

HOLE HAMMER

1.8" (45 mm), 2" (55 mm), 2-1/2" (65 mm), 3" (76 mm), 3-1/3" (85 mm)

Quarter-Turn Reverse Operator's and Maintenance Manual



VHH180/VHH180RT_VHH200/VHH200RT_VHH250/VHH250RT_VHH300/VHH300RT_VHH330/VHH330RT

VHH180/VHH180RT Serial No. 180001 -

VHH200/VHH200RT Serial No. 110001 -

VHH250/VHH250RT Serial No. 210001 -

VHH300/VHH300RT Serial No. 310001 -

VHH330/VHH330RT Serial No. 310001 -

Order No. 296379354

McLAUGHLIN®

Introduction

This manual explains the proper operation of your machine. Study and understand these instructions thoroughly before operating or maintaining the machine. Failure to do so could result in personal injury or equipment damage. Consult your McLaughlin dealer if you do not understand the instructions in this manual, or need additional information.

The instructions, illustrations, and specifications in this manual are based on the latest information available at time of publication. Your machine may have product improvements and features not yet contained in this manual.

McLaughlin reserves the right to make changes at any time without notice or obligation.

Operation and maintenance instructions are included in the Operator's Manual provided with the machine.

Additional copies of the manuals are available from your dealer. Use the reorder number on the front cover to order additional manuals.

NOTICE TO OWNER

You are requested to notify Vermeer Corporation when you have purchased a **used** machine. Notify the Customer Data Department by telephone: 800-829-0051 or 641-628-3141; email: customerdata@vermeer.com; internet: www.vermeer.com or www.vermeerag.com; or letter: Customer Data Dept., Vermeer Corporation, PO Box 200, Pella IA 50219 USA. Upon request, an owner of a used Vermeer machine will receive one free set of Operator's, Maintenance and Parts manuals.

TRADEMARKS

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MCLAUGHLIN and **HOLE HAMMER** are trademarks of McLaughlin Group, Inc.

LOCTITE is a trademark of Henkel Corporation.

McLAUGHLIN LIMITED WARRANTY

The Manufacturer warrants its product to be free from defects in material and workmanship for a period of twelve months from the date of shipment from the factory. The Manufacturer shall not be responsible for any damage resulting to or caused by its product by reason of installation, improper storage, unauthorized service, alteration of the products, neglect or abuse, or use of the product in a manner inconsistent with its design. If during the Warranty period, any product becomes defective by reason of material or workmanship, the buyer should immediately contact McLaughlin of such defect, McLaughlin shall, at its opinion, supply a replacement part or request the return of product back to its plant in Greenville, South Carolina. No part shall be returned to MCL without prior written authorization from MCL, and this warranty does not obligate MCL to bear any transportation charges in connection with the repair or replacement of defective parts. MCL will not accept ANY charges for labor and/or parts incidental to the removal or remounting of repaired or replaced under this warranty. MCL will only cover major product components i.e. Body Tube, Striker, Front and Rear Anvil. This does not include wear items, including but not limited to: Whip Hoses, Springs, Seals, Wear Rings, Bushings, etc.

The warranty does not extend to any component parts not manufactured by Manufacturer; however, Manufacturer's warranty herein shall not limit any warranties made by manufacturers of component parts which extend to Buyer.

Claims for defects in material and workmanship shall be made in writing to Manufacturer within ten days of discovery or defect. Manufacturer may either send a service representative or have the product returned to its factory at Buyer's expense for inspection. Upon notification of defect, Manufacturer will issue a return goods authorization number to Buyer. The return goods authorization number must accompany the product returned. If judged by Manufacturer to be defective in material or workmanship, the product will be replaced or repaired at the option of the Manufacturer, free from all charges except authorized transportation. Buyer shall be

responsible for all maintenance services consisting of lubrication and cleaning of equipment, replacing expendable parts, making minor adjustments and performing operation checks, all in accordance outlined in manufacturer's maintenance literature.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES AND NO REPRESENTATIONS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, (INCLUDING, BUT NOT LIMITED TO, A WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE) ARE MADE BY THE MANUFACTURER IN CONNECTION WITH THE MANUFACTURE OR SALE OF ITS PRODUCTS. NO EMPLOYEE, DISTRIBUTOR, OR REPRESENTATIVE IS AUTHORIZED TO CHANGE THIS WARRANTY IN ANY WAY OR GRANT ANY OTHER WARRANTY ON BEHALF OF MANUFACTURER.

THE REMEDIES OF BUYER SET FORTH HEREIN ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER REMEDIES. THE LIABILITY OF MANUFACTURER WHETHER IN CONTRACT, TORT, UNDER ANY WARRANTY, OR OTHERWISE SHALL NOT EXTEND BEYOND ITS OBLIGATION TO REPAIR OR REPLACE, AT ITS OPTION, ANY PRODUCT OR PART FOUND BY MANUFACTURER TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP. MANUFACTURER SHALL NOT BE LIABLE FOR COST OF INSTALLATION AND/OR REMOVAL OR BE RESPONSIBLE FOR DIRECT, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE.

FOR SERVICE OR ASSISTANCE, SEE THE AUTHORIZED McLAUGHLIN DEALER IN YOUR AREA, OR CALL TOLL- FREE 800/435-9340

Model No. _____ Ser. No. _____

Purchased From _____

Date of Purchase _____



2006 Perimeter Rd., Greenville, SC 29605
864/277-5870 Worldwide
Telefax 864/235-9661

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Receiving and Delivery Report

DEALER PREP

Check or perform the following:

- ___ Check for unwanted material around the hose connections at the tool and exhaust ports, in the hose, and around the hose coupler.
- ___ Check forward and reverse valve for correct function.
- ___ Check that internal striker slides freely by lifting nose or tail by at least 22°.
- ___ Check condition of safety signs and decals.

DELIVERY

Review and demonstrate with the customer the various aspects of the piercing tool:

- ___ overall explanation of how the tool works
- ___ tool safety
- ___ preparing the tool for operation
- ___ Complete “Identification Numbers - Record,” [page iii](#).

DEALER/OWNER INFORMATION

dealer

address

city

state / province

zip / postal code

country

phone number

email address

owner

address

city

state / province

zip / postal code

country

phone number

email address

IDENTIFICATION NUMBERS - RECORD

Machine Model Number _____

Machine Serial Number _____

Located on rear lip of tool body and along outer tool body



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Section 10: Safety Messages

General safety messages appear in this Safety Messages section. Specific safety messages are located in appropriate sections of the manual where a potential hazard may occur if the instructions or procedures are not followed.

A signal word “**DANGER**”, “**WARNING**”, or “**CAUTION**” is used with the safety alert symbol.

Safety signs with signal word “**DANGER**”, “**WARNING**”, or “**CAUTION**” are located near specific hazards.

DANGER Indicates a hazardous situation that, if not avoided, will result in death or serious injury.

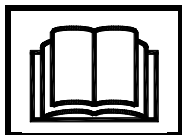
WARNING Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

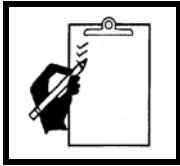
SAFETY SYMBOL EXPLANATION



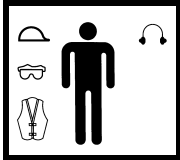
This is the safety alert symbol. This symbol is used in combination with an exclamation mark or other symbols to alert you to the potential for bodily injury or death.



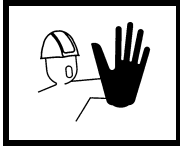
WARNING: Read Operator’s Manual and safety signs before operating machine.



WARNING: Check tool before operating. Tool must be in good operating condition and all safety equipment installed and functioning properly.



WARNING: Wear personal protective equipment. Dress properly. Refer to “Personal Protection,” [page 30-3](#).



WARNING: Keep spectators away.



WARNING: Failure to follow any of the preceding safety instructions or those that follow within this manual, could result in serious injury or death. This machine is to be used only for those purposes for which it was intended as explained in this Operator’s Manual.

Section 15: Intended Use

The McLaughlin Hole Hammer is designed solely for use in creating horizontal holes through the earth. Utilities are typically installed in these underground holes.

Always use the Hole Hammer in accordance with the instructions contained in this Operator's Manual, safety signs on the tool, and other material provided by Vermeer Corporation.

Correct maintenance and repair is essential for safety, and for efficient operation of the tool. Do not use the tool if it is not in suitable operating condition.

HOW THE TOOL WORKS

The tools use pneumatic power to drive the striker inside the tool forward at a very high velocity. The striker then impacts the anvil at the front of the tool, driving the tool forward into the soil.

As the striker travels forward, ports in the rear of the striker pass by the valve, opening an air passage to the front of the tool. This allows the air to be redirected and push the striker toward the rear of the tool.

Before the striker has a chance to hit the rear anvil, the striker passes the ports again and redirects the air, forcing the striker forward again.

When the tool is placed into reverse, the valve timing is changed so that the forward stroke of the striker becomes shorter and the reverse stroke becomes longer. This allows the striker to impact the rear anvil, not the front anvil, propelling the tool in the reverse direction.

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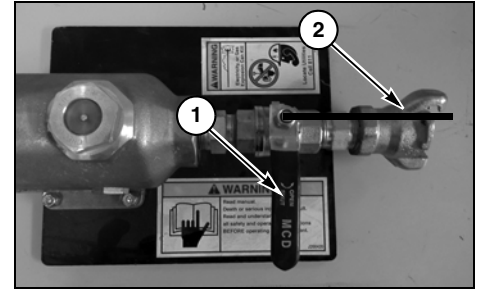
Section 20: Machine Controls

A representative oiler is shown. Oiler is supplied by customer and style may vary. Oiler instructions included in this manual represent typical operation. Refer to operating instructions supplied by oiler manufacturer for more detail.

AIR VALVE

- (1) Perpendicular to valve body (shown) off
- (2) Parallel to valve body. on

Tool speed is variable; the farther the handle is turned toward (2), the faster the speed.



TOOL OILER

During operation, the oiler unit continuously lubricates the air-powered tool.

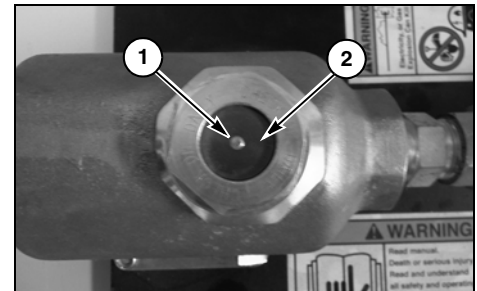
NOTICE: When operating tool for the first time, add 1/2 oz (15 ml) of oil directly to the tool whip hose to provide lubrication during start-up.

Pressure Relief

Press red pressure relief button (1) in fill plug (2) to relieve pressure.

Relieve pressure from oiler:

- at the end of each use. High-pressure air, trapped inside oiler, will force remaining oil into air line.
- before adding oil to reservoir
- before disconnecting hoses



Oil - Check and Add

Step 1: Turn off air supply.

Step 2: Relieve air pressure.

Step 3: Remove fill plug (2) and check/add oil. Refer to “Lubricants,” [page 70-1](#).

Oiler - Adjust

Screw (3) controls the amount of oil supplied to the tool. Remove the fill plug and use a screwdriver to adjust the screw between 0 and 9.

“0” lowest rate

“4” lowest recommended rate

“9” highest rate

Adjustments are made due to changes in the air pressure and oil viscosity.

To adjust:

Step 1: Turn off air supply.

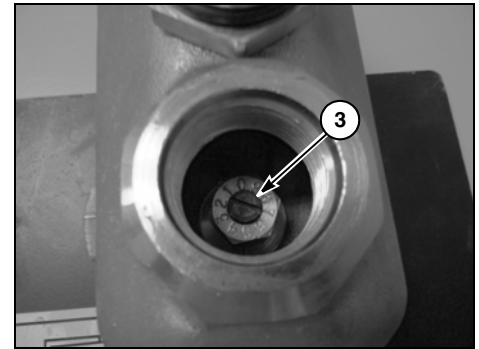
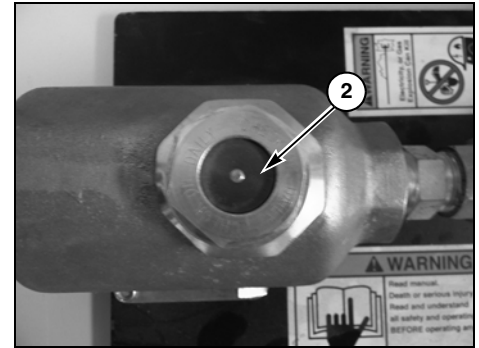
Step 2: Relieve air pressure.

Step 3: Remove fill plug (2) and turn adjustment screw (3) with a screwdriver.

Fill to cover the adjustment screw but leave an air space to allow for oil flow.

Start on “9” and lower the setting until 1–2 oz (30–60 ml) of oil per hour is supplied to the tool. At this setting, add oil every 3 to 4 hours, depending on the capacity of the oiler.

NOTICE: It may take up to an hour before a setting change is noticed in the tool.



NOTICE: The adjustment screw has been set at the factory to a level 4. To reset oiler, turn adjustment screw clockwise to reduce the flow rate. Turn counterclockwise to increase flow rate. Use the following chart to set the appropriate flow rate for each corresponding tool.

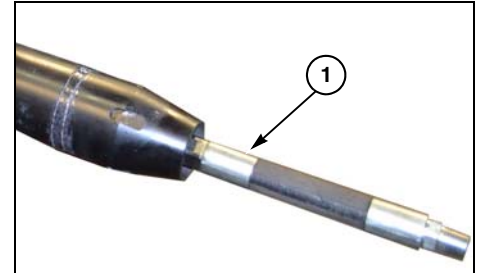
Tool Size	Oiler Setting
1.8"	3
2"	3
2-1/2"	4
3"	4
3-1/2"	4

REAR WHIP HOSE

Rotating the whip hose (1) a quarter counterclockwise turn controls which direction the tool travels.

Hose pushed into the tool forward travel

Hose pulled out of the tool reverse travel



LEVEL

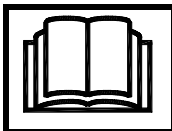
Use a level to set the boring angle of the tool.

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Section 30: Preparing the Machine and Work Area

Preparing Personnel

OPERATOR QUALIFICATIONS



WARNING: Read Operator's Manual and safety signs before operating machine.

Allow only responsible, correctly instructed individuals to operate machine.

Become familiar with the controls, operation, and use of the machine under the supervision of a trained and experienced operator.

The operator must be familiar with the workplace's safety rules and regulations, and must be mentally and physically capable of operating the machine safely.

Safety Conscious Operators and Workers

Operators and workers should exercise reasonable accident-prevention measures.

TRAINING

Before operating the tool, the operator and crew should be trained in the operation of the tool. Initial training should cover the following:

- all sections of this manual
- jobsite safety, including safety barriers and protective clothing, as well as operating and emergency procedures
- two-way radio communication
- setup of the tool
- operation of the tool

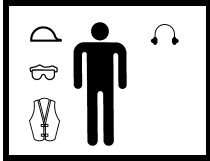
WARNING SAFETY SIGNS AND OPERATING INSTRUCTIONS

Warning safety signs and operating instructions provide information on potential safety hazards and safe operating instructions.

HANDLING THE HOLE HAMMER

To prevent back injury, use correct lifting technique. Lift with your legs, not your back. Use an appropriate lifting device when necessary. See “Tool Specifications” for tool weights. Refer to [page 70-2](#).

PERSONAL PROTECTION



WARNING: Wear personal protective equipment. To reduce the risk of being caught and entangled in moving components wear close-fitting clothing and confine long hair. Avoid jewelry, such as rings, wristwatches, necklaces, or bracelets.

Operating the machine will require you to wear protective equipment. Always wear a hard hat and wrap-around eye protection or goggles. If working near traffic, you may need to wear reflective clothing.

Hearing protection must be worn by machine operator. Other crew members may need to wear hearing protection when working close to the machine and/or support equipment

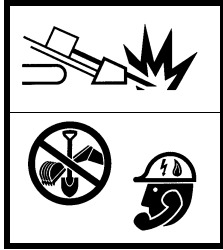
Eye protection must consist of wrap-around safety glasses or goggles.

Other workers in the immediate area must also wear hard hats and eye protection.

Wear close-fitting clothing and confine long hair.

Do not wear jewelry, such as rings, wristwatches, necklaces, or bracelets.

UNDERGROUND UTILITY CONTACT



WARNING: Electricity or gas explosion can kill. Laser light in cut cable can result in eye damage.

Locate utilities before drilling. Call 811 (U.S. only) or 1-888-258-0808 (U.S. or Canada) or local utility companies or national regulating authority.

Before you start any digging project, do not forget to call the local One-Call system in your area and any utility company that does not subscribe to the One-Call system. For areas not represented by One-Call systems International, contact the appropriate utility companies or national regulating authority to locate and mark the underground installations. If you do not call, you may have an accident or suffer injuries; cause interruption of services; damage the environment; or, experience job delays.

The One-Call representative will notify participating utility companies of your proposed digging activities. Utilities will then mark their underground facilities by using the following international marking codes:

Red	Electric	Green/Brown	Sewer
Yellow	Gas, Oil or Petroleum	White	Proposed Excavation
Orange	Communication, Telephone, TV	Pink	Surveying
Blue	Potable Water		

OSHA CFR 29 1926.651 requires that the estimated location of underground utilities be determined before beginning the excavation or underground drilling operation. When the actual excavation or bore approaches an estimated utility location, the exact location of the underground installation must be determined by a safe, acceptable and dependable method. If the utility cannot be precisely located, it must be shut off by the utility company.

JOBSITE ASSESSMENT

Examine work area for obstructions, conditions, or situations which may impair machine operation or create a safety hazard for the operator or other persons. Use information in this manual combined with your own good judgment when identifying these hazards and implementing hazard prevention measures.

LAWS AND REGULATIONS - CHECK

Know and obey all federal, state, and local laws and regulations that apply to your work situation.

CHECK HARDWARE

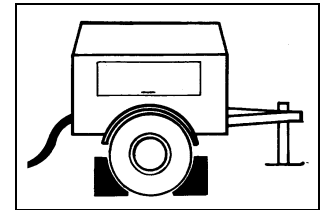
Ensure all air line couplings are tightened and secured to eliminate the chance of accidental uncoupling. Use hose connection retaining devices such as locking rings, clips, pins, chains, or cables.

Check the tightness of the tailcone bolts before use. Refer to “Maintenance,” [page 50-1](#).

CHECK AIR COMPRESSOR

Be sure the air compressor is securely parked at a safe distance from the excavation pit to prevent pit cave-in. Chock the wheels to prevent the compressor from rolling or falling into the pit.

Maximum air pressure that can be delivered to the tool is 110 psi (760 kPa). Do not exceed this pressure or damage to the tool or personal injury may result.



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Section 40: Operation

PRECAUTIONS DURING OPERATION

Two people are required to operate the tool. One person should always be outside the excavation pit and in control of the air supply to the tool in case of an emergency. The tool operator must monitor the tool to be sure that the air hose does not cause an unsafe condition around the pit.

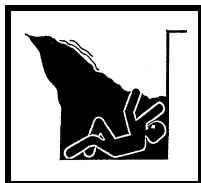
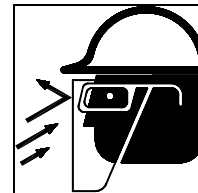
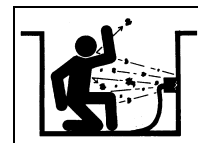
Eye protection is necessary when using the Hole Hammer. Avoid looking into the bore hole while the tool is in use. High pressure exhaust can eject dirt, stones, or other materials. Be careful when blowing out the hose. Aim the hose away from yourself and other persons.

If the tool operates but does not move forward, turn off the air supply. Ensure the tool is not in contact with a gas line, water line, electrical line, or some other underground obstruction that can be damaged or cause personal injury.

Do not override any safety controls on the tool or any support machinery.

Shut down the unit at the first sign of malfunction or hazardous condition.

Do not disconnect the air supply without first shutting off the air valve. Serious injury may result from the air under high pressure or from uncontrolled hose movement.



WARNING: Do not work in excavation with unstable sides which could cave in. Specific requirements for shoring or sloping trench walls are available from several sources, including national and other governing authorities. Be sure to contact suitable authorities for these requirements before working in the excavation.

ENTRY AND EXIT PITS

The depth of the entry pit should be approximately 10 times the tool diameter.

The pit should be long enough to prevent the service line from kinking during launch.

Dig exit pit with extra width and depth to allow for possible tool misalignment.

PREPARING TO BORE

Step 1: Determine length of the bore.

Step 2: Starting at the tool, wrap tape over the hose every 3–6 ft (1–2 m). Do this for the length of the bore.

While boring, keep track of the increments to determine the location of the tool.

Keeping track of the time will also enable you to determine how fast the tool is moving.

Step 3: Place tool at the entry pit and aim it toward the exit pit. Place the level on the straight surface of the tool. Use a support under the tool to keep the tool aligned.

Consider the type of soil when aligning the tool. Some soils, such as topsoil and sand, cause a tool to rise.

Pitching the nose of the tool slightly downward provides a more accurate bore. The amount of downward pitch required depends upon the soil type and length of the bore.

NOTICE: Do not allow dirt or other material into the air hose.

Step 4: Connect hose to a compressed air supply.

Step 5: Remove any oil or debris that may make the hose slippery.



WARNING: To prevent the hose from whipping, do not fully open the compressor valve. Be sure to aim the hose away from yourself and other persons.

Step 6: Hold the other end of the hose tightly and partially open the compressor valve to blow the air hose clean.

- Step 7: Close compressor valve.
- Step 8: Ensure whip hose is in FORWARD and rotated completely clockwise.
- Step 9: Ensure air valve control handle is OFF.
- Step 10: Fill oiler with Vermeer Hole Hammer Oil. Refer to “Tool Oiler,” [page 20-1](#).
- Step 11: Connect air supply hose to the oiler and the supply hose to the tool.

To avoid accidental uncoupling:

- Tighten all hose locking collars against fittings
- or
- Install any hose fitting retaining device, such as locking ring, clip, pin, chain, or cable.

BORING

Step 1: Fully open the air supply valve to start the striker motion. Do this quickly, then slow it down. This starts the bore more easily.

Launching the tool with reduced power provides time for the operator to accurately aim the tool.

Step 2: Stop tool periodically as it enters the ground. Use bubble level to check angle and aim. Adjust the direction of the tool by pushing or pulling the tool body.

Step 3: When the tool comes near the exit pit, decrease tool speed by adjusting air flow at the oiler.

Step 4: When the tool is inside the pit, shut tool OFF and remove.

If tool does not reach exit pit at length marked off on air hose:

Step 5: Decrease tool speed at the oiler so that forward motion is stopped, but tool is still operating.

Step 6: Locate tool by sound and vibration.

AFTER THE BORE

Disconnect the air hose from the tool and remove the tool from the exit pit. Install a cap on the inlet fitting, or cover it with tape to prevent dirt and sand from entering the tool.

REVERSING DIRECTION

Reverse direction of the tool if it becomes stuck or is deflected off course.

Step 1: Turn the whip hose 1/4 turn to the left/counterclockwise, with the air on. Tool automatically shifts to reverse.

Step 2: Continue to pull on the air supply hose as the tool is reversing. This prevents the tool from backing over the air supply hose.

Step 3: To return to forward direction, stop air flow, then turn air hose to the left/counterclockwise. A gentle push forward on the hose may be needed to shift into forward gear. Once hose has moved forward, allow hose to roll back to the right/clockwise.

NOTICE: Use extra care when using the tool in unstable soils, gravel, sand, or under trees. Use the tool cable in these conditions, because a tunnel may collapse or the tool may oscillate.

Section 50: Maintenance

DURING SERVICE

NOTICE: Shut off the air supply valve and disconnect the air line before servicing the tool.

- Read and obey the maintenance instructions in this section before servicing the tool.
- Use only authorized parts for repair or replacement. These replacement parts, including bolts, are specified in the [Parts Manual](#).
- Check the air supply hose periodically for damage to the hose or fittings. Never use the tool with damaged or worn air lines or fittings.
- Check and tighten loose hose clamps and clamp bolts regularly.

NOTICE: Do not use a torch or welder on the tool. Applying heat may damage important parts of the tool. Heat may change the component's strength and result in premature failure or personal injury.

- When the tailcone and rear anvil are removed, be careful when elevating the front of the tool. The heavy striker inside the tool body may slide out.

SAFETY SIGNS MAINTENANCE

Safety signs located on your machine contain important and useful information that help you operate your equipment safely and correctly. Refer to the [Parts Manual](#) for identification and location of safety signs.

To ensure that all safety signs remain in place and in good condition, use these instructions:

- Keep safety signs clean. Use soap and water - not mineral spirits, abrasive cleaners, or other similar cleaners that will damage the sign.
- Replace damaged or missing safety signs. When attaching safety signs, the temperature of the mounting surface must be at least 40°F (5°C). The mounting surface must be clean and dry.
- When replacing a machine component with a safety sign attached, replace the safety sign also.

Replacement safety signs can be purchased from your Vermeer equipment dealer.

After First 30 Service Hours

STRIKER AND VALVE WEAR RINGS - CHECK

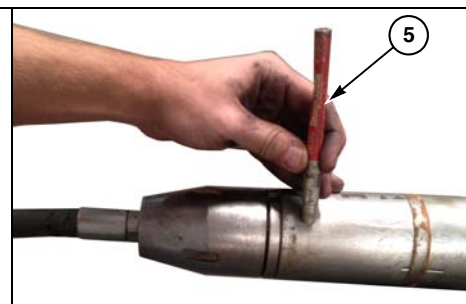
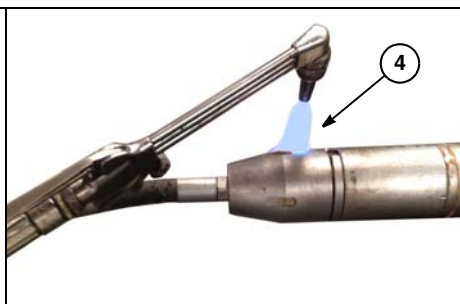
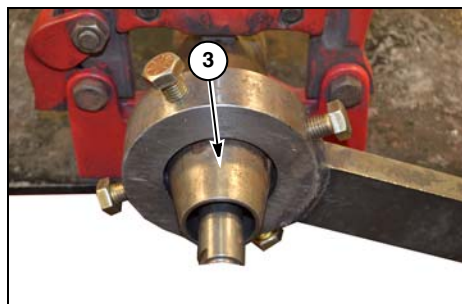
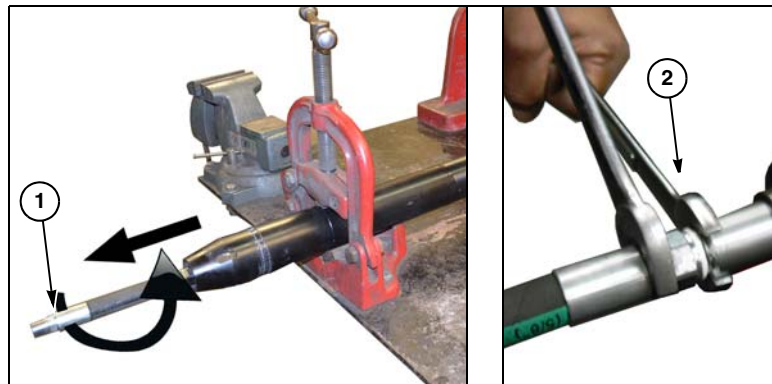
Instructions for checking the wear rings are included on the next pages.

Every 150 Service Hours or Yearly

REAR DISASSEMBLY

- Step 1:** Secure tool in a vise.
- Step 2:** Shift tool into reverse(1), and remove tail hose using two wrenches (2).
- Step 3:** Use factory wrench to remove tailcone (3).
Apply heat (4) to the tailcone if necessary. Use a heat/temperature stick (5) to monitor temperature.

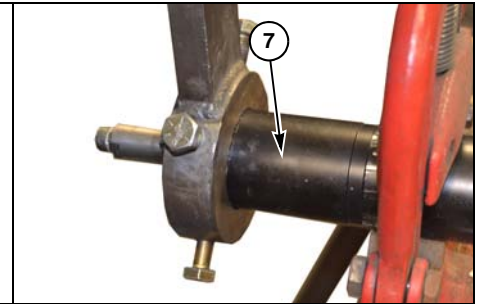
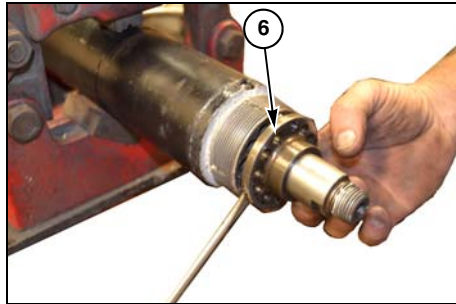
NOTICE: It is **CRUCIAL** to avoid overheating the tool. DO NOT heat to more than 400°F (204°C) to preserve tool integrity.



Step 4: Use a screwdriver to gently separate and remove intermediate spacer (6).

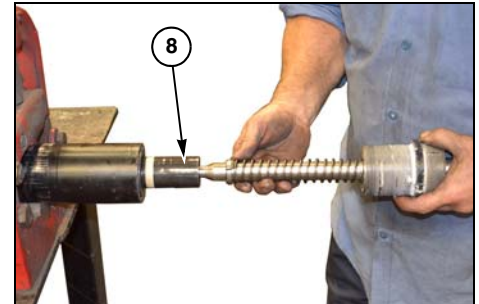
Step 5: Use a factory wrench to remove rear anvil assembly (7).

Apply heat to the rear anvil if necessary. Use a heat/temperature stick to monitor temperature.



NOTICE: Use a heat/temperature stick to monitor temperature. It is **CRUCIAL** to avoid overheating the tool. **DO NOT** heat to more than 400°F (204°C) to preserve tool integrity.

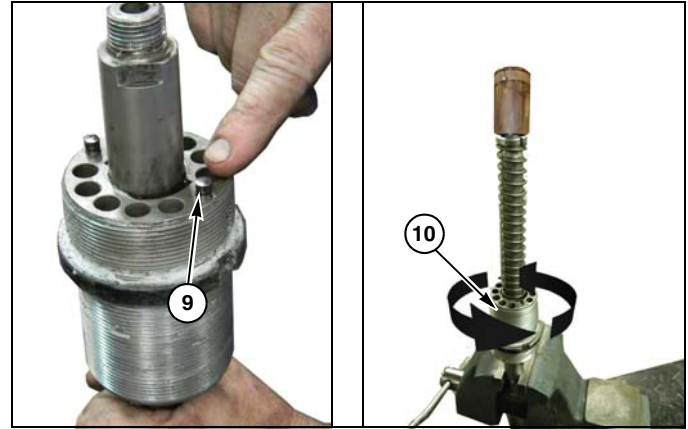
Step 6: Slide rear assembly (8) out of the body tube.



Step 7: Check dowel pins (9) in the rear anvil for cracks or damage. Replace if necessary.

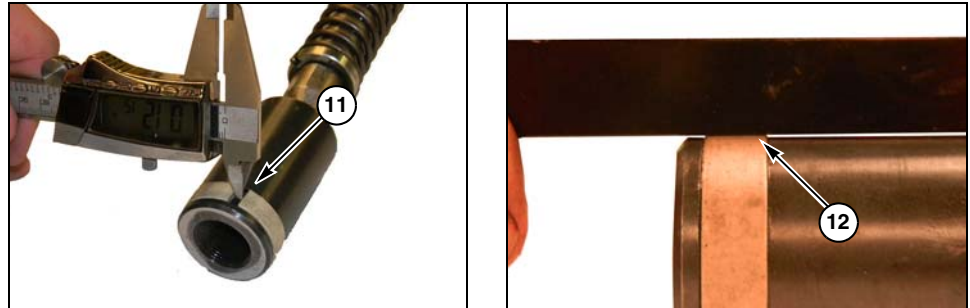
Step 8: Rotate anvil (10) and check operation for correct rotational spring torsion.

- a. Place the flats of the rear control stem in a vise.
- b. Grasp the rear anvil in one hand and gently rotate the rear anvil counterclockwise 1/4 turn.
- c. Check that the spring pushes the rear anvil back to the starting position.

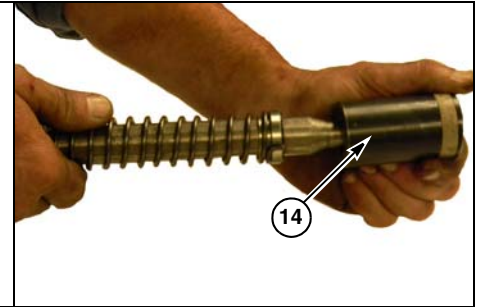


Step 9: Check valve wear ring end gap (11). Recommended gap is 0.070–0.100" (1.8–2.5 mm).

Step 10: Check valve wear ring height (12). Ring should extend beyond valve surface. Replace if necessary.

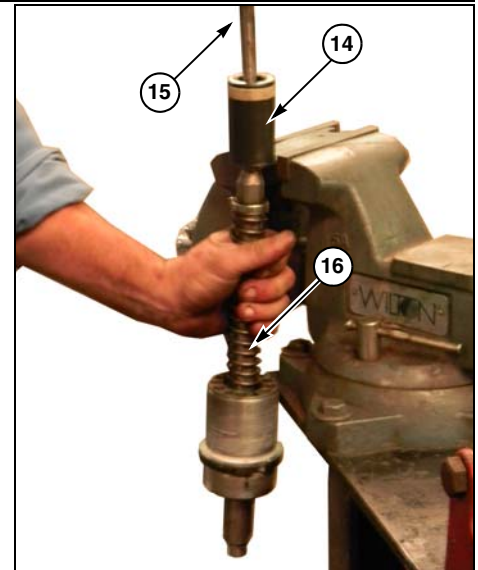


Step 11: Check valve bushing (13) inside valve (14) for too much or too little play by rolling and rotating valve while on control stem. Bushing should be firm, not too tight or too loose. If necessary, replace bushing.

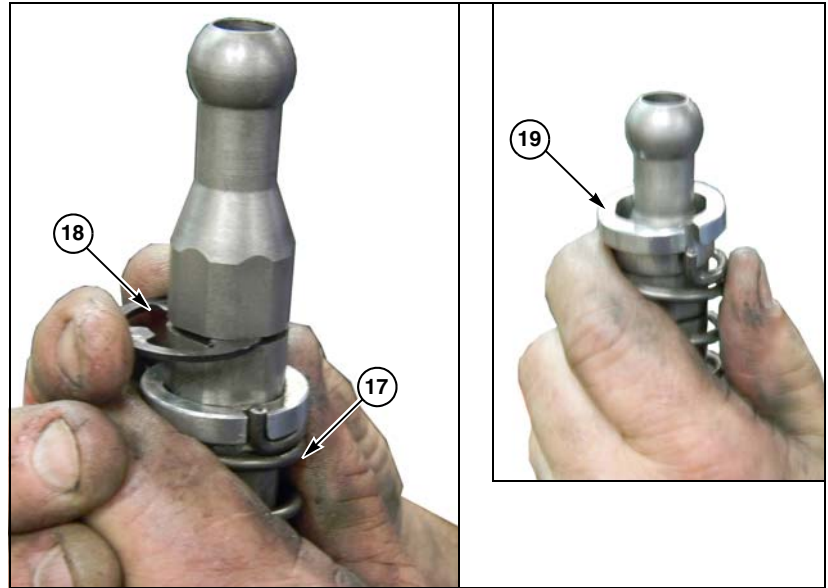


Step 12: Use the supplied tool (15) to separate valve (14) from control stem (16).

Step 13: Remove valve bushing from inside valve (14).



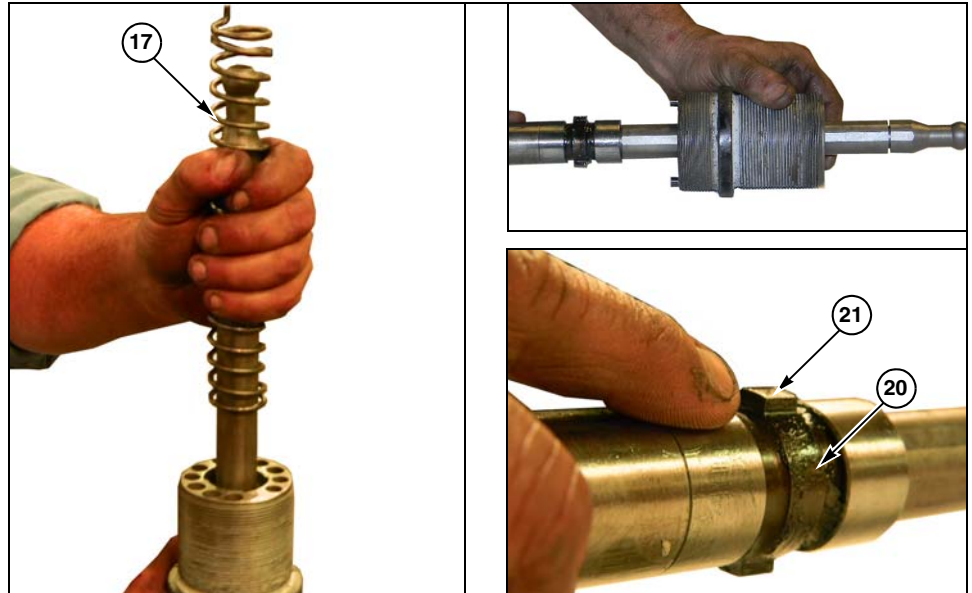
- Step 14:** Compress spring (17) on stem and carefully remove e-clip (18), then release spring slowly.
- Step 15:** Remove spring retainer (19) and check for excessive wear. Replace if necessary.



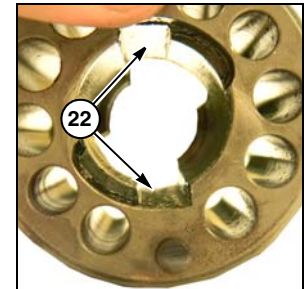
Step 16: Remove control stem spring (17) and check for excessive wear or bent tabs. Replace if necessary.

Step 17: Rotate the control stem counterclockwise and carefully slide the stem out of the rear anvil.

Step 18: Check control stem cam (20) for excessive wear. Slight rounding of the ears (21) is acceptable. Replace cam if necessary.



Step 19: Check the rear anvil tracks (22) for excessive wear. Replace if necessary.



Step 20: Secure control stem in a vise and support stem with free hand. Use a 6-pt socket to remove the upper half of the stem (**23**).

Step 21: Slide front bushing and front bushing carrier upward and off of rear control stem (**24**).

Step 22: Slide off cam (**25**).

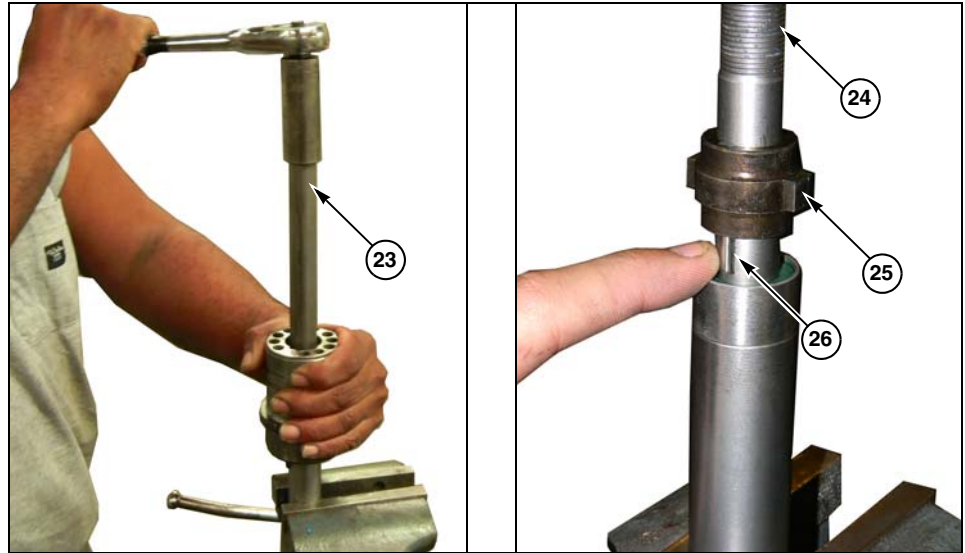
NOTICE: Be sure to capture the control stem dowel pin, which becomes loose as cam is removed.

Step 23: Remove control stem dowel pin (**26**).

Step 24: Slide off rear bushing carrier and bushing.

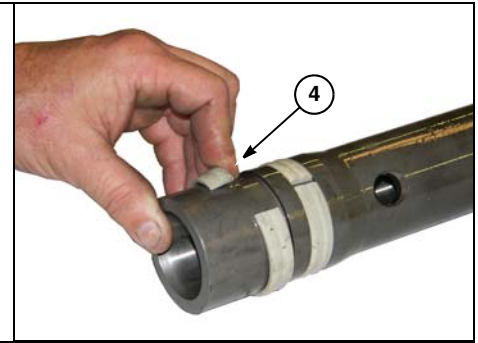
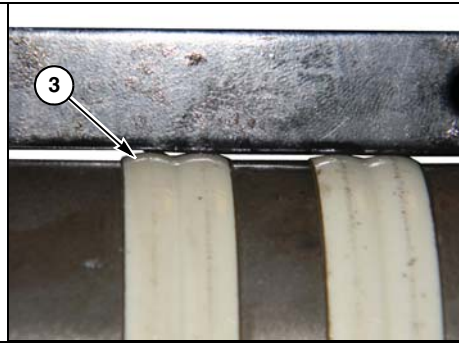
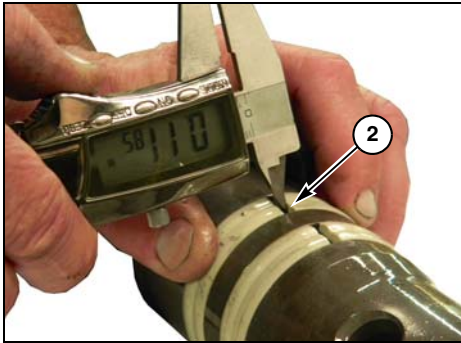
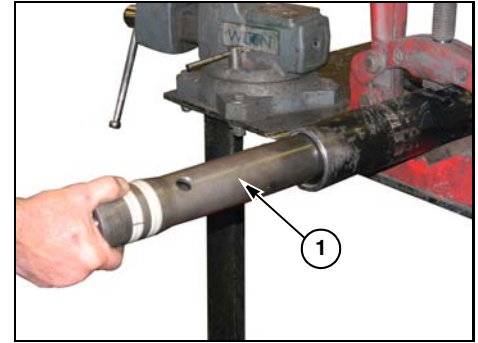
Step 25: Inspect carriers, bushings, and cam. Bushings should fit firmly in carriers and on stem shaft. Replace if loose.

NOTICE: Bushing carriers are not identical.



STRIKER DISASSEMBLY

- Step 1:** Carefully remove striker (1) from body tube. Be careful to not damage body tube threads with striker.
- Step 2:** Check striker wear ring and gap (2). Recommended gap is 0.100–0.120" (2.5–3 mm).
- Step 3:** Check striker wear ring height (3). Ring should extend beyond striker surface. Remove ring (4) and replace if necessary.

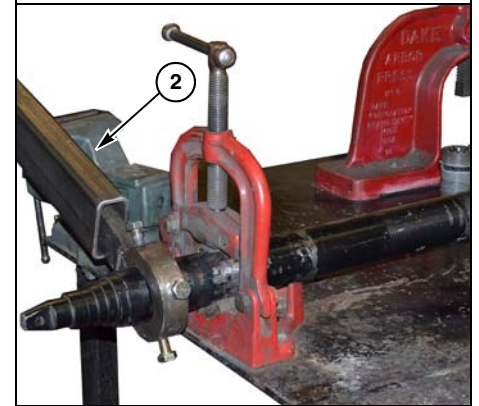
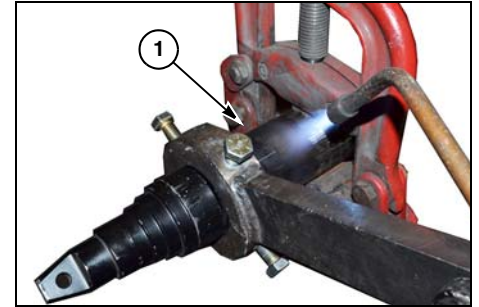


HEAD DISASSEMBLY

Step 1: Apply heat to the tube body (1) to remove head assembly.

NOTICE: Use a heat/temperature stick to monitor temperature. It is **CRUCIAL** to avoid overheating the tool. **DO NOT** heat to more than 400°F (204°C) to preserve tool integrity.

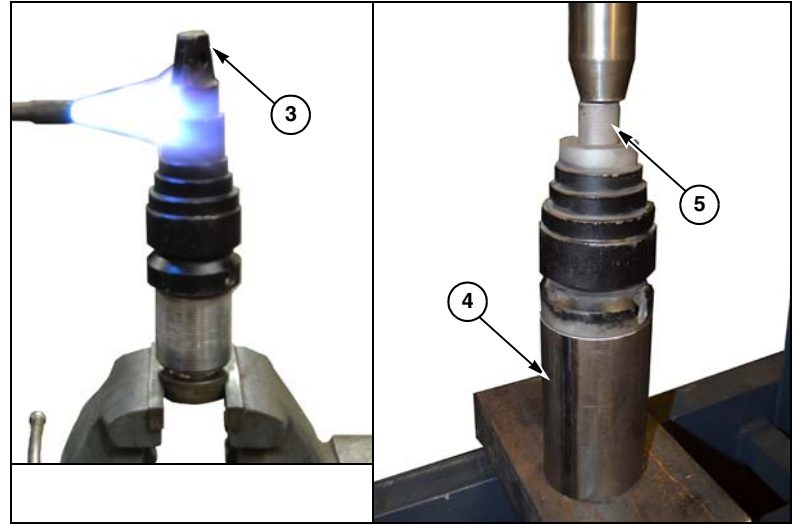
Use a large breaker bar with a factory wrench (2) to loosen the head assembly.



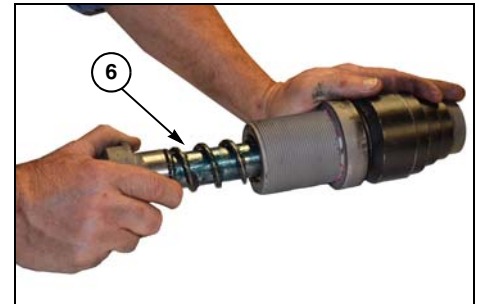
Step 2: Secure head assembly in a vise and use a wrench to remove bit shaft lock nut (3). Heat will be required.

NOTICE: Use a heat/temperature stick to monitor temperature. It is **CRUCIAL** to avoid overheating the tool. **DO NOT** heat to more than 400°F (204°C) to preserve tool integrity.

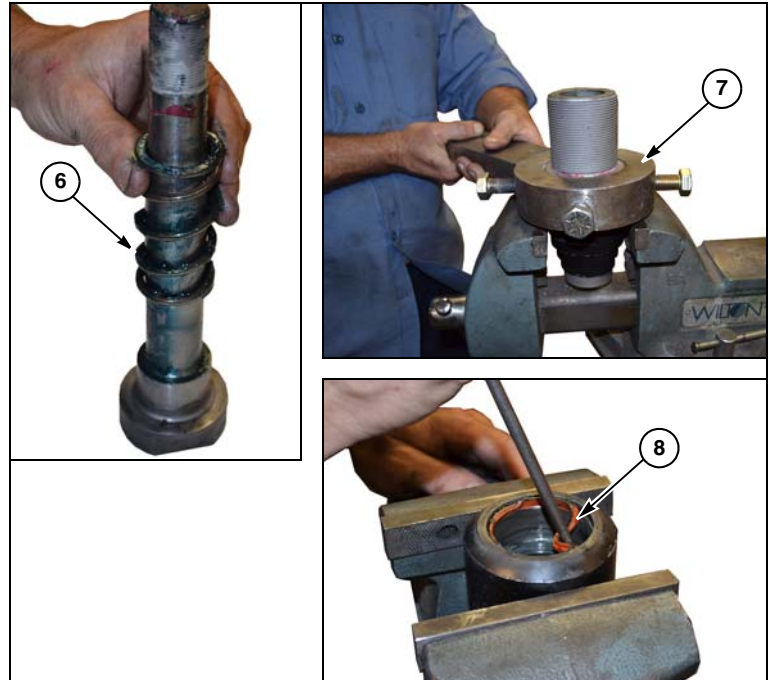
Step 3: Use factory fixture (4) to carefully press bit shaft (5) through stepped head and front anvil.



Step 4: Slide bit shaft with head spring (6) out of front anvil.



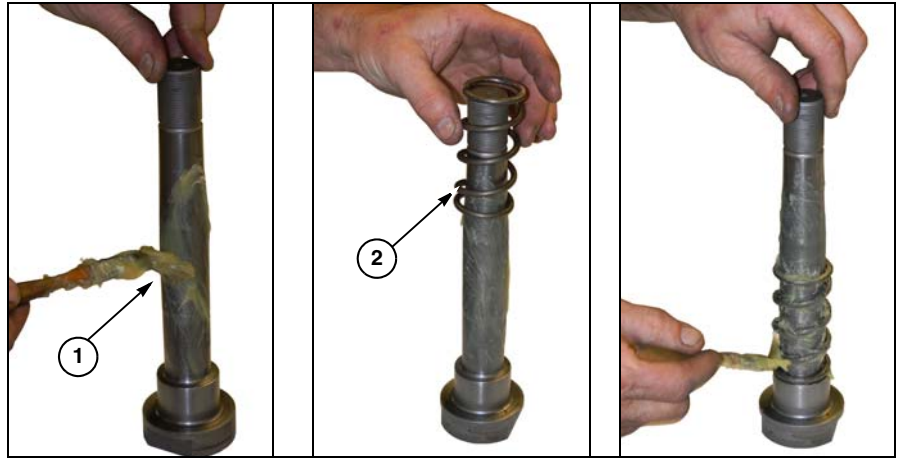
- Step 5: Remove head spring (6) from bit shaft.
- Step 6: Secure stepped head in a vise.
- Step 7: Use factory wrench (7) to rotate front anvil and separate it from the stepped head.
- Step 8: Carefully remove head seal (8) from stepped head.



HEAD ASSEMBLY

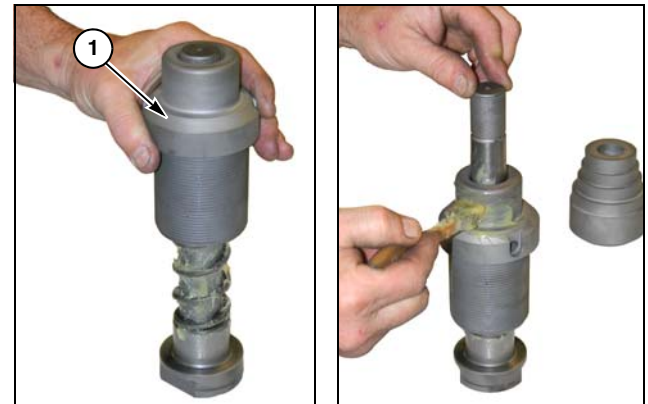
Install Bit Shaft

- Step 1:** Liberally apply general purpose grease to bit shaft (1).
- Step 2:** Slide head spring (2) over bit shaft.
- Step 3:** Liberally apply general purpose grease to head spring.



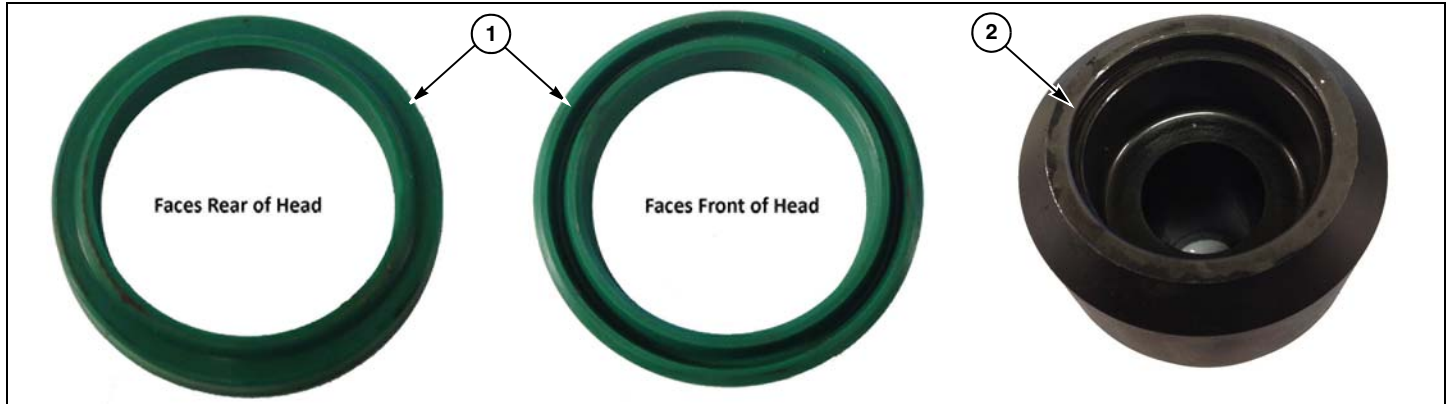
Install Front Anvil

- Step 1:** Slide front anvil (1) over bit shaft and head spring. Be sure the threaded portion of the front anvil is toward the bottom.
- Step 2:** Liberally apply general purpose grease to the top half of the front anvil.

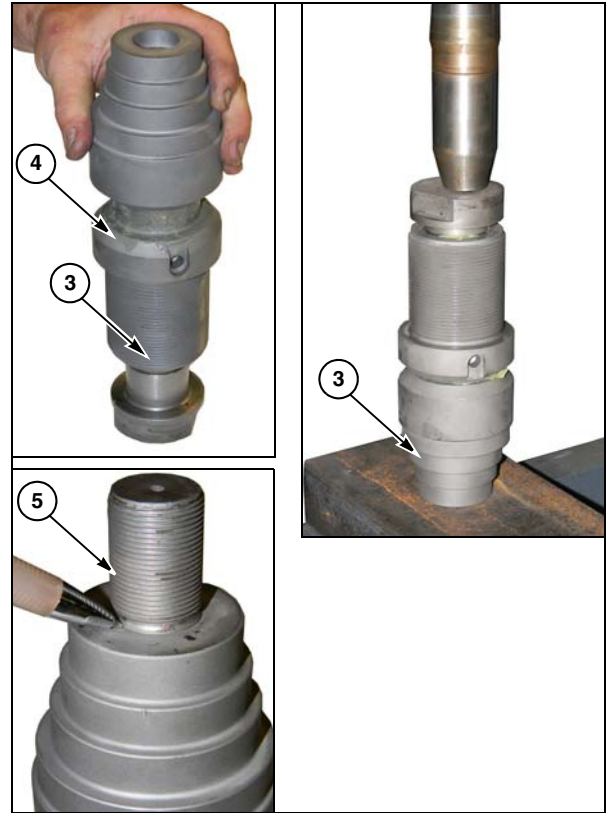


Install Stepped Head

Step 1: Install head seal (1) into stepped head (2).

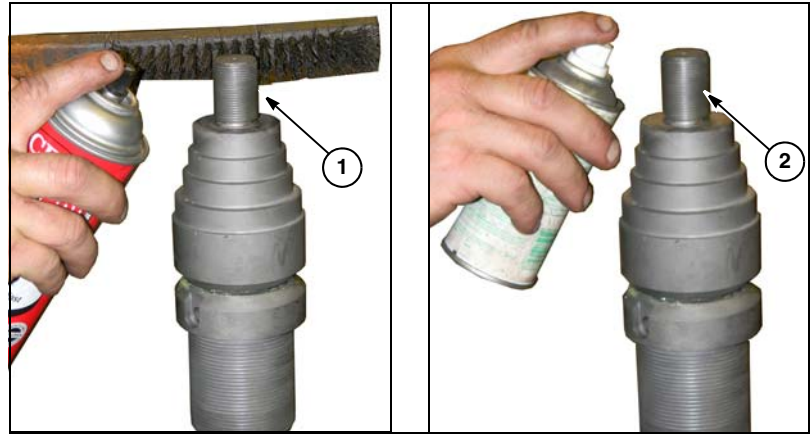


- Step 2:** Slide stepped head down over bit shaft onto front anvil (3).
- Step 3:** Place head assembly nose down (4) into factory press fixture. Bit shaft must protrude through factory fixture.
- Step 4:** Carefully press bit shaft into front anvil to approximately 10 tons (9 metric tons).
- Step 5:** When bit shaft is correctly seated in front anvil, the end of the bit shaft threads (5) can be seen.



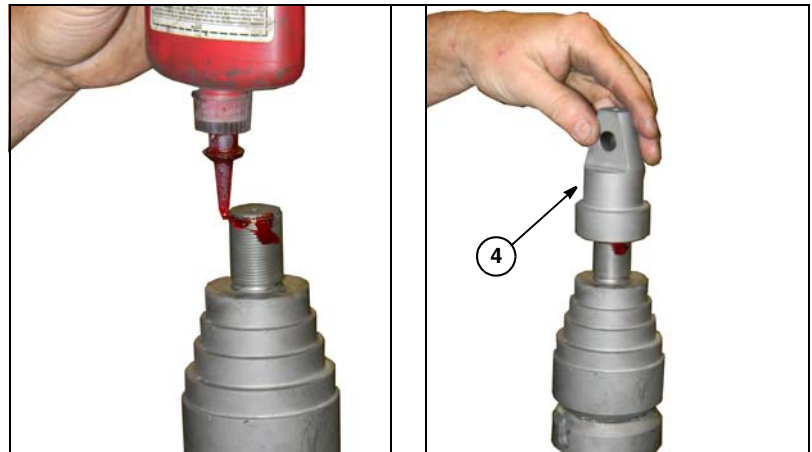
Install Bit Shaft Lock Nut

- Step 1:** Clean and brush the threads (1) on the bit shaft with brake cleaner and a wire brush.
- Step 2:** Apply Loctite primer No. 7649 to threads (2) on bit shaft. Allow time to dry.
- Step 3:** Apply Loctite No. 277 to bit shaft threads.



- Step 4:** Install bit shaft lock nut (4).
- Step 5:** Torque bit shaft lock nut.

Tool Size	Torque
1.8"	175 ft-lb (237 Nm)
2"	275 ft-lb (373 Nm)
2-1/2"	375 ft-lbs (508 Nm)
3"	475 ft-lb (644 Nm)
3-1/3"	475 ft-lb (644 Nm)



Install Head Assembly

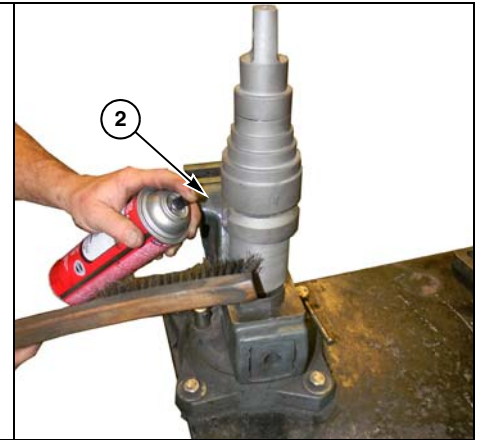
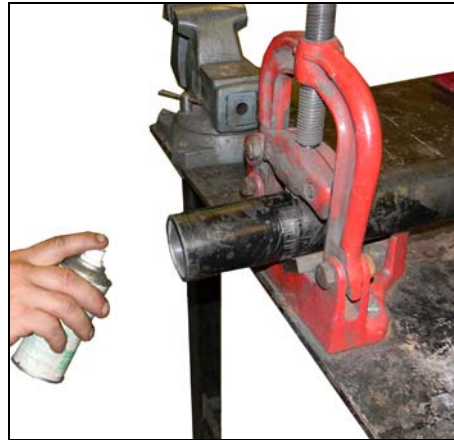
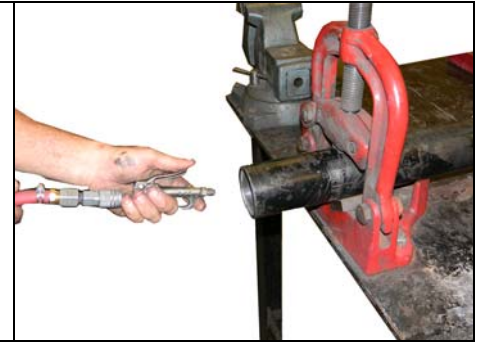
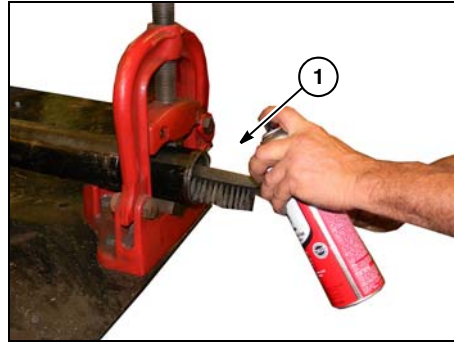
Step 1: Secure body tube in a vise.

Step 2: Clean and brush tube threads (1) with brake cleaner and a wire brush.

Step 3: Thoroughly dry rear assembly threads with compressed air.

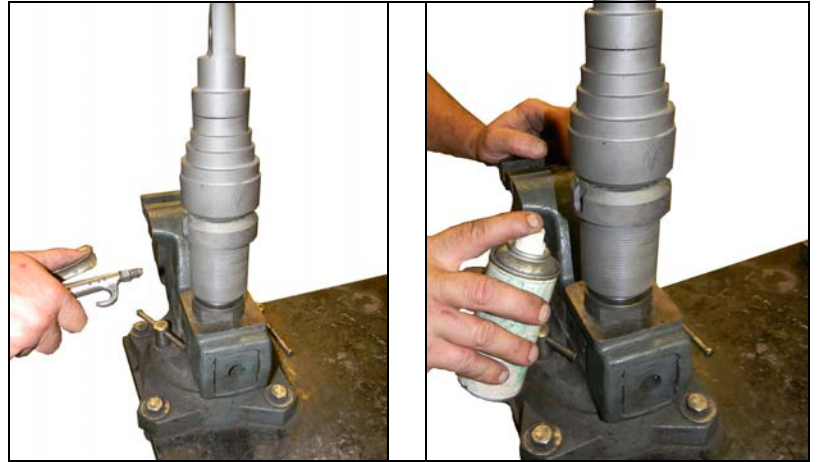
Step 4: Apply Loctite primer No. 7649 to threads. Allow time to dry.

Step 5: Clean and brush threads on head assembly (2) with brake cleaner and a wire brush.



Step 6: Thoroughly dry threads with compressed air.

Step 7: Apply Loctite primer No. 7649 to threads. Allow time to dry.



Step 8: Apply Loctite No. 277 to head assembly threads (3).

Step 9: Install and torque front anvil to factory specifications.

Tool Size	Torque
1.8"	800 ft-lb (1085 Nm)
2"	800 ft-lb (1085 Nm)
2-1/2"	1200 ft-lb (1627 Nm)
3"	1200 ft-lb (1627 Nm)
3-1/3"	1200 ft-lb (1627 Nm)



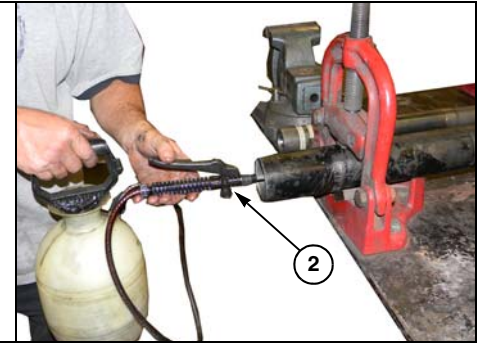
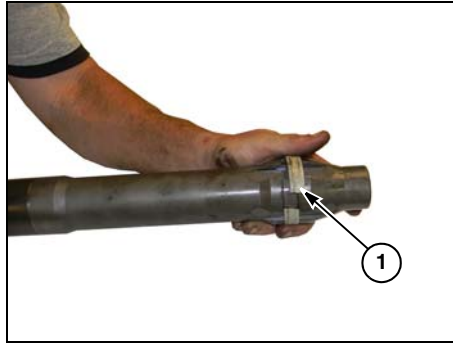
Step 10: Using a factory wrench attached to the head assembly and 20-lb (9-kg) sledge hammer, shock threads into final position by giving two blows to the factory wrench



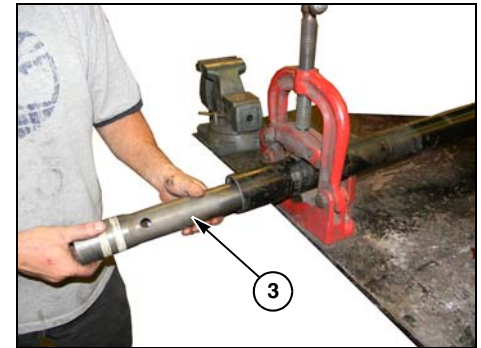
STRIKER ASSEMBLY

Step 1: Install striker wear rings (1).

Step 2: Lightly oil body tube (2).



Step 3: Carefully slide striker (3) into body tube. Be sure not to damage body tube threads with striker.



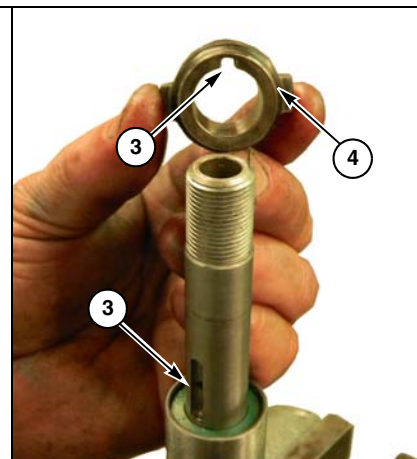
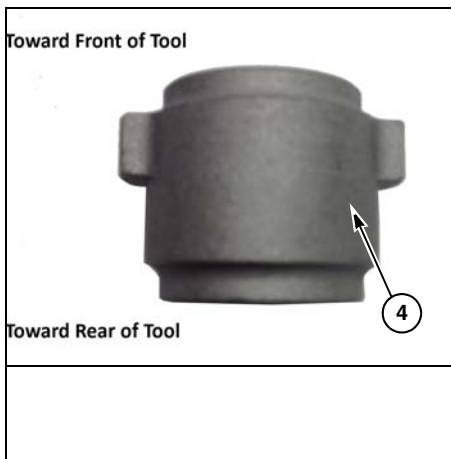
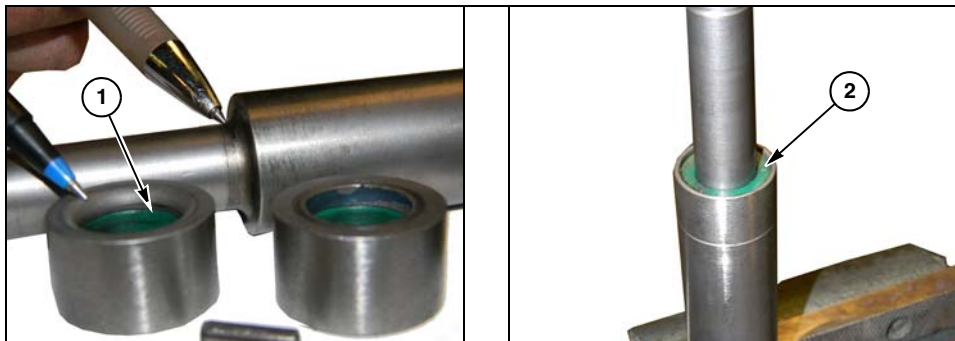
REAR ASSEMBLY

Assemble Control Stem

- Step 1:** Secure rear half of control stem in a vise.
- Step 2:** Identify the lower bushing (1). It has a round inner diameter to match the round control stem.
- Step 3:** Install lower bushing on control stem with rubber bushing facing up (2).
- Step 4:** Align the cam with the dowel pin groove (3) in the control stem.

NOTICE: The 1.8" and 2" cams (4) can only be installed one way. The 2-1/2", 3", and 3-1/3" cams can be installed either way.

- Step 5:** Install cam (4) on control stem.

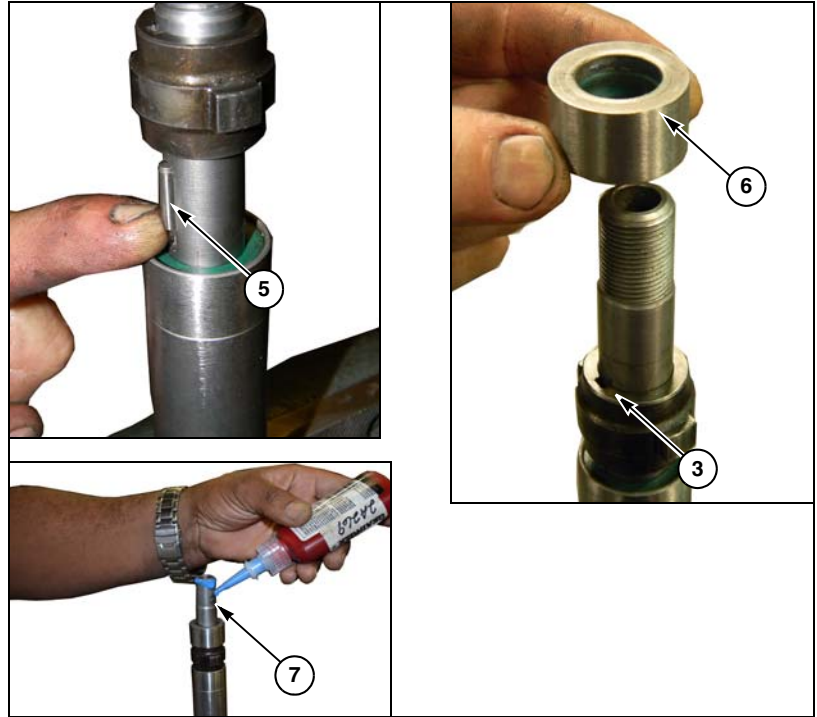


Step 6: Lay the dowel pin (5) in the groove in the control stem, and hold it in place.

Be sure the pin slides into the channel in the cam (3), as shown, and does not slide down and rest on the lower bushing.

Step 7: Install the upper bushing (6) with the rubber facing downward against the cam.

Step 8: Apply Loctite No. 277 to control stem threads (7).



Step 9: Install top half of control stem.

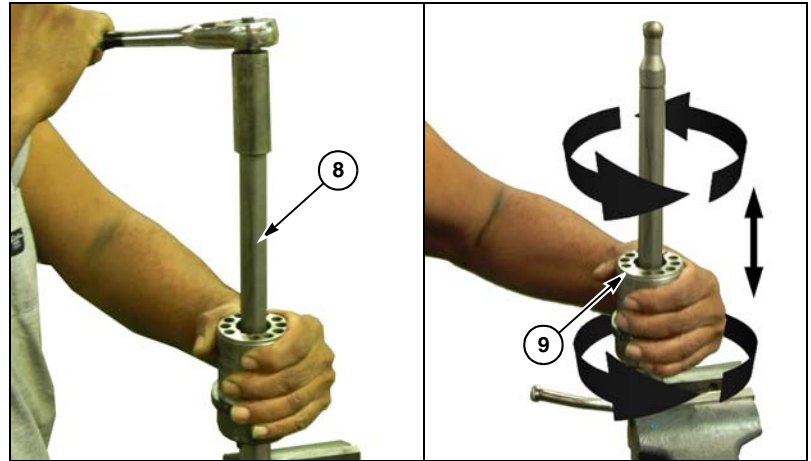
- a. Begin by threading the top half of stem **(8)** onto the lower half, tightening by hand.
- b. Slide rear anvil **(9)** over the loosely tightened stem, with large threaded section up.
- c. Torque top half of stem 1/2 rotation at a time.

NOTICE: Between each 1/2 rotation, check action of the rear anvil in upper position.

- d. Place anvil at bottom of stem, and rotate clockwise 1/4 turn. The rear anvil should reach a stop. Rotate anvil back counterclockwise 1/4 turn.
- e. Slide rear anvil up to the top position.
- f. Rotate the anvil clockwise 1/4 turn. The rear anvil should reach a stop; when it does, rotate it back counterclockwise 1/4 turn.

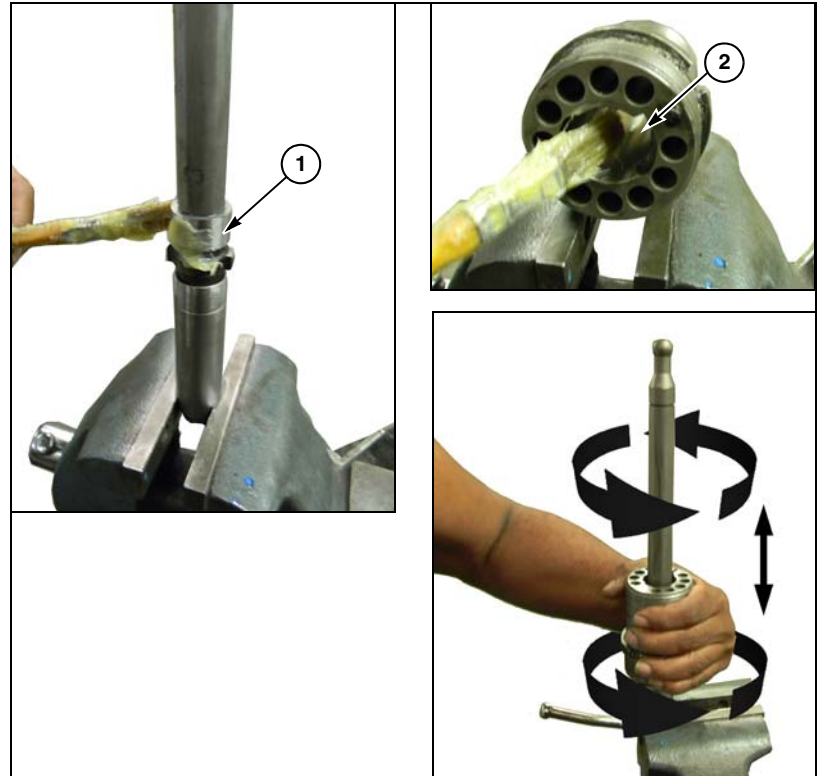
NOTICE: When the appropriate torque on the control stem is reached (approximately 35 ft-lb/48 Nm), the rear anvil will perform steps d, e, and f smoothly. The travel and operation should feel fluid.

- g. Torque stem an additional 1/4 to 1/2 turn.



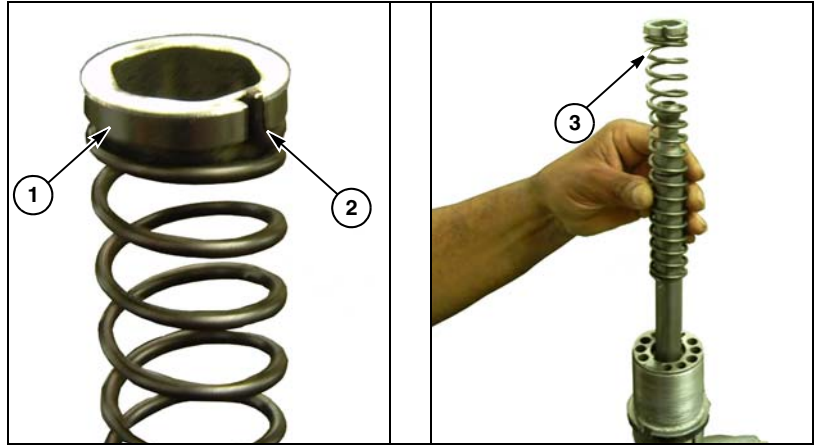
Install Rear Anvil on Control Stem

- Step 1:** Remove rear anvil and apply general purpose grease to cam and bushings (1).
- Step 2:** Cover inner tracks (2) inside rear anvil with general purpose grease.
- Step 3:** Re-install rear anvil, checking that it slides and rotates smoothly in both upper and lower tracks.
- Place anvil at bottom of stem, and rotate clockwise 1/4 turn. The rear anvil should reach a stop. Rotate anvil back counterclockwise 1/4 turn.
 - Slide rear anvil up to the top position.
 - Rotate the anvil clockwise 1/4 turn. The rear anvil should reach a stop; when it does, rotate it back counterclockwise 1/4 turn.
- Step 4:** Position rear anvil in lowermost clockwise position to ensure correct spring torsion.



Install Control Spring

- Step 1:** Install spring retainer (1) on spring. Ensure tab (2) on spring is seated in the recess on retainer, and that the retainer is seated down as far as possible inside the spring itself.
- Step 2:** Slide spring (3) and retainer over control stem, down onto the rear anvil.



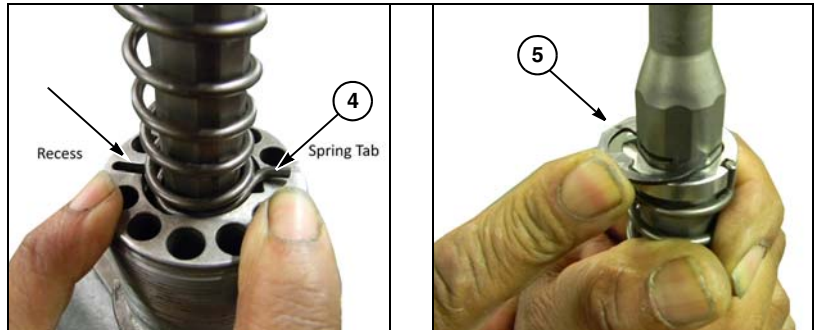
- Step 3:** Position spring so that lower tab (4) on spring is opposite the recess in the rear anvil.

NOTICE: Ensure anvil is in lowest, most clockwise position, and that the lower spring tab is opposite the recess in the rear anvil.

- Step 4:** Slide spring (3) and retainer (1) down onto the hex of the control stem.

NOTICE: If the spring retainer must rotate to slide onto the hex, be certain the spring retainer rotates counterclockwise to the nearest hex position.

- Step 5:** Install e-clip (5).



Step 6: To seat the control stem spring, grasp spring, lift up slightly, and rotate lower tab of spring counterclockwise around to the recess in rear anvil (5).

Step 7: Seat tab in recess. Be certain lower tab of spring has been seated all the way into rear anvil.

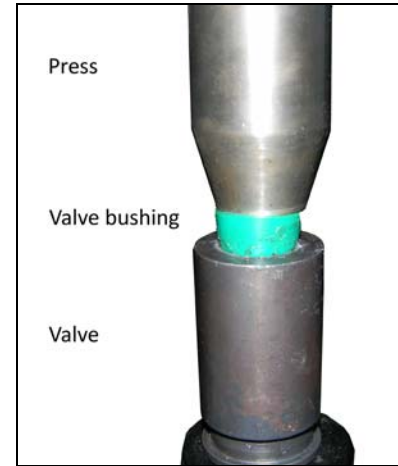
Step 8: With control stem still secured in vise, check operation of rear anvil. Grasp anvil and rotate counterclockwise.

NOTICE: After rotating, when rear anvil is released, control stem spring should rotate the rear anvil back to its initial position.



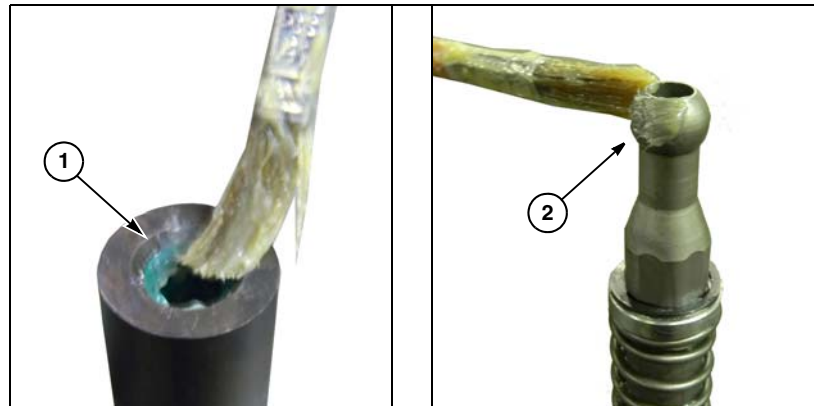
Install Valve Bushing

- Step 1:** Apply general purpose grease to valve and bushing.
- Step 2:** Using a press, push valve bushing into valve.



Install Valve on Control Stem

- Step 1:** Apply general purpose grease to valve bushing (1) and to the ball end (2) of control stem.

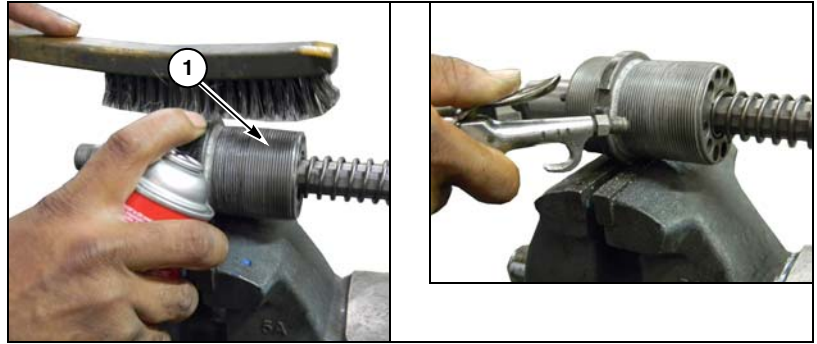


- Step 2:** Place valve, with bushing, on ball end of control stem.
- Step 3:** Use a brass mallet to seat the valve on the stem.
- Step 4:** Install valve wear ring onto valve.

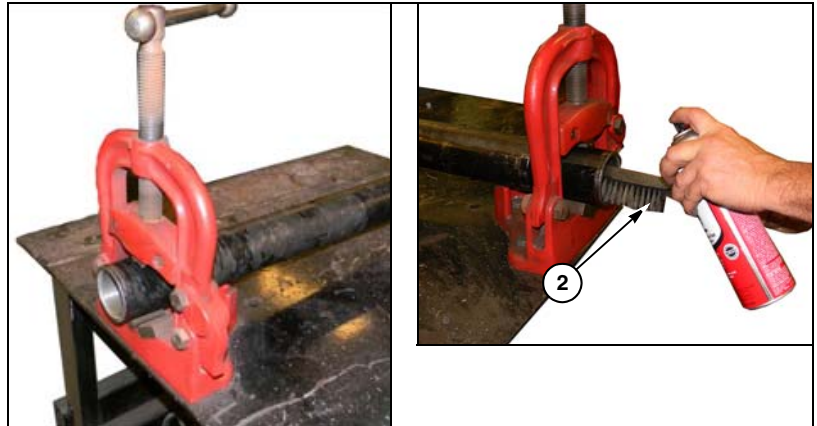


Install Rear Anvil

- Step 1:** Clean and brush all sides of rear anvil threads (1) with brake cleaner and wire brush.
- Step 2:** Thoroughly dry rear anvil threads with compressed air.
- Step 3:** Secure body tube in a vise.



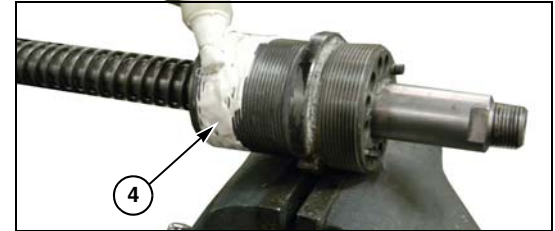
- Step 4:** Clean and brush the tube body threads (2) with brake cleaner and a wire brush.



Step 5: Lightly oil the inside of striker (3).



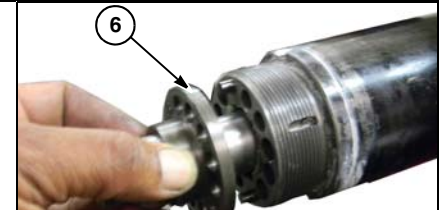
Step 6: Apply Loctite No. 567 liberally to three-fourths of the larger portion of rear anvil threads (4).



Step 7: Insert the reverse mechanism assembly (5) into the tool, threading the rear anvil into the body tube.

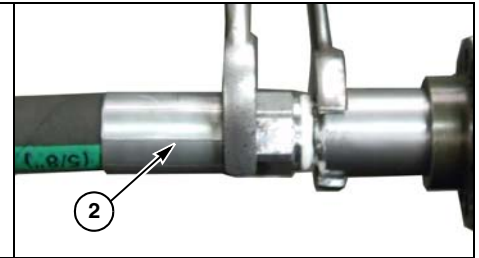
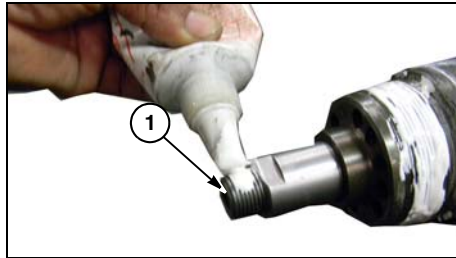


Step 8: Install the intermediate spacer (6) over the control stem and seat it up against the rear anvil.



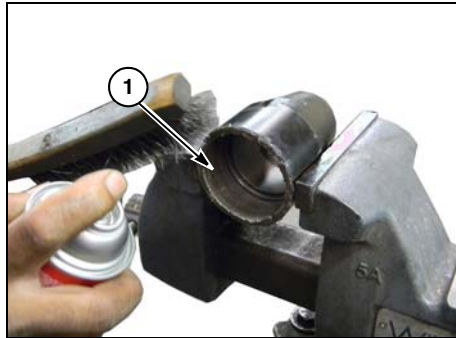
Install External Hose

- Step 1:** Apply Loctite No. 567 to control stem threads (1).
- Step 2:** Install the external hose whip (2) onto the control stem. Tighten with two wrenches.



Install Tailcone

- Step 1:** Clean and brush the threads inside the tailcone (1) with brake cleaner and a wire brush.
- Step 2:** Thoroughly dry rear tailcone threads with compressed air.
- Step 3:** Apply Loctite No. 567 liberally to three-fourths of the exposed portion of rear anvil threads (2).
- Step 4:** Install tailcone over the external hose onto the rear anvil. Thread it forward until it is lightly seated against the rear anvil.

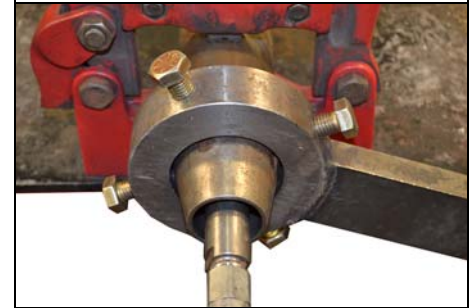
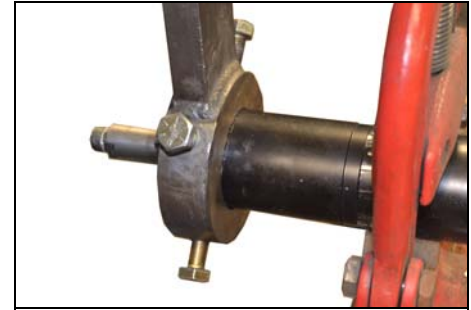


Step 5: Torque rear anvil to specifications in table below.

Tool Size	Rear Anvil	Tailcone
1.8"	600 ft-lb (814 Nm)	400 ft-lb (542 Nm)
2"	700 ft-lb (949 Nm)	500 lb-ft (678 Nm)
2-1/2"	800 ft-lb (1085 Nm)	600 ft-lb (814 Nm)
3"	900 ft-lb (1220 Nm)	700 ft-lb (949 Nm)
3-1/3"	900 ft-lb (1220 Nm)	700 ft-lb (949 Nm)

Step 6: Torque tailcone to specifications in table above.

Step 7: Test that reverse mechanism moves freely from forward to reverse. Grasp whip hose, rotate 1/4 turn counterclockwise, and pull firmly until hose slides rearward. In the rear position, allow whip hose to rotate 1/4 turn clockwise. The tool is now in reverse.



AFTER ASSEMBLY

Allow tool to rest for 12 hours after assembly, to allow time for adhesives to cure.

STORAGE

Hold tool nose down and pour 1 oz (30 ml) of Vermeer Oil into the air line. Wait 30 seconds for the oil to get into the tool. Tip the tool back and forth 20 to 30 times while rotating the tool to disperse the oil. Tape or cap the tool whip hose to prevent dirt and sand from entering the tool.

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Section 60: Troubleshooting

TOOL WILL NOT START

- Check air compressor for correct air output (90–110 psi or 620–760 kPa). Incorrect or low air pressure setting can prevent starting.
- Check that full pressure air is available at the tool and that hoses and fittings are of the correct diameter. Refer to “Tool Specifications,” [page 70-2](#).



WARNING: High pressure air can forcefully eject dirt or other materials. Be careful when blowing out the hose. Aim the hose away from yourself and other persons.

- Take tool apart and clean it. Refer to “Rear Disassembly,” [page 50-3](#).
- *If tool is in the ground:*
 - a. Remove air supply hose from oiler to tool and inject 1/2 oz (15 cc) of oil directly into the hose.
 - b. Turn air supply hose 1/4 turn counterclockwise to REVERSE if in FORWARD, and try to snap-start in REVERSE.
 - c. Connect supply line to oiler and open air control valve.
 - d. If tool does not start, repeat Steps a, b, and c.

If tool does not start after these steps have been performed, return tool to your Vermeer dealer for inspection.

TOOL WILL NOT REVERSE DIRECTION

NOTICE: Ensure all air line couplings are tight and lock collars in place.

- If the tunnel has collapsed on the air supply hose, turn air supply hose counterclockwise while the tool is operating. The impact action of the tool will help loosen the supply line.
- If unstable soil conditions have caused the tool to lose traction and oscillate, reduce air flow at the control valve until traction is regained. Unstable soil conditions include gravel, sand, watery slick clays, and soil under trees.
- Check air supply lines for possible obstructions.

TOOL RUNS BUT WILL NOT MOVE IN HOLE

- Ensure hose is in FORWARD.
- If tool is oscillating, reduce tool speed at the oiler valve and gently push on air supply hose, to help the tool gain traction. Soft or wet ground conditions can cause a tool to lose traction and oscillate.
- Put a reference mark on the hose to determine if the tool is moving or stopped by an obstruction.
- If the tool is unable to break through the obstruction, reverse tool direction and start a new hole away from the obstruction.

NOTICE: When starting a new bore, the operator should move over a distance of 10 times the diameter of the tool, so that the tool does not cross into the other bore.

TOOL SLOWS DOWN DURING LONG BORES

- Perform the striker tip test: Tip the body from horizontal to approximately 22°. The striker should slide from front to back. A tool with high striker friction may have ingested dirt and should be taken apart before being used again. Add more oil to the end of the 50-ft air hose.
- The tunnel behind the tool may have collapsed, restricting air flow. Refer to previous page for possible solutions.
- Applying more oil to the end of the 50-ft hose may be needed.

TOOL RUNS BUT IS LOW ON POWER

- Step 1:** Check air compressor for correct air output and pressure.
- Step 2:** Check that the tool is using oil. Refer to “Machine Controls,” [page 20-1](#).
- Step 3:** Check that supply lines and fittings are correctly sized. Refer to “Tool Specifications,” [page 70-2](#).
- Step 4:** Perform striker tip test. Refer to previous module.
- Step 5:** Check striker wear ring end gap. Refer to [page 50-10](#).
- Step 6:** Check valve assembly overall length.
- Step 7:** Check valve rings end gap. Refer to [page 50-5](#).

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Section 70: Specifications

LUBRICANTS

Vermeer Piercing Tool Summer Oil

Summer oil should have a zinc and paraffin hydraulic air line additive to reduce friction and prevent rust (SAE-10W/ISO-22).

Vermeer Piercing Tool Winter Oil

Winter oil contains a fully synthetic base of ISO propanol and additives that reduce corrosion and evaporation, and make it compatible with the summer oil. Winter oil at full strength prevent freezing at temperatures as low as -10°F (-23°C) (ISO-46).

TOOL SPECIFICATIONS

Model	VHH180	VHH180RT	VHH200	VHH200RT	VHH250
Diameter	1.8" (4.6 cm)	1.8" (4.6 cm)	2" (5.1 cm)	2" (5.1 cm)	2-1/2" (6.4 cm)
Length	37" (94 cm)	38" (96.5 cm)	40" (101.6 cm)	40" (101.6 cm)	44" (111.8 cm)
Weight	18 lb (8.2 kg)	19 lb (8.6 kg)	25 lb (11.3 kg)	25 lb (11.3 kg)	43 lb (19.5 kg)
Air Consumption	12 cfm (339.8 L/min)	12 cfm (339.8 L/min)	25 cfm (707.9 L/min)	25 cfm (707.9 L/min)	28 cfm (792.9 L/min)
Air Pressure	110 psi (7.6 bar)	110 psi (7.6 bar)	110 psi (7.6 bar)	110 psi (7.6 bar)	110 psi (7.6 bar)
Reverse	AIR-ON Quarter Turn	AIR-ON Quarter Turn	AIR-ON Quarter Turn	AIR-ON Quarter Turn	AIR-ON Quarter Turn
Blows/Min	580	580	480	480	460

Model	VHH250RT	VHH300	VHH300RT	VHH330	VHH330RT
Diameter	2-1/2" (6.4 cm)	3" (7.6 cm)	3" (7.6 cm)	3-1/3" (8.4 cm)	3-1/3" (8.4 cm)
Length	45" (114.3 cm)	53" (134.6 cm)	54" (137.2 cm)	53" (134.6 cm)	54" (137.2 cm)
Weight	44 lb (20 kg)	71 lb (32.2 kg)	72 lb (32.2 kg)	87 lb (39.5 kg)	88 lb (39.9 kg)
Air Consumption	25 cfm (707.9 L/min)	32 cfm (906.1 L/min)	32 cfm (906.1 L/min)	32 cfm (906.1 L/min)	32 cfm (906.1 L/min)
Air Pressure	110 psi (7.6 bar)	110 psi (7.6 bar)	110 psi (7.6 bar)	110 psi (7.6 bar)	906.1 psi (7.6 bar)
Reverse	AIR-ON Quarter Turn	AIR-ON Quarter Turn	AIR-ON Quarter Turn	AIR-ON Quarter Turn	AIR-ON Quarter Turn
Blows/Min	460	400	400	400	400

Picture in Parts Manual	Description	Loctite No.	Torque in ft-lb (Nm)			
			Tool Size			
			1.8"	2"	2-1/2"	3" and 3-1/3"
	VHH (Tool with Replaceable Head)		VHH180	VHH200	VHH250	VHH300
	VHH_RT (Tool with Rock Head)		VHH180RT	VHH200RT	VHH250RT	VHH300RT
	Rock Head Assembly	Primer No. 7649 and Loctite No. 277	800 (1085)	800 (1085)	1200 (1627)	1200 (1627)
	Replaceable Head		800 (1085)	800 (1085)	1200 (1627)	1200 (1627)
1	Bit Shaft					
3	Front Anvil		800 (1085)	800 (1085)	1200 (1627)	1200 (1627)
6	Bit Shaft Lock Nut		175 (237)	275 (373)	375 (508)	475 (644)
11	Tailcone	Loctite No. 567	400 (542)	500 (678)	600 (814)	700 (949)
17	Rear Anvil		600 (814)	700 (949)	800 (1085)	900 (1220)
21	Rear Control Stem	Loctite No. 277	Critical Use of Rear Anvil as a Fit Gauge			
27	Front Control Stem		<p>As the stem is tightened, bushings are being compressed and length of assembly changes. It is very important to compress bushings just enough to allow the cam to rotate to forward position inside rear anvil.</p> <p>On 1.8" & 2" torque will be 5 ft-lb (6.8 Nm).</p> <p>On 2.5" & 3" torque will be 9 ft-lb (12.2 Nm).</p> <p>Too much compression creates premature wear and potential damage to bushing cups.</p>			

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Revision History

Revision	Date	Page(s)	Description
o-m1_00	11/12	All	First Edition Manual released
o-m1_01	05/15	Sections 20, 50, 70	3-1/3" tool

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