COLS73E478-3D	3.0	ER 25	Mini	25 ft/lbs
PERKRS35.5-2D	2.00	ER 20	Mini	20 ft/lbs	COLS90E810-7.5,D	7.5	ER-25	Slotted	77 ft/lbs
PERV503 – 3 HP	3.00	SOYUS 20	Hook	36 ft/lbs	GC90E1683-7.5D	7.5	ER 32	Slotted	100 ft/lbs
PERKRSV51.14-2D	7.00	SOYUS 25	Hook	90 ft/lbs	COLS116150-10,D	10.0	ER 40	Slotted	130 ft/lbs
<b>HSD Motor KVAL Part Number</b>	<b>Horse Power</b>	<b>Type Collet</b>	<b>Type Nut</b>	<b>Torque Value</b>	<b>COLS63F0020-11D</b>	<b>11.0</b>	<b>ER 40</b>	<b>Slotted</b>	<b>130 ft/lbs</b>
A6161H0824 – HSD Spin-die Motor	10.0	ER 32	Slotted	100 ft/lbs	COLS135501-12D	12.0	ER 40	Slotted	130 ft/lbs

Mini Nut and Torque Head Used



Hook Nut and Torque Head Used



Slotted Nut and Torque Head Used



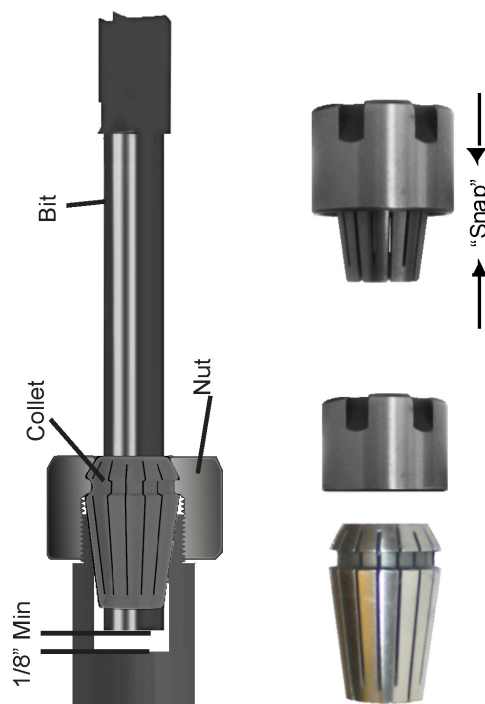
**EXCEED**

Exceeding the torque does not provide more clamping force; it just leads to runout. In fact, the more force is applied, the more the top of the collet wants to twist with the nut. Too much force can actually twist the collet's top, deforming the collet, which will increase runout and reduce clamping force.



## Tips

- *Never use a torque wrench to loosen bolts or nuts*
- *Always set the torque wrench to zero after using it.*
- *Ensure a minimum of 1/8" clearance from the end of the bit to the bottom of the tool holder.*
- *Periodically use compressed air to clean both the nut and collet*
- *Check the collet for bluing (Overheating) or damage. If it is damaged or over heated , re-place it.*
- *When inserting the collet into the nut , it should "SNAP" in to place.*









<http://www.kvalinc.com>



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or fax (707) 762-0485

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