

# ***D24x40 Series II Navigator<sup>®</sup>*** ***Horizontal Directional Drill***

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## ***Maintenance Manual***



D24x40\_series\_II\_m3\_04  
Serial No. 381 - 2000  
Order No. 105400Z88

**Vermeer<sup>®</sup>**

# Introduction

This manual explains the proper maintenance of your machine. Do not attempt any maintenance procedure that is not fully understood, or that cannot be safely and accurately performed with the available tools and equipment. If a problem is encountered that is not understood or cannot be solved, contact your authorized independent Vermeer dealer.

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 options not yet contained in this manual.

The maintenance intervals are based on normal operating conditions. When operating under severe conditions, the maintenance intervals should be shortened.

To provide a better view, some photographs or illustrations in the maintenance sections may show the machine shields removed. **Never operate the machine with the shields removed - keep all shields in place.** If removing a shield is necessary, return it to its operating position before operating the machine.

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

This manual is supplied with each machine. Refer to it for all lubrication and maintenance procedures. Keep this manual with the machine for ready reference. Store it in a protected location when not in use.

Additional copies of the manuals, and Operations and Safety video, are available from your dealer. Reorder numbers are listed on the front covers of the manuals and on the video.

Copies of this manual, and the Operations and Safety video, are available in Spanish from your dealer.

Su distribuidor dispone de ejemplares en español de este manual y del vídeo de Operaciones y Seguridad.

## NOTICE TO OWNER

You are requested to notify Vermeer Corporation when you have purchased a **used** Vermeer machine. Notify the Customer Data Department by telephone: 800-829-0051 or 641-628-3141; email: [customerdata@vermeer.com](mailto:customerdata@vermeer.com); internet: [www.vermeer.com](http://www.vermeer.com) or [www.vermeerag.com](http://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.

## SERVICE

Service instructions are contained in a separate *Service Manual*. Service manuals can be obtained by contacting your Vermeer dealer. If you are considering servicing the machine without the assistance of a Vermeer dealer, remember this is a complex machine which often involves complex service procedures.

There are also many components which are not user-serviceable. Do not attempt any service which you do not fully understand, nor any service that you cannot do accurately and safely with proper tools and equipment. If you encounter a problem that you do not understand or cannot solve, contact your Vermeer dealer.

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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.

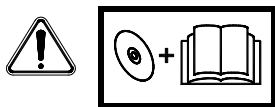
Safety signs with signal word “**DANGER**”, “**WARNING**”, or “**CAUTION**” are located near specific hazards.

- DANGER** Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- WARNING** Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- CAUTION** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

## SAFETY SYMBOL EXPLANATION



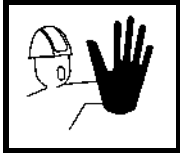
This is the safety alert symbol. This symbol is used in combination with an exclamation mark or other symbols to alert you to the potential for bodily injury or death.



**WARNING:** Read Operator's Manual and safety signs, and watch the operations and safety video, before operating machine.



**WARNING:** Wear personal protective equipment. Wear close-fitting clothing and confine long hair. Always wear a hard hat, safety glasses, and safety shoes.

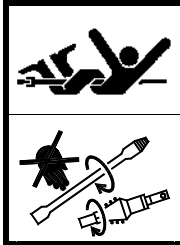


**WARNING:** Keep spectators away.



**WARNING:** Exhaust fumes can be fatal.

If operating in an enclosed area, remove exhaust fumes with an exhaust pipe extension to the outside.



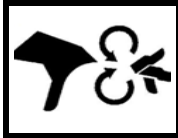
**DANGER:** Entanglement with rotating drill string or drilling tools can kill.

Stay away from rotating drill rod and drilling tool.

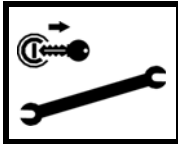


**DANGER:** Rotating drill string can kill. Unexpected start-up possible.

Lockout before working on drill string.



**WARNING:** Keep hands, feet, and clothing away from power-driven parts. Keep shields in place and properly secured.



**WARNING:** Use Shutdown Procedure before servicing, cleaning, repairing or transporting machine. Refer to [Shutdown Procedure](#), page 12-1, for instructions.



**WARNING:** Make no modifications to this equipment unless specifically recommended by Vermeer Corporation.



**WARNING:** Be sure that all safety devices, including shields, are installed and functioning properly after servicing the machine.



**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 the Operator's Manual.

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# Section 11: Welding Precautions

## WELDING ALERT - ELECTRONIC COMPONENTS

**Attention:** Electronic modules and controllers will be damaged from stray voltages and currents generated during welding if not unplugged *before welding*.

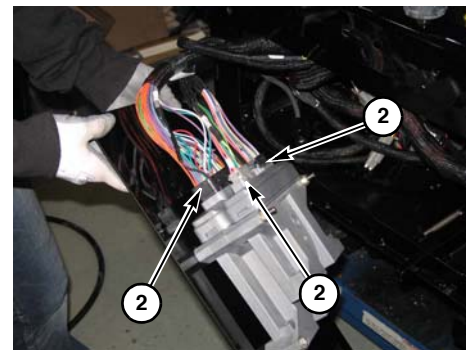
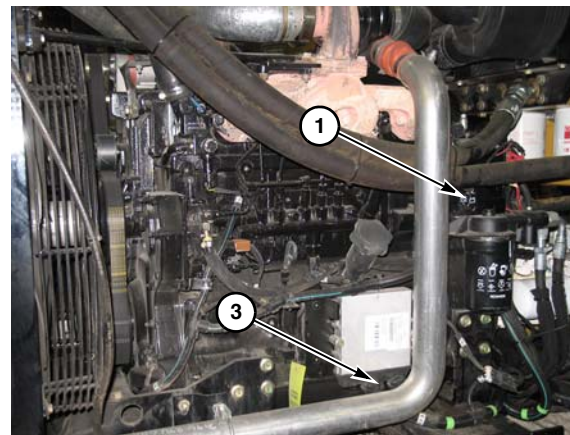
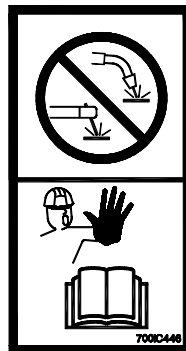
To prevent extensive and costly damage to the electrical components:

**Step 1:** Turn *Battery Disconnect Switch* (1) to DISCONNECT.

**Step 2:** Unplug three connectors to the Remote Lockout module (2), (located under the seat), and two on the Engine Control Unit, ECU, (3).

**NOTE:** Access connectors (2) through foot panel in front of operator seat in cab machine; in non-cab machine, tip seat forward and lift panel.

**IMPORTANT:** Disconnecting the battery ground with the battery disconnect switch will not prevent damage to the electronic components during welding. Each of the modules must have the electrical connector unplugged from the module.



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# Section 12: Shutdown Procedure

**Step 1:** Shut off drilling fluid pump.

**Step 2:** Reduce engine speed to idle.

**Step 3:** Wait two minutes to shut off engine when shutting down after operating at full power.

**Step 4:** Shut off engine and remove key.

For your safety and the safety of others, use shutdown procedure before working on the machine for any reason, including servicing, cleaning, unplugging, or inspecting.

**IMPORTANT:** If working on the drill string or drill tools at a remote location away from the machine, follow the [Lockout Procedure - With Remote Lockout](#) or the [Lockout Procedure - Without Remote Lockout System](#) in the [Overview Section](#) of the [Operator's Manual](#).

A variation of the above procedure may be used if instructed within this manual or if an emergency requires it.

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# Section 20: Maintenance - 10 Service Hours or Daily

## MACHINE - GREASE

As a general rule, grease machine after it is shut down for the day. This protects metal under seals from corrosion caused by condensation as temperature drops.

Ensure all fittings and nozzle of grease applicator are clean before applying grease. If any grease fittings are missing, replace them immediately.

## ENGINE MAINTENANCE

Refer to the Engine Operation Manual supplied with each machine for complete instructions.

- Check fan and alternator belt (1).
- Check cooling system.
- Check engine for leaks.

## MACHINE INSPECTION

- Inspect machine daily and check for leaks before starting.
- If stabilizer or rack hydraulic cylinders drift, contact your Vermeer dealer for repair.

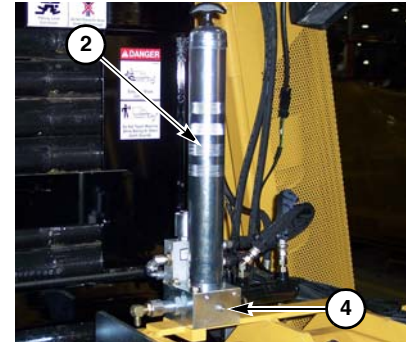
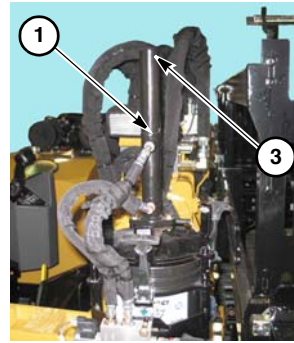


## AUTO GREASER - CHECK/REFILL

Check the level of grease in bucket (1) or tube (2) each day at start-up by removing top cap. Refill as needed.

On bucket greaser, remove plug (3) at top of tube with Allen wrench.

On tube greaser, replace cartridge or use fitting (4) on tube greaser. Cartridge is full when cartridge handle can no longer be lifted.



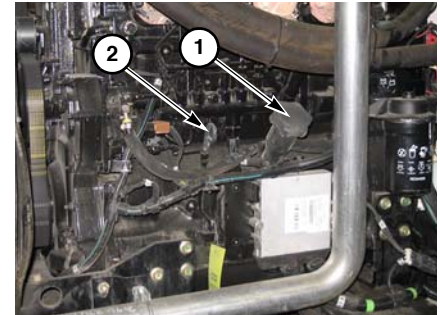
## FLUID LEVELS - CHECK

Check fluid levels daily before operating the machine. Also inspect machine and make any necessary adjustments and repairs before starting the engine.

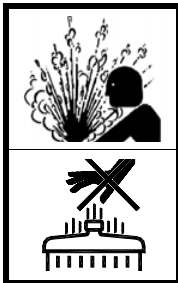
## Engine Crankcase Oil - Check/Fill

With engine level, fill to full mark on dipstick. Do not overfill.

- (1) Engine Oil Fill Cap
- (2) Engine Oil Dipstick

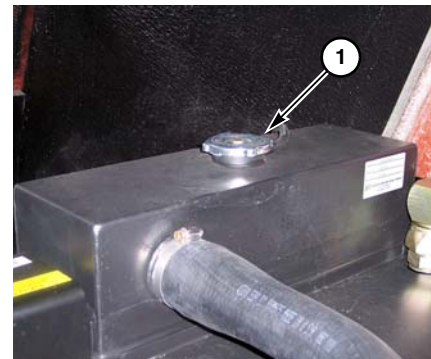


## Radiator - Check/Fill



**WARNING:** Hot fluid under pressure can erupt and scald if opened.

Allow to cool before opening.



Do not remove radiator cap from a hot engine. Wait until the temperature has cooled before removing the cap (1). Failure to do so can result in personal injury from heated coolant spray or steam. Remove radiator cap slowly to relieve coolant system pressure.

Fill to within 1/2" (13 mm) of the bottom of the fill pipe with a low-silicate (ethylene glycol) antifreeze and clean water mixture.

**NOTE:** Fill pipe is located under the radiator cap (1).

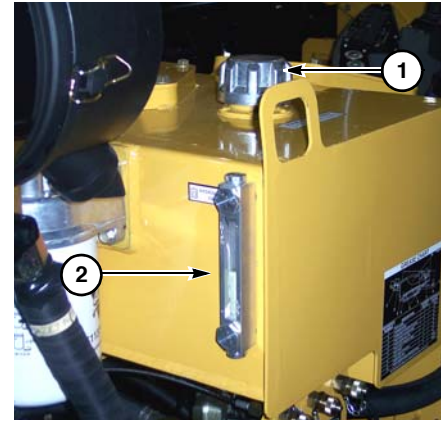
**NOTE:** Never add pure antifreeze to a cooling system. We recommend using a 50/50 mixture. Never use high-silicate antifreeze or antifreeze that is higher than 60/40 mixture.

## Hydraulic Fluid Level - Check

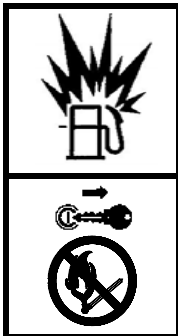
Clean hydraulic fluid is very important. Do not spill dirt or other contaminants into the tank. Filter all hydraulic fluid through a 5-micron filter before adding it to the tank. Check hydraulic fluid level.

Keep tank filled to sight gauge level. Machine must be level and in transport position. Refer to “Lubricants,” [page 80-1](#), for fluid specifications.

- Step 1:** Open engine cover.
- Step 2:** Remove fill cap (1).
- Step 3:** Fill to sight gauge level (2).
- Step 4:** Install fill cap.
- Step 5:** Close engine cover.



## Fuel Tank - Fill

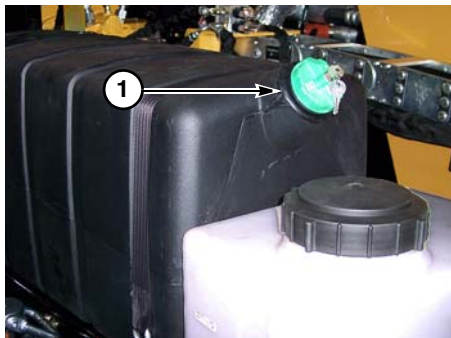


**WARNING:** Fuel and fumes can explode and burn.

Shut off engine before refueling. No flame. No smoking.

Fill fuel tank at the end of each day to reduce condensation. Do not fill to the very top; leave room for expansion.

- (1) **Fill Cap**
- (2) **Fuel Gauge**



## Fuel/Water Separators - Check



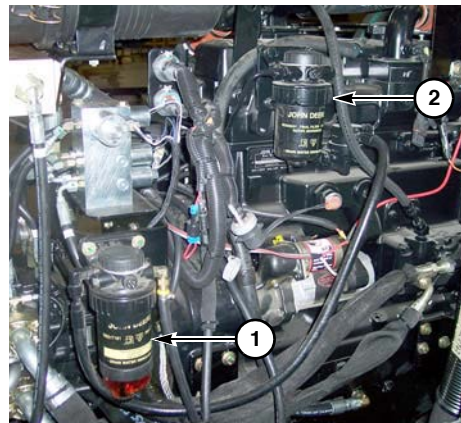
**WARNING:** Fuel and fumes can catch fire or explode, resulting in serious burns or death.

Never work around fuel while smoking or near an open flame.

- (1) **Secondary Fuel Filter with Water Separator**
- (2) **Primary Fuel Filter with Water Separator**

Check both fuel filters for water or debris. Drain water as needed based on daily visual inspection. Refer to “Fuel/Water Separators - Drain,” [page 60-2](#).

**IMPORTANT:** Do not spill fuel. Catch expelled fuel in an appropriate container.



## AIR CLEANER RESTRICTION INDICATOR - CHECK

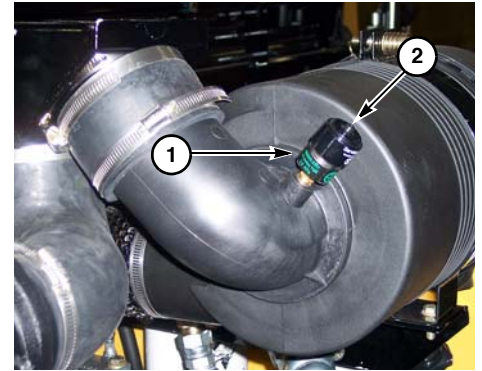
Check air cleaner restriction indicator daily. When the indicator (1) shows a colored band (usually red), filter elements must be replaced. Push button (2) to reset indicator.

- **Do not** remove the elements until the indicator shows they need to be replaced.
- **Do not** wash or blow out the elements. **Elements must be replaced.**

Replace air cleaner elements. Refer to “Air Cleaner Element - Replace,” [page 60-3](#).

**IMPORTANT:** The air restriction indicator will not function properly if:

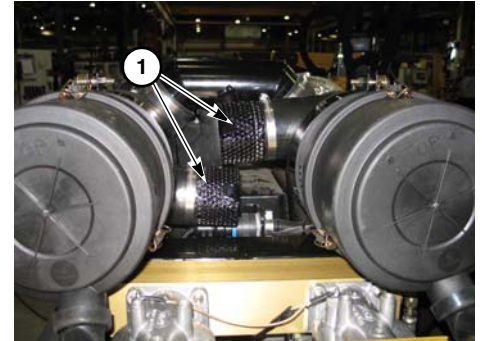
- Elements are damaged or not seated properly in housing.
- Air cleaner housing or element is damaged. If so, unfiltered air may be entering engine.
- Air transfer duct between air cleaners and engine is damaged or clamps are loose.
- Air duct between air cleaners and restriction indicator is damaged or pinched.



## AIR INTAKE SCREENS - CHECK AND CLEAN

Check air intake screens (1) for dirt and debris. Remove screens and clean with compressed air or water.

**NOTE:** Blocked air flow increases engine temperature.

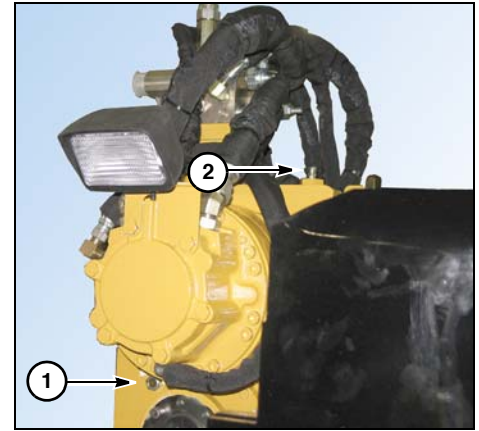


## ROTATION GEARBOX OIL - CHECK

Maintain oil level at sight gauge (1). Fill at fill plug (2). Refer to “Lubricants,” [page 80-1](#). Capacity is 6 qt (5.7 L).

## DRILL ROD CARE AND INSPECTION

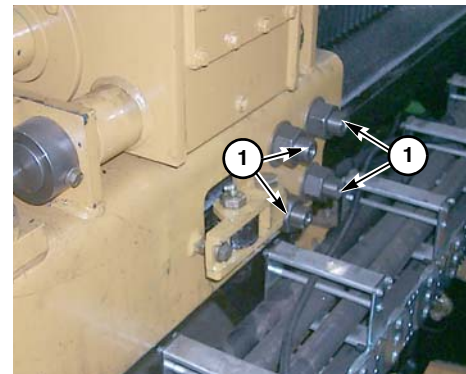
- Do not exceed bend radius of the drill rod.
- Do not over-torque or under-torque drill rods. Doing so will cause premature failure of the drill rod.
- Move leading rod to back of rod box after each job to prevent excessive wear on the lead rod.
- Inspect drill rods before and during each use.
- Remove any rod from drill string with damaged or worn ends.
- Remove any bent rod from drill string.
- Use proper thread or profile gauge to check for damaged thread.
- After rods are coupled together, check for fluid leakage at the joint.
- Leaking drill rod joints indicate damaged shoulders, which will not torque properly.
- Check shoulders for dents, gouges, or high spots.
- Dress damaged shoulders with a file.





## GEARBOX GUIDE ROLLERS - GREASE

If equipped with optional greasable guide rollers, apply 1–2 shots at 16 fittings (1): four on each corner of gearbox.

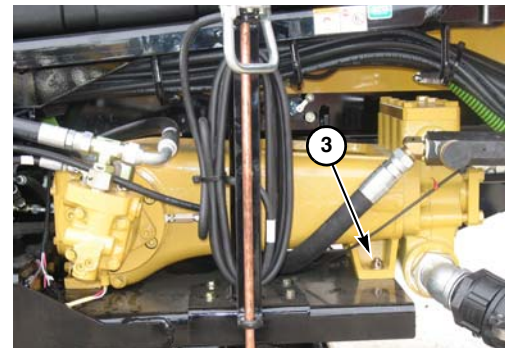
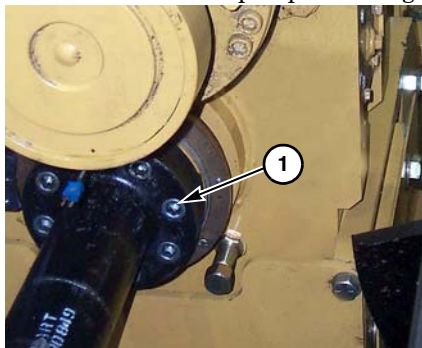


## BOLTS - CHECK/TIGHTEN

Check gearbox/drive chuck bolts (1) and tighten to 340 ft-lb (461 Nm).

Check four water pump/hydraulic motor bolts (2) and tighten to 60 ft-lb (81 Nm).

Check four water pump mounting bolts (3) and tighten to 300 ft-lb (407 Nm).



# ROCKFIRE PNEUMATIC ROCK DRILL - INSPECT AND GREASE

## RS6 RockFire - Inspect

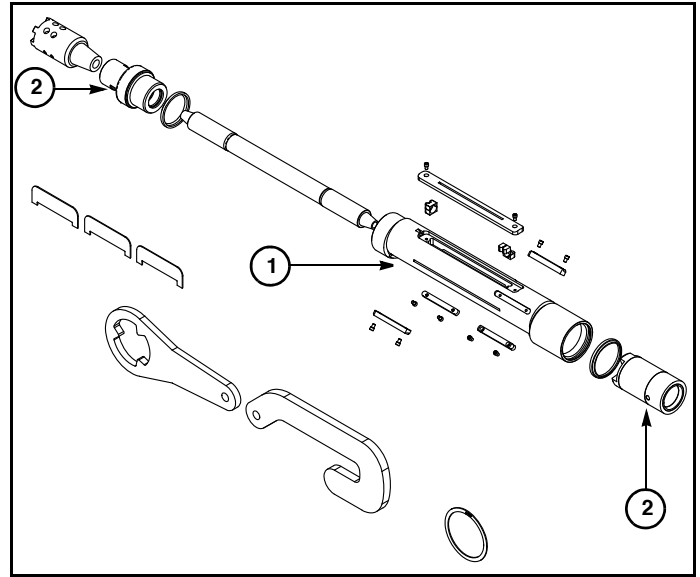
Body (1) should rotate freely and smoothly. Replace bearings if rotation is rough or “gritty.”

**NOTE:** Specialized tools are required to replace RS6 bearings. Contact your Vermeer dealer for assistance.

## RS6 RockFire - Grease

Grease two fittings (2) *before beginning each bore*. Apply until new grease oozes from the seals, expelling foreign material from the area.

**NOTE:** The 6” (152 mm) RS6 Drill head with body assembly weighs approximately 310 lb (141 kg).



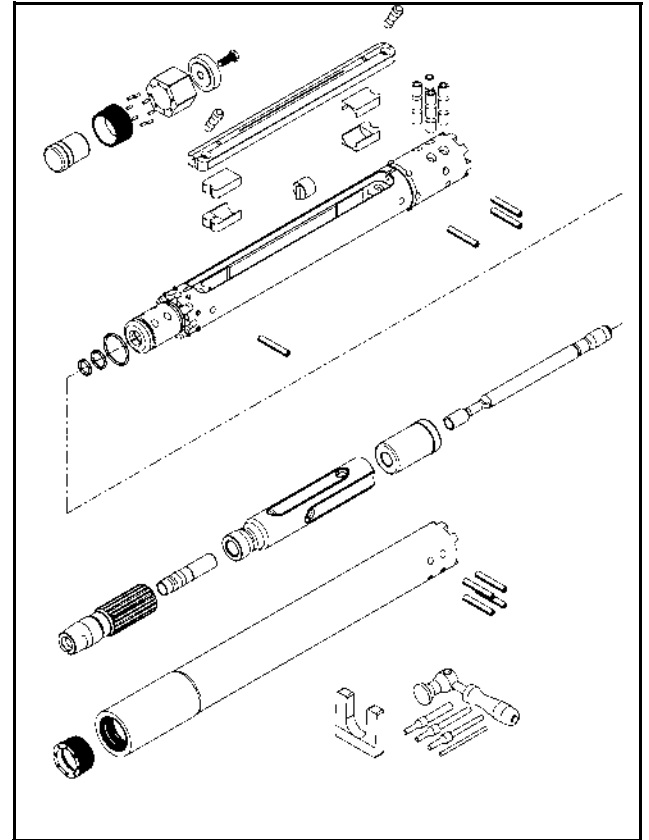
# ROCKFIRE PNEUMATIC ROCK DRILL - CLEAN AND STORE

## AS4 RockFire - Clean Between Bores

- Step 1: Keep AS4 on the drill string.
- Step 2: Turn off water/foam system.
- Step 3: Clean surface with wire brush.
- Step 4: Pump air and oil through AS4 until clean oil bleeds through unit.

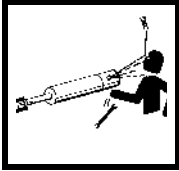
## AS4 RockFire - Store

- Step 1: Disassemble entire unit.  
Refer to Supplemental Operations Section in the *Operator's Manual* for disassembly instructions.
  - Step 2: Clean and oil all parts.
  - Step 3: Reassemble unit.
  - Step 4: Store in a clean dry place.
- NOTE:** The 4" (102 mm) AS4 Drill head with body assembly weighs approximately 140 lb (64 kg).



# R.A.T.T. TOOL

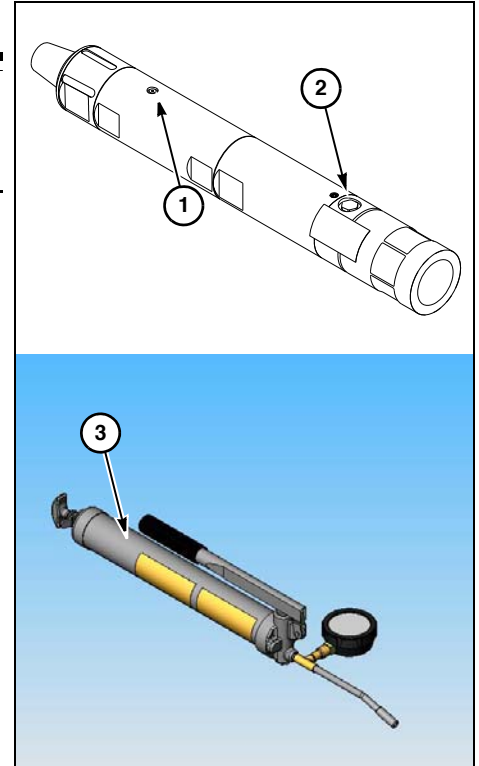
## Tool - Oil



**WARNING:** Some residual pressure may remain in the R.A.T.T. body. Use caution when removing any plugs. If residual pressure is present in the tool body, it will be released. Do not stand in front of any plugs when removing them.

Oil tool daily or after every bore. Use DEXRON III or MERCON automatic transmission fluid.

- Step 1:** Elevate fill vent plug (1) end of tool at a minimum angle of 10°.
- Step 2:** Remove vent plug and fill cap (2).
- Step 3:** Use oil gun (3) provided to fill tool. The attached pressure gauge will read around 50 psi (3.5 bar).
- Step 4:** As soon as the ATF flows out of the vent hole, install plug (1).
- Step 5:** Continue to fill the tool until the gauge reads approximately 70 psi (4.8 bar). Replace fill cap.

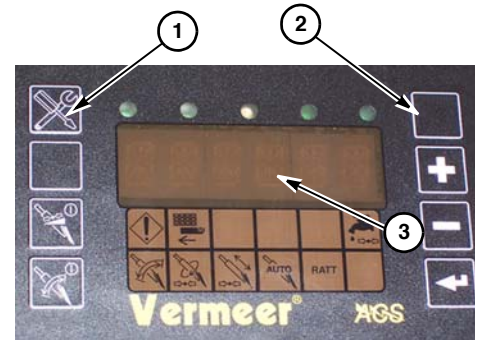


## Rotation Sensor Phase - Verify

Verify rotation sensor phase is calibrated correctly.

Press *Buttons* (1), then (2). Move *Rotation Handle* out of NEUTRAL. Display (3) should read a positive 85–90°.

To adjust, refer to “Rotation Sensor Phase - Adjust,” [page 60-12](#).



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# Section 25: Maintenance - 50 Service Hours or Weekly

## CONTROL LEVERS LINKAGE - CHECK/OIL

Check that control levers move freely and spring-return to NEUTRAL.

- (1) **Controls Levers Linkage**  
Lightly oil linkage attachment points.



## TRACK PLANETARY GEARBOX OIL LEVEL - CHECK

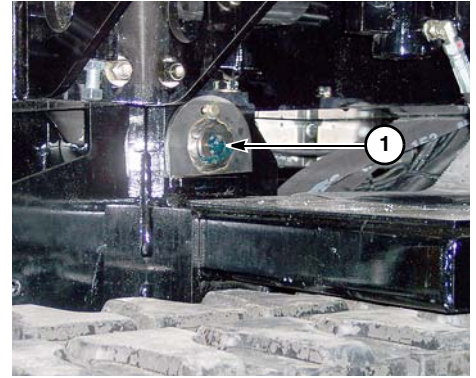
Check oil level with plug at 3:00 or 9:00 position. Fill to check plug level.

- (1) **Fill/Check/Drain Plug**  
Refer to “Lubricants,” [page 80-1](#), for oil specifications.



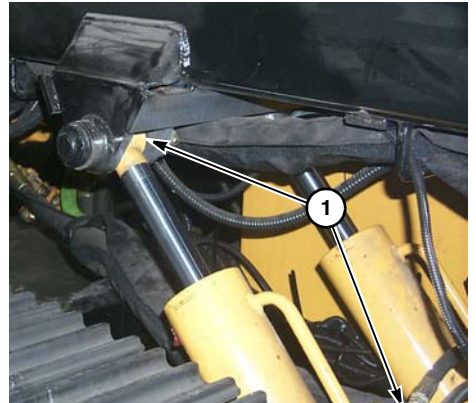
## RACK FRAME PIVOT - GREASE

(1) One shot ..... one fitting



## RACK FRAME PIVOT CYLINDERS - GREASE

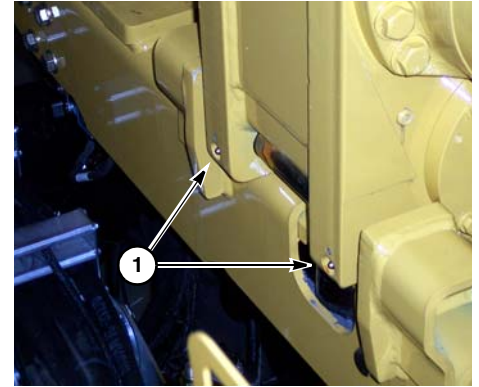
(1) One shot ..... two fittings per cylinder, two cylinders





## RACK CARRIAGE FLOAT - GREASE

- (1) One shot . . . . . two fittings on each side of carriage

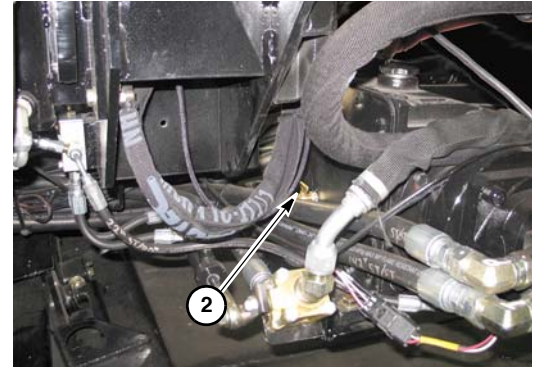
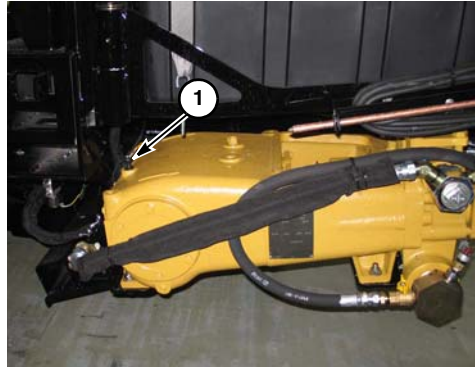


## DRILLING FLUID PUMP CRANKCASE OIL LEVEL - CHECK

Keep crankcase filled to petcock level.

- (1) **Aplex Pump petcock**  
(2) **FMC Pump petcock**

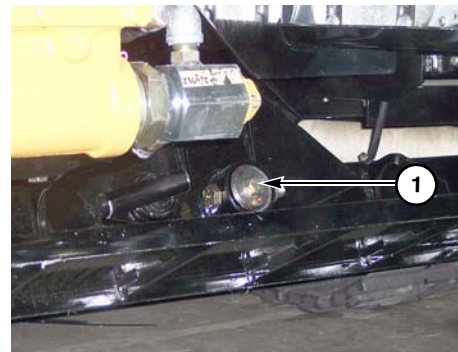
Refer to “Lubricants,” [page 80-1](#),  
for oil specifications.



## REAR STABILIZER - GREASE

- (1) One shot ..... two fittings

**NOTE:** Lower stabilizer onto level ground. The fitting is recessed in hole.



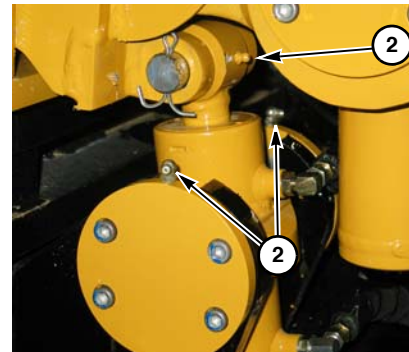
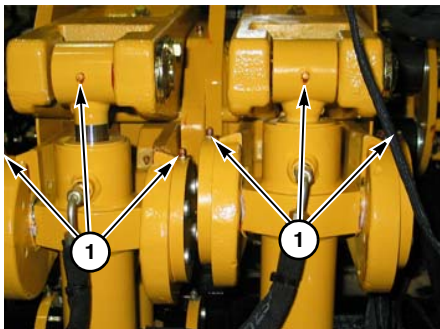
## POWER VISE CYLINDERS - GREASE

- (1) **Clamp Cylinders**

Two shots ..... three fittings per cylinder

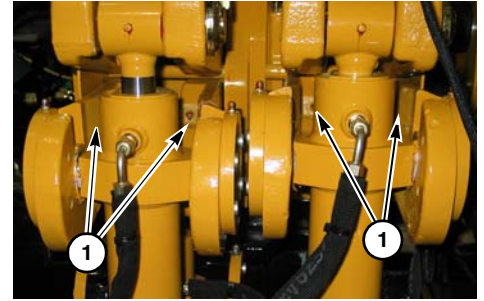
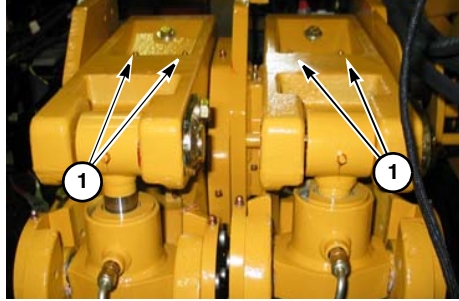
- (2) **Rotation Cylinders**

Two shots ..... three fittings each end

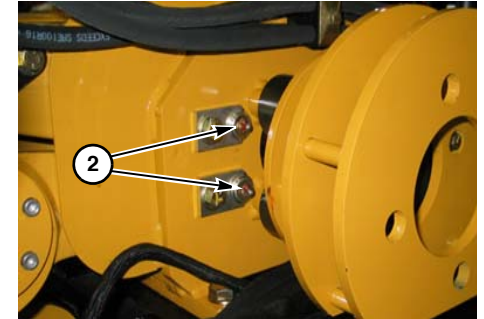
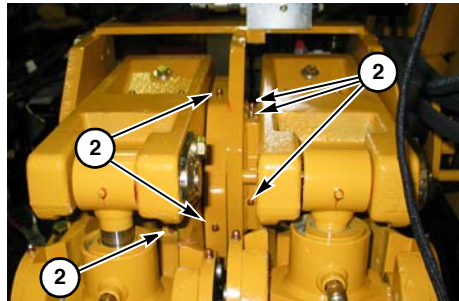
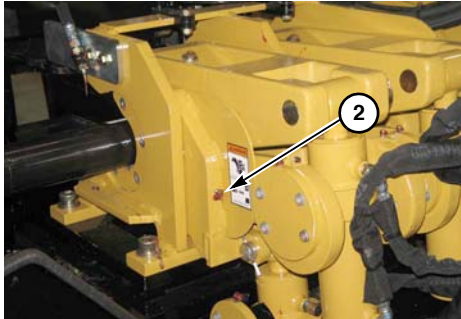


## POWER VISE - GREASE

- (1) **Vise Jaw Pivots**  
Two shots . . . . . eight fittings

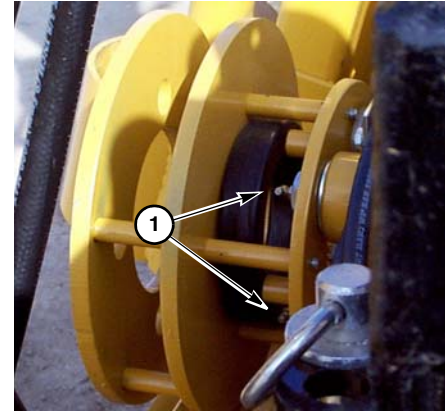


- (2) **Vise Frame Pivots**  
Two shots . . . . . nine fittings



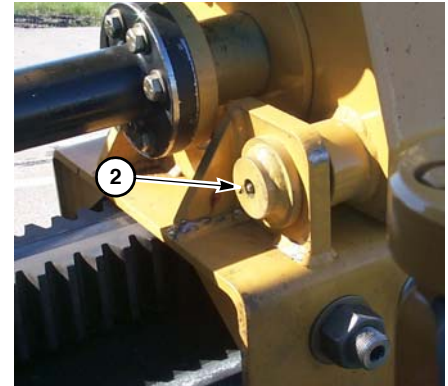
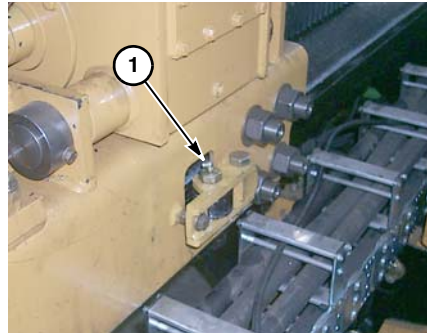
## FRONT ROLLER GUIDES - GREASE

- (1) Two shots ..... one fitting on each of four guide rollers



## ROTATION GEARBOX - GREASE

- (1) **Guide Rollers**  
One shot ..... two fittings
- (2) **Floating Slide Bars**  
One shot ..... two fittings  
One per side of gearbox



# Section 30: Maintenance - 100 Service Hours

## ENGINE MAINTENANCE

Refer to the Engine Operation Manual supplied with each machine for complete instructions.

### Engine Oil and Filter - Initial Change/Replacement

- (1) Engine Oil Drain Plug
- (2) Engine Oil Filter
- (3) Engine Oil Fill Cap
- (4) Engine Oil Dipstick

**IMPORTANT:** After changing engine oil and filter, oil must be distributed to all vital parts before starting engine.

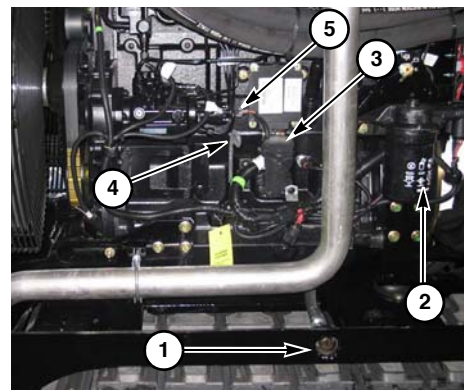
**Step 1:** Prevent engine from starting by disconnecting wire (5) to fuel shutoff solenoid.

**Step 2:** Crank engine for 30 seconds.

**Step 3:** Connect wire to fuel shutoff solenoid.

**Step 4:** Start engine and check for oil leaks.

**NOTE:** Under normal operating conditions, change oil and replace filter every 250 hours.



## **RADIATOR AND OIL COOLER - CLEAN**

Clean fins with water or air pressure. Partially blocked fins will increase engine coolant and/or hydraulic oil operating temperature.

## **DRILLING FLUID SYSTEM - CHECK**

Check drilling fluid system for leaks, kinked or collapsed hoses, and hoses or other parts that rub against each other.

## **SAFETY SIGNS MAINTENANCE**

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

To assure that all safety signs remain in place and in good condition, follow the instructions given below:

- Keep safety signs clean. Use soap and water - not mineral spirits, abrasive cleaners, or other similar cleaners that will damage the sign.
- Replace any 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.

## OVERALL MACHINE - CHECK

**Shields and Guards** – Check that all shields and guards are installed and are fastened securely to machine. Replace and repair any shields or guards that are damaged or have missing parts.

**Hardware** – Check machine for loose, worn, or missing parts and hardware. Tighten any loose parts and replace any worn or missing parts. Refer to the [Parts Manual](#) for replacement parts.

**Frame** – Check machine frame and contact Vermeer dealer immediately if you notice any bending or cracking.

**Fire Prevention** – Keep engine compartment, battery, hydraulic lines, fuel tank and operator's station clean of accumulated trash, grease, and debris.

**Slip Resistant Material** - Check for worn or missing slip-resistant strips. Replace at once if damaged. Refer to the [Parts Manual](#) for replacement parts.

**Electrical Harness** - Check that electrical harness and all wires are properly supported and not rubbing on any sharp corners. Support any loose wires hanging under machine frame.

## BATTERY VOLTAGE - CHECK

Hydraulic systems will not function with a low battery voltage.

Low battery voltage will be indicated by a loss of hydraulic power at the drill unit. If low voltage is suspected, follow [Shutdown Procedure](#), page [12-1](#), and determine the cause.

## HYDRAULIC SYSTEM - CHECK



**WARNING:** Pressurized fluid can penetrate body tissue and result in serious injury or death. Leaks can be invisible. Keep away from any suspected leak. Relieve pressure in the hydraulic system before searching for leaks, disconnecting hoses, or performing any other work on the system. If you must pressurize the system to find a suspected leak, use an object such as a piece of wood or cardboard rather than your hands. When loosening a fitting where some residual pressure may exist, slowly loosen the fitting until oil begins to leak. Wait for leaking to stop before disconnecting the fitting. Fluid injected under the skin must be removed immediately by a surgeon familiar with this type of injury.

- Ensure all connections are tight and hoses are in good condition before applying pressure to the system.
- Check hydraulic cylinders for leaks and damage. Repair or replace as required.
- Examine condition of hoses. Check for leaking hoses, kinked hoses, and for hoses that rub against other hoses or other parts of the machine.
- Replace all deteriorated or damaged hoses. When a hose with a protective sleeve is replaced, always install a new protective sleeve over the new hose.



## HYDRAULIC ENABLE - CHECK

A *Hydraulic Enable Button* on the operator's panel must be pressed after starting the engine and while sitting in the seat to enable hydraulics for the power vise, rod loader, and water system ball valve.

**Step 1:** Sit in operator's seat and start engine. Without pressing the *Hydraulic Enable Button*, press top of *Front Vise Switch (1)* to clamp vise. The front vise **should not function**.

**Step 2:** Return *Front Vise Switch* to release position.

**Step 3:** Press and release *Rod Lifter Button (3)*. The rod lifter should not function.

**Step 4:** Press *Hydraulic Enable Button (2)*.

**Step 5:** Press top of *Front Vise Switch (1)*. The front vise should clamp.

**Step 6:** Press *Rod Lifter Button (3)*. The rod lifter should move.

Contact a Vermeer dealer if Hydraulic Enable system does not work properly.



## OPERATOR PRESENCE SYSTEM - CHECK

The machine is equipped with an Operator Presence system. This system is intended for operator safety and must be maintained in good functional condition.

Transport, rod thrust and rotation drive will not function if operator is not seated at the controls. Transport and rack angle controls will not function with operator seated at controls.

To check Operator Presence system:

- Step 1:** Press and hold *Run Button* on remote lockout transmitter for two seconds to enter remote lockout RUN mode.
- Step 2:** Push *Thrust/Pullback Handle* forward. The gearbox should move forward.
- Step 3:** While gearbox is moving, partially stand to remove your weight from the seat. **The gearbox must stop moving.**
- Step 4:** Sit in operator's seat.
- Step 5:** Pull *Drill Rotation Handle* back to rotate drill rod.
- Step 6:** While rod is rotating, partially stand to remove your weight from the seat. **Rod rotation must stop.**
- Step 7:** With operator in seat, have an assistant move the *Propel Handles* out of NEUTRAL. The tracks must not move.

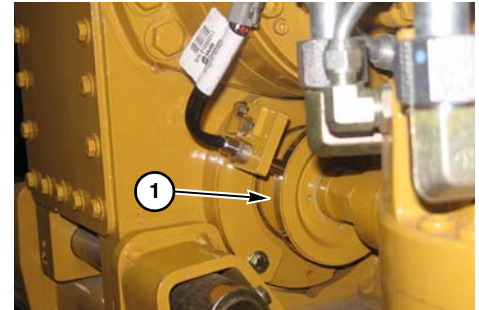
Contact a Vermeer dealer if either the Hydraulic Enable or Operator Presence system does not work properly.

## NEUTRAL START INTERLOCK - CHECK

- Step 1:** Move and hold *Thrust Control Handle* out of NEUTRAL position.
- Step 2:** Start the engine. Thrust must not move until handle is returned to NEUTRAL and then moved back out of NEUTRAL. Shut off engine.
- Step 3:** Move and hold *Rotation Control Handle* out of NEUTRAL position.
- Step 4:** Start the engine. Rotation must not move until handle is returned to NEUTRAL and then moved back out of NEUTRAL.
- Step 5:** Return handle to NEUTRAL.
- Step 6:** Increase engine speed to full RPM. Rotation, thrust and ground drive must not move with controls in NEUTRAL and engine at full RPM with operator seated at the controls.

## R.A.T.T. PULSE RING - CHECK/CLEAN

Shut down machine and check magnetic pulse ring (1) for bits of metal sticking to it. Clean off all metal and debris.



## GROUND DRIVE SYSTEM - INSPECT

Check condition of wear plates and washers. Replace if missing or if thickness is less than 1/16" (1.6 mm).

**(1) Upper Track Wear Plate**

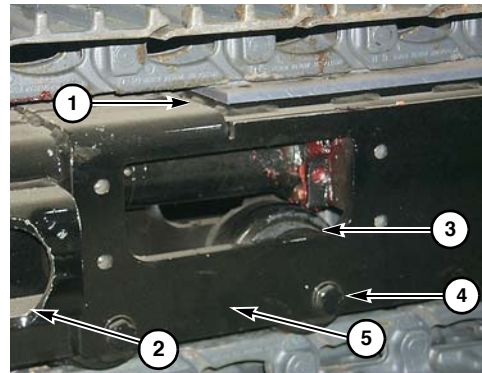
One on each side. Visible at the location indicated.

**(2) Lower Track Wear Plates**

Seven on each side. Ensure all rollers roll when track weight is on them and machine is moving. Replace a roller if it will not turn.

**(3) Roller Wear Washers**

Seven on each side—located on inside of plate (5) at bolts (4).



### Track Pads and Bolt Tension

Check for loose or damaged track pads. Replace damaged pads. Tighten any loose bolts.

### Track Chain Tension

Refer to “Track Tension - Adjust,” [page 60-9](#).

# Section 35: Maintenance - 250 Service Hours

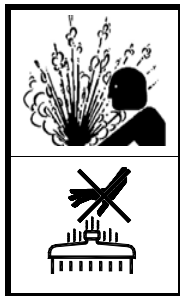
## ENGINE MAINTENANCE

Refer to the Engine Operation Manual supplied with each machine for complete instructions.

- Engine Mounts - Check
- Automatic Belt Tensioner Spring Tension and Belt Wear - Check
- Engine Oil and Filter - Change and Replace

Refer to “Engine Oil and Filter - Initial Change/Replacement,” [page 30-1](#).

## COOLING SYSTEM ADDITIVE - ADD



**WARNING:** Hot fluid under pressure can scald.

Allow engine to cool before opening radiator cap.

Add 6.5 oz (192 ml) of Cool-Gard DCA4 to cooling system to restore corrosion inhibitors.

# HYDRAULIC FLUID FILTERS - INITIAL REPLACEMENT

Replace hydraulic fluid filter:

- after initial 250 service hours; every 500 service hours thereafter
- each time hydraulic fluid is changed

## (1) Return Filters

## (2) Charge Filters

**Step 1:** Follow [Shutdown Procedure](#), page [12-1](#).

**Step 2:** Thoroughly clean area around filter to keep contaminants out of hydraulic system.

**Step 3:** Use a filter wrench to turn filter body (1) and (2) counterclockwise to remove filters.

**Step 4:** Carefully clean mating surface of filter head. Look for cracks or pitting in filter head. If needed, replace filter head.

**Step 5:** Apply a thin film of oil to gasket of new filter.

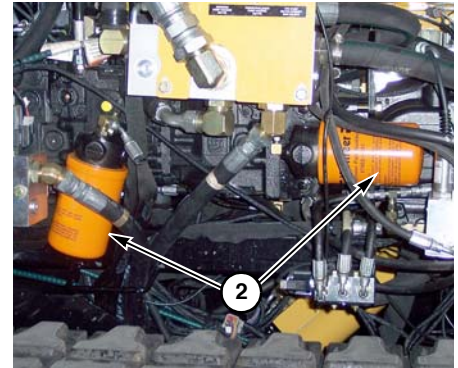
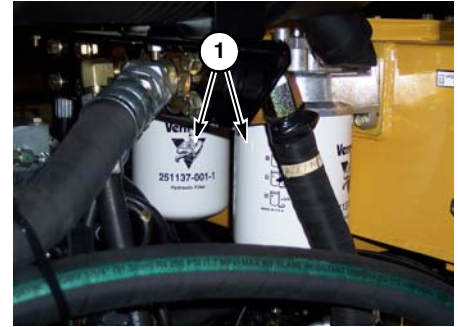
**Step 6:** Thread filter onto filter head and tighten by hand until it is snug.

**Step 7:** Use a filter wrench to tighten filter an additional 1/10 turn. **Do not overtighten.**

**Step 8:** Start engine and allow it to idle for one minute.

**Step 9:** After one minute, press [Hydraulic Enable Button](#) and cycle all hydraulic cylinders and drill functions to fill all components. Shut down and check hydraulic fluid level. Check for leaks around filter.

**IMPORTANT:** If leaks are found, tighten filter only enough to stop the leak.

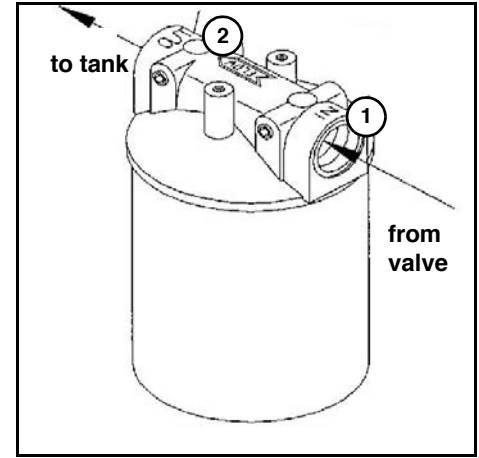


## Hydraulic Fluid Flow Direction

When replacing a filter head, note that “IN” (1) and “OUT” (2) are stamped above the ports, with an arrow to indicate direction of oil flow through the filter head.

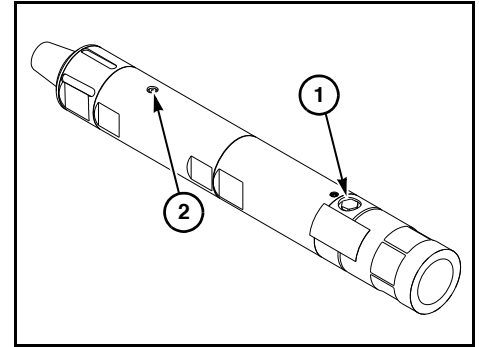
The filter head has a built-in relief, which will open and bypass the filter element if hydraulic fluid is cold or if filter is dirty or clogged.

If the filter head is installed backwards, the relief will not function, and cold fluid or a clogged filter can cause damage to the hydraulic system.



## R.A.T.T. TOOL OIL - CHANGE

- Step 1:** Elevate fill vent plug **(2)** end of tool at a minimum angle of 10°.
- Step 2:** Remove vent plug and fill cap **(1)** and drain oil.
- Step 3:** Use oil gun provided to fill tool. The attached pressure gauge will read around 50 psi (3.5 bar).
- Step 4:** As soon as the ATF flows out of the vent hole, install plug **(2)**.
- Step 5:** Continue to fill the tool until the gauge reads approximately 70 psi (4.8 bar). Replace fill cap.





# Section 40: Maintenance - 500 Service Hours

## ENGINE MAINTENANCE

Refer to the Engine Operation Manual supplied with each machine for complete instructions.

- Crankcase Vent Tube - Clean
- Air Intake System - Check
- Electrical Ground Connection - Check
- Cooling System - Check coolant concentration and pressure test.

## HYDRAULIC FLUID FILTERS - REPLACE

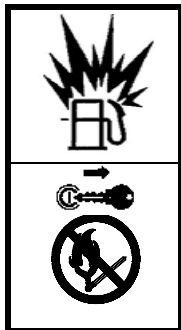
Refer to procedure “Hydraulic Fluid Filters - Initial Replacement,” [page 35-2](#).

Look for cracks or pitting in filter head. Replace filter head as needed. Refer to “Hydraulic Fluid Flow Direction,” [page 35-3](#), for filter head replacement instructions.

## DRILLING FLUID PUMP CRANKCASE OIL - INITIAL CHANGE

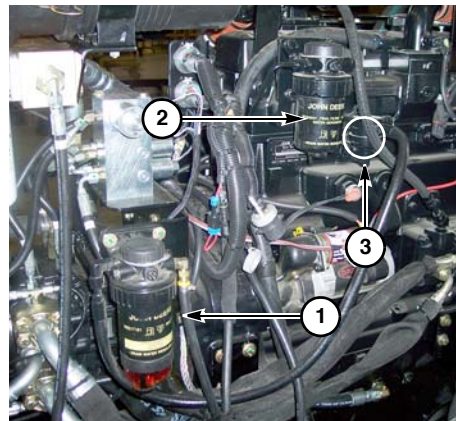
Change oil after initial 500 service hours and every 1000 hours thereafter. Refer to “Drilling Fluid Pump Crankcase Oil - Change,” [page 45-2](#).

## FUEL FILTERS - REPLACE



**WARNING:** Fuel and fumes can explode and burn.

Shut off engine before refueling. No flame. No smoking.  
Clean up any spilled fuel.



**NOTE:** Replace fuel filters sooner than 500-hour interval if engine loses power.

(1) **Primary Fuel Filter with Water Separator**

(2) **Final Fuel Filter with Water Separator**

**Step 1:** Clean area around fuel filters.

**IMPORTANT:** Do not spill fuel. Catch expelled fuel in an appropriate container.

**Step 2:** Remove filters by turning them counterclockwise.

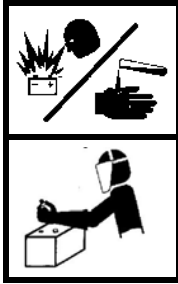
**Step 3:** Spin on new filters. Hand tighten, then turn an additional 3/4 turn.

**Step 4:** Open drain plug on primary filter (1).

**Step 5:** Prime final fuel filter (2) by operating primer lever (3) until expelled fuel is free of air bubbles. Close drain plug.

**Step 6:** Start engine and check for leaks.

## BATTERY MAINTENANCE



**WARNING:** Battery fumes are flammable and can explode. Keep all burning materials away from battery. Battery explosion can blind. Acid can blind and burn. Tools and cable clamps can make sparks.

Do not smoke. Shield eyes and face. Read instructions.

- Use a flashlight to check electrolyte level.
- Work in a well-ventilated area.
- Avoid breathing fumes from battery.
- Avoid contact with skin, eyes, or clothing.
- Keep flame and sparks away, and do not smoke.
- Keep out of reach of children.
- Do not short across battery terminals or allow tools to short from battery terminals to frame.
- Do not jump-start or charge a battery with frozen electrolyte.

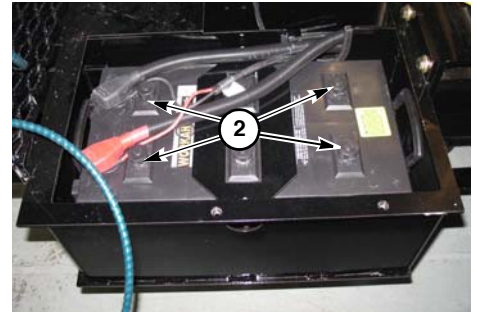
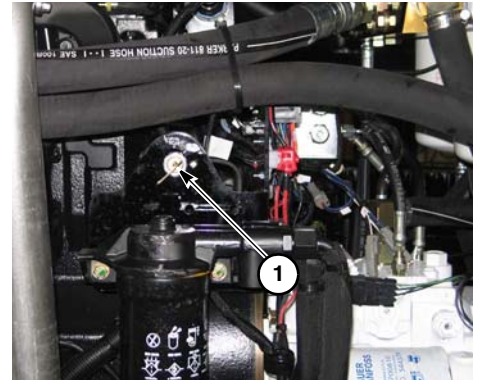
In case of acid contact:

**External:** Flush with plenty of water. If eyes have been exposed, flush with water for 15 minutes and get prompt medical attention.

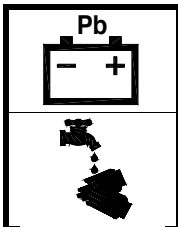
**Internal:** Drink large quantities of water or milk, follow with milk of magnesia, beaten egg, or vegetable oil. Call a physician immediately.

## Battery Electrolyte Level - Check

- Step 1:** Raise engine bay hood.
- Step 2:** Disconnect battery ground using the *Battery Disconnect Switch (1)*.
- Step 3:** Remove battery cover. Cab version: refer to “Battery Access in Cab Machine,” [page 40-6](#), for access. Non-cab version: battery located on frame between seat pedestal and hydraulic tank; remove bolts and shield to access.
- Step 4:** Remove cell caps (2).
- Step 5:** Fill each cell with distilled water until plate tops are covered.
- IMPORTANT:** If battery is underfilled, electrolyte will be too concentrated, causing plates to deteriorate more rapidly. Do not overfill. In freezing weather run engine for a few minutes immediately after filling battery, to allow proper mixing of water and electrolyte. If battery uses too much water, check system for overcharging.
- Step 6:** Install cell caps.
- Step 7:** Install battery cover.
- Step 8:** Reconnect battery ground with *Battery Disconnect Switch*.
- Step 9:** Close and lock engine bay hood.



## Battery Terminals - Clean



**WARNING:** Battery post, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer and reproductive harm.

Wash hands after handling.

**Step 1:** Raise engine bay hood. Disconnect battery ground using the *Battery Disconnect Switch (1)*.

**Step 2:** Remove battery cover (located on frame between seat pedestal and hydraulic tank).

**Step 3:** Remove negative (-) cable (**2**), then positive (+) cable (**3**).

**Step 4:** Clean terminals and clamps with a stiff wire brush.

**Step 5:** Apply a light coating of petroleum jelly around base of each terminal.

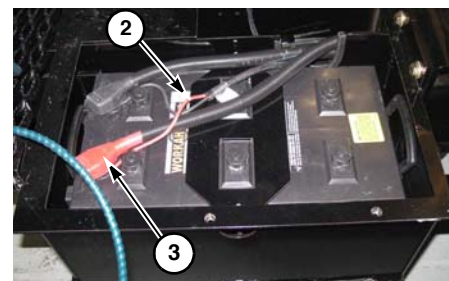
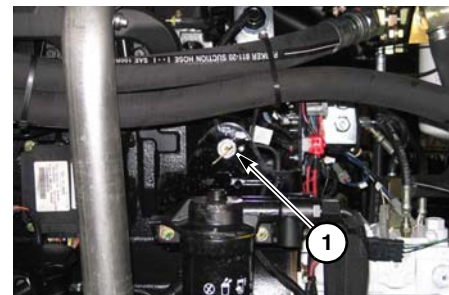
**IMPORTANT:** Keep top of battery clean. If necessary, wash it with a baking soda solution, then rinse with clean water. Do not let any baking soda solution enter battery.

**Step 6:** Install positive cable, then negative cable. Install plastic cap over positive cable clamp.

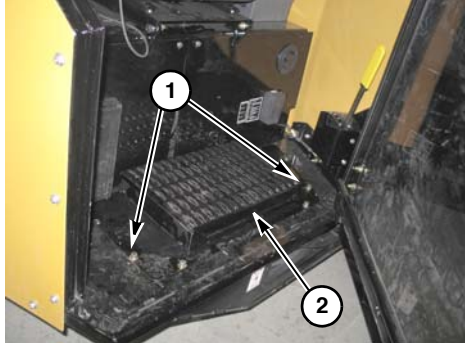
**Step 7:** Reconnect battery ground with *Battery Disconnect Switch (1)*.

**Step 8:** Install battery cover.

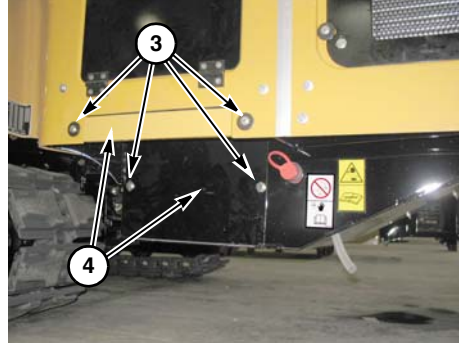
**Step 9:** Close and lock engine access door.



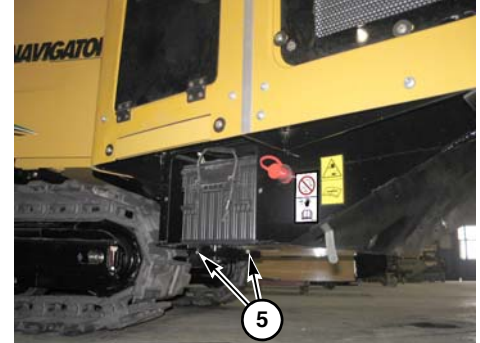
## Battery Access in Cab Machine



Inside cab, remove bolts (1) and shield (2).



Under cab in the back, remove two bolts (3) and shields (4).



On bottom of battery compartment, remove two bolts (5), which connect to hold-down bracket.

Remove positive and negative cables from inside cab, and slide battery out the back.

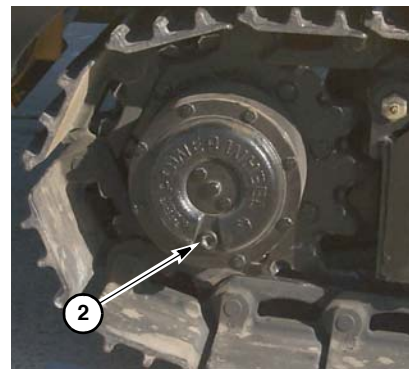
# Section 45: Maintenance - 1000 Service Hours

## TRACK GEARBOX OIL - CHANGE

### Fill/Check/Drain Plug

- (1) Fill/check at 3:00 or 9:00 position: Fill to check plug level.
- (2) Drain position: Rotate plug to bottom to drain.

Refer to “Lubricants,” [page 80-1](#), for oil specifications.



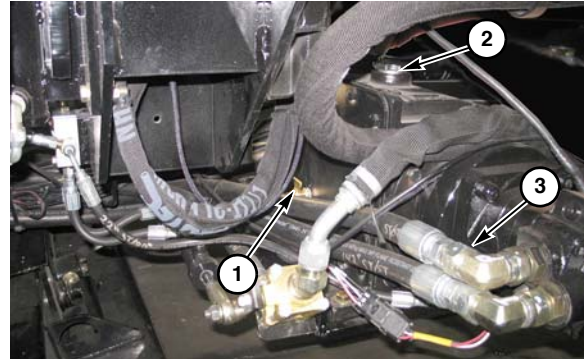
## DRILLING FLUID PUMP CRANKCASE OIL - CHANGE

Drain tank, and fill to petcock level. Refer to “Lubricants,” [page 80-1](#).

If oil appears milky, water is seeping past the plunger stem seals. Contact your Vermeer dealer.

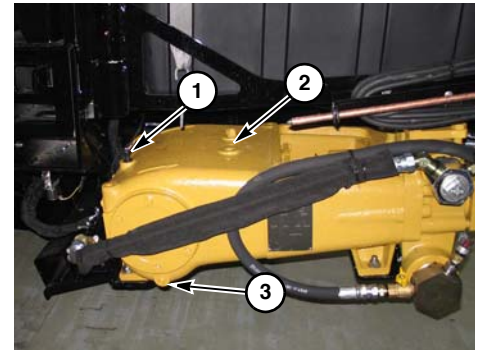
### FMC Pump

- (1) **Check Petcock**
- (2) **Fill Cap**
- (3) **Drain Plugs** (behind hoses, one on each side of tank)



### Aplex Pumps

- (1) **Check Petcock**
- (2) **Fill Port/Breather**
- (3) **Drain Plug**





# HYDRAULIC FLUID - CHANGE

## Hydraulic Fluid - Drain

**NOTE:** If fluid smells burnt, contains air bubbles, or appears contaminated, consult your Vermeer dealer immediately.

**Step 1:** Run engine until hydraulic fluid is warm.

**Step 2:** Follow [Shutdown Procedure](#), page [12-1](#).

**Step 3:** Remove fill cap (1).

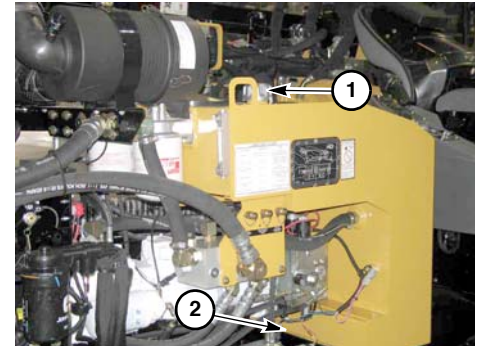
**Step 4:** Remove drain plug (2) from bottom of hydraulic tank and drain fluid into a suitable container; 55 gal (208 L) capacity minimum.

**Step 5:** Clean and inspect drain plug.

**NOTE:** Contact your Vermeer dealer if excessive metal particles are found on the magnetic drain plug.

**Step 6:** Install drain plug.

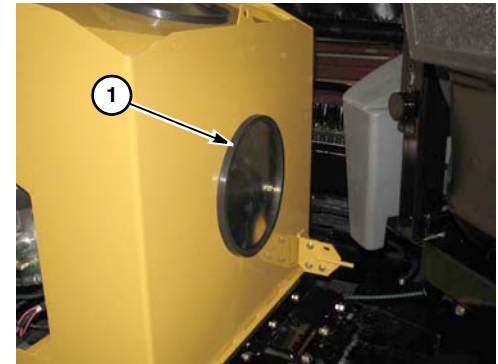
**Step 7:** Replace hydraulic filter; refer to “Hydraulic Fluid Filters - Initial Replacement,” [page 35-2](#).



## Strainer - Remove

**Step 1:** Remove access cover (1) and O-ring.

**Step 2:** Unscrew strainer and remove it from inside the tank.



## Strainer - Clean and Inspect

Clean strainer with a petroleum-based paint thinner or other good cleaning solvent. Scrub strainer with a soft-bristled brush.

Inspect strainer. Consult a Vermeer dealer if you find any of the following:

- lacquers which may have formed as a result of hot spots in the hydraulic system
- an extremely dirty strainer that will not come clean
- metallic particles on the screen mesh
- any evidence of a hydraulic system failure
- any evidence of holes or other damage that would allow unfiltered oil to circulate in the hydraulic system

## Strainer - Install

Install strainer, O-ring, and access cover.

## Tank - Fill

**IMPORTANT:** Clean hydraulic fluid is very important for longer life and good operation of hydraulic components. Take care not to spill dirt or other contaminants into the tank when checking or adding hydraulic fluid. Filter all hydraulic fluid through a 5-micron filter before adding it to the tank.

**Step 1:** Fill hydraulic fluid tank. Refer to “Lubricants,” [page 80-1](#), for oil specifications.

**Step 2:** Install and tighten fill cap.

**Step 3:** Start engine, press *Hydraulic Enable Button* and cycle all hydraulic cylinders and drill functions to fill all components.

**Step 4:** Check hydraulic fluid level. The fluid level must be within the upper half of the sight gauge.

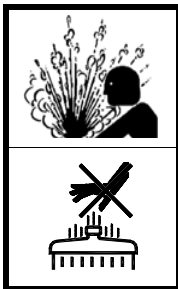
# Section 50: Maintenance - 2000 Service Hours

## ENGINE MAINTENANCE

Refer to the Engine Operation Manual supplied with each machine for complete instructions.

- Thermostats - Check
- Valve Clearance - Adjust

## COOLING SYSTEM - DRAIN AND CLEAN



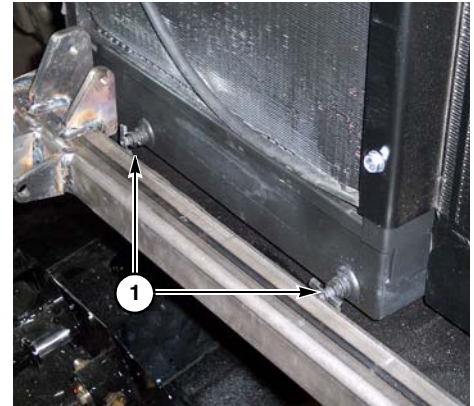
**WARNING:** Hot fluid under pressure can scald.

Allow engine to cool before opening radiator cap.

- Step 1:** Follow *Shutdown Procedure*, page 12-1.
- Step 2:** Drain old coolant from system by opening petcocks (1) on radiator. The system holds approximately 4.5 gal (17 L).
- Step 3:** Close petcocks.
- Step 4:** Fill radiator with clean water. Add a cooling system cleaner to water if drained coolant appears excessively rusty.
- Step 5:** Install radiator cap. Run engine long enough to ensure thermostat has opened, allowing engine and radiator to receive fresh water.
- Step 6:** Shut off engine. Allow system to cool, then remove radiator cap and open petcocks to drain water.

## Cooling System - Refill

- Step 1:** Close petcocks. Use 2.2 gal (8.3 L) of low-silicate ethylene glycol antifreeze and 2.2 gal (8.3 L) of clean water to prepare a 50/50 water/antifreeze mixture. Add most but not all of mixture to radiator. Do not fill it completely.
- Step 2:** Run engine until mixture has circulated through system.
- Step 3:** Add 20 oz (591 ml) of Cool-Gard DCA4. Finish filling radiator with 50/50 water/antifreeze mixture. Install radiator cap.
- Step 4:** Recheck radiator after engine has cooled overnight. As air works out of system, you may need to add more water/antifreeze mixture to keep radiator full. Continue checking before starting each day until radiator remains full.



# Section 60: Maintenance - As Required

## ENGINE MAINTENANCE

Refer to the Engine Operation Manual supplied with each machine for complete instructions.

- Fan and Alternator Belt - Replace
- Fuses - Check/Replace
- Fuel System - Bleed

## ENGINE COMPARTMENT - CLEAN

Inspect and clean engine compartment frequently to prevent engine compartment fires. Always clean up spilled fuels and lubricants, including any debris that is fuel or oil contaminated. Use appropriate methods to dispose of contaminated materials.

## FUEL/WATER SEPARATORS - DRAIN



**WARNING:** Fuel and fumes can catch fire or explode, resulting in serious burns or death.

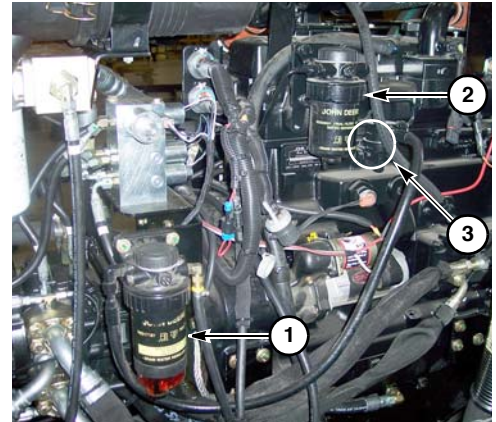
Never work around fuel while smoking or near an open flame.

- (1) **Secondary Fuel Filter with Water Separator**
- (2) **Primary Fuel Filter with Water Separator**

Check both fuel filters for water or debris. Drain water as needed based on daily visual inspection.

**IMPORTANT:** Do not spill fuel. Catch expelled fuel in an appropriate container.

Ensure system is free of air bubbles by operating primer lever (3).



## AIR CLEANER ELEMENT - REPLACE

When air filter indicator (1) shows a colored band (usually red), *replace both filter elements*.

**NOTE:** Do not attempt to clean and return a used element to service.

**Step 1:** Unbuckle and remove cover.

**Step 2:** Remove dirty air cleaner element.

Refer to the Engine Operation Manual supplied with the machine to determine model and number of correct replacement filter.

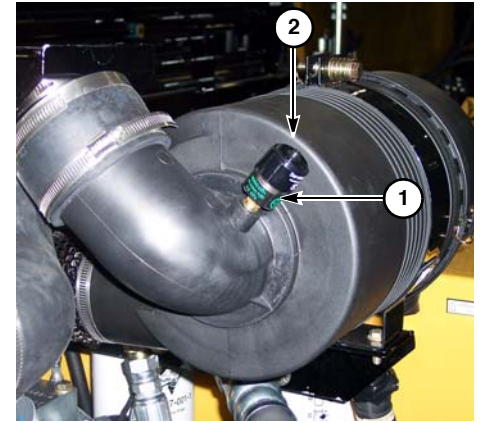
**Step 3:** Check replacement air cleaner element for damage.

**Step 4:** Install replacement air cleaner.

**NOTE:** Ensure end of element is installed against closed end of air cleaner assembly, and is seated properly.

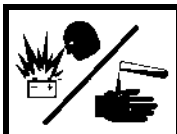
**Step 5:** Install end of air cleaner assembly. Ensure all buckles are properly closed.

**Step 6:** Reset indicator by pushing on button (2).

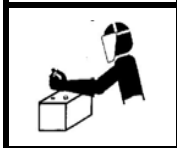


## BATTERY - REPLACE

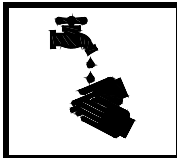
Replacement batteries must meet standard battery specifications provided in *"Machine Specifications," page 80-3.*



**WARNING:** Battery fumes are flammable and can explode. Keep all burning materials away from battery. Battery explosion can blind. Acid can blind and burn. Tools and cable clamps can make sparks.



Do not smoke. Shield eyes and face. Read instructions.

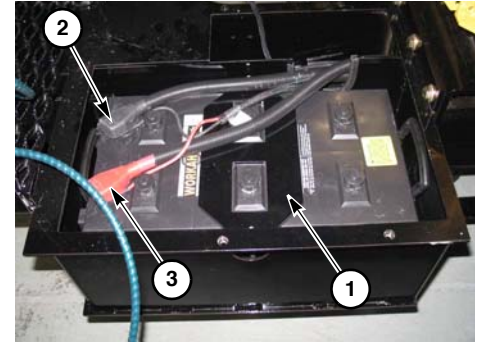


**WARNING:** Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm.

Wash hands after handling.



- Step 1: Turn *Battery Ground Disconnect Switch* to DISCONNECTED.
- Step 2: Remove battery access cover (located on frame between seat and hydraulic tank).
- Step 3: Remove battery hold-down bracket (1).
- Step 4: Remove negative (-) cable (2) first. Then remove positive (+) cable (3).
- Step 5: Remove battery and install new battery.
- Step 6: Spray cables and terminals with a battery terminal sealer.
- Step 7: Install battery hold-down bracket (1).
- Step 8: Install positive (+) cable (3) and then negative (-) cable (2). Check that red cap is properly installed over positive cable clamp.
- Step 9: Connect battery ground using *Battery Disconnect Switch*.
- Step 10: Install battery access cover.



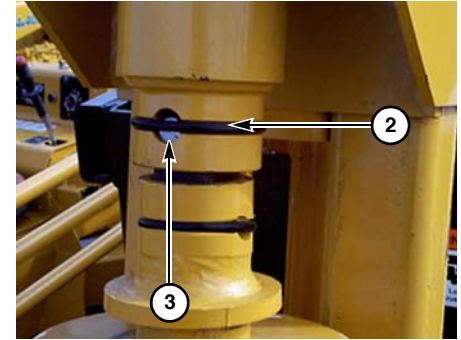
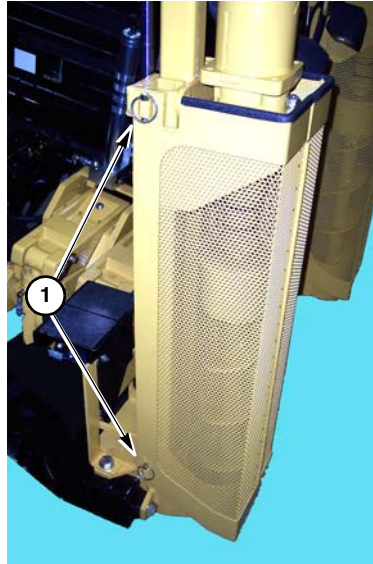
## Battery Access in Cab Machine

Refer to “Battery Access in Cab Machine,” [page 40-6](#).

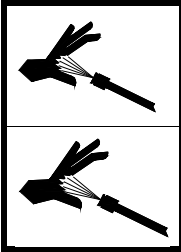
## STAKEDOWNS - REMOVE/INSTALL

To remove or install stakes on machine:

- Step 1:** Remove pins (1) to open stakedown auger guard.
- Step 2:** Roll rubber ring (2) out of groove.
- Step 3:** Support stake while removing pin (3).
- Step 4:** Remove stake.
- NOTE:** Reverse procedure to install stake.
- Step 5:** Close auger guard and install pins.



## DRILL THRUST RACK AND PINION MAINTENANCE

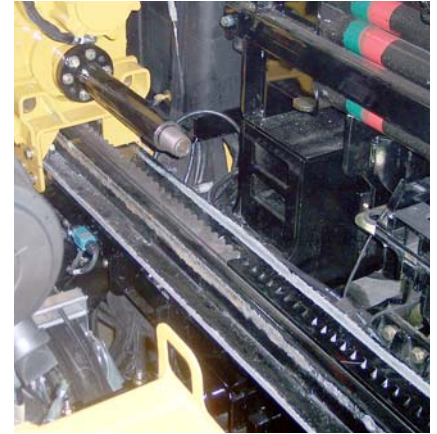


**WARNING:** High pressure water can penetrate skin. Serious injury is possible.

Keep nozzles away from body.

Power wash drill thrust rack and pinion gears each time the machine is washed down or as needed to ensure gears remain free of foreign materials.

**NOTE:** Do not apply grease on rack or pinion gears. Dust, dirt and other foreign matter will adhere to the grease and can cause premature failure of rack and pinion gears.



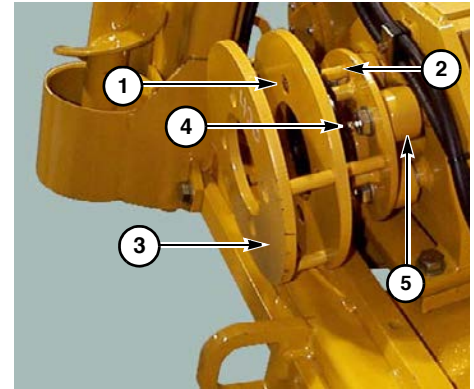
## ROD GUIDE ROLLERS - REPLACE

Replace rollers (5) if there is excessive play in the bearing, or if rollers do not turn freely.

**Step 1:** Remove bolts (1), tubes (2), and rod wiper holder (3).

**Step 2:** Remove bolts (4), washers, and rollers (5).

**Step 3:** Assemble in reverse order. Torque bolts (1) to 35 ft-lb (47 Nm). Torque bolts (4) to 305 ft-lb (414 Nm).



## WISE JAW GRIPS - REPLACE

**Step 1:** Open vise jaws and shut off engine.

**Step 2:** Remove bolts (1) to replace top grips. Install new top grips.

**Step 3:** Close vise jaws and shut off engine.

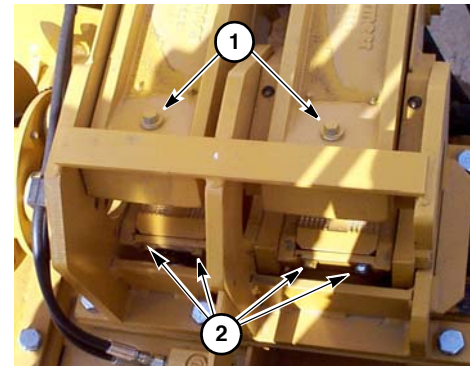
**Step 4:** Remove bolts (2) to replace bottom grips.

**Step 5:** Open vise jaws and shut off engine.

**Step 6:** Remove and replace bottom grips.

**Step 7:** Close vise jaws and shut off engine.

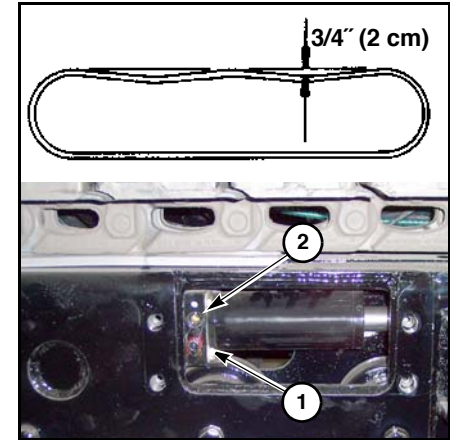
**Step 8:** Install bottom grip retainer bolts.



## TRACK TENSION - ADJUST

Track tension is set with a grease cylinder which compresses a spring against the idler roller.

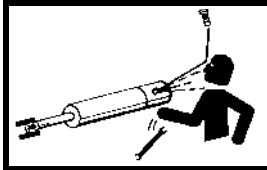
With clean tracks, the proper tension is 3/4" (2 cm) of slack when measured as shown.



### Track Tension - Increase

- Step 1: Remove access cover.
- Step 2: Attach grease gun to the fitting on ball check (1). Add grease to grease cylinder until track is properly tensioned.
- Step 3: Install access cover.

### Track Tension - Decrease



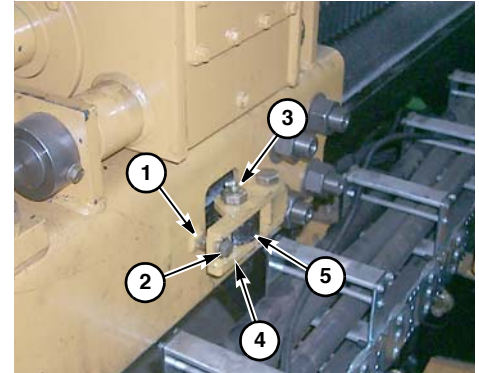
**WARNING:** The track tensioning system is under high pressure and may result in personal injury if not released according to the instructions given below.

- Step 1: Remove access cover.
- Step 2: Loosen Allen screw (2) about one-half turn. Allow grease to come out until track tension is correct. Tighten screw and clean up expelled grease.
- Step 3: Install access cover

## GEARBOX GUIDE ROLLERS - REPLACE

To remove rollers:

- Step 1: Loosen jam nut (1).
- Step 2: Remove setscrew (2) and bolt (3).
- Step 3: Swing bracket (4) open.
- Step 4: Remove roller (5).
- Step 5: Install new roller.
- Step 6: Close bracket (4) and install setscrew (2) and bolt (3). Tighten jam nut (1).



## Gearbox Guide Rollers - Adjust

Adjust guide rollers after replacing.

- Step 1: Position gearbox at widest point on rack.

On each side, loosen jam nut (1) and adjust setscrew (2) till snug.

Clockwise . . . . . tighten (push roller against rack)

Counterclockwise . . . . . loosen (pull roller away from rack)

- Step 2: After adjusting, slowly move gearbox up and down rack to ensure no binding between gearbox and rack. If gearbox drags on rack, loosen setscrew (2) 1/4 turn and test again.
- Step 3: Repeat test until operation is smooth.

## ETHER CYLINDER (OPTIONAL) - CHECK AND REPLACE

Machine may be equipped with an optional automatic cold weather starting system. Sensors automatically inject ether into the engine when the engine is turned over and the temperature is low enough. There are no machine gauges or indicators for this system.



**WARNING:** Starting fluid is highly flammable and can explode. Keep container away from heat, sparks, and open flame. Do not puncture or incinerate container.

Determine quantity of ether remaining by weighing cylinder. Full cylinder weight: 18 oz (510 g). Empty cylinder weight: 10 oz (283 g).

To replace cylinder:

**Step 1:** Read all instructions on new cylinder.

**NOTE:** Do not remove large cap (1) on new canister.

**Step 2:** Clean old canister, clamp, and top of valve area.

**Step 3:** Loosen clamp.

**Step 4:** Remove old cylinder and O-ring by turning counterclockwise.

**Step 5:** Remove any foreign material from inside valve.

**Step 6:** Apply a light coat of clean oil to the O-ring and threads of the new cylinder.

**NOTE:** Do not use any additional gaskets, the O-ring is the only seal needed.

**Step 7:** Thread new cylinder onto valve by turning clockwise until O-ring bottoms out. Do not overtighten.

**Step 8:** Tighten clamp.



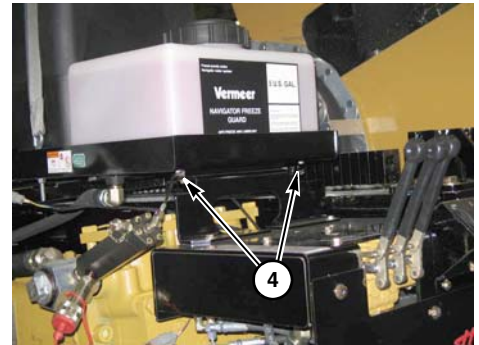
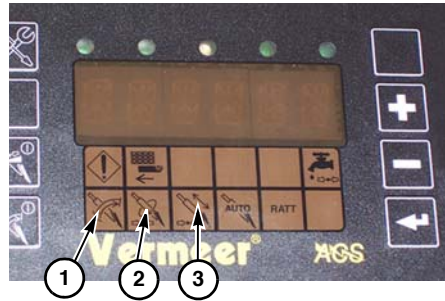
## ROTATION SENSOR PHASE - ADJUST



**WARNING:** Entanglement in rotating shaft while adjusting sensor can result in serious injury or death. Never adjust the sensor unless the operator is at the controls and in visual contact with the person doing the adjustment. Adjust sensor only when the shaft is rotating slowly. Never place fingers between sensor mounting plate and the rotating shaft when adjusting the sensor.

This procedure requires two people.

- Step 1:** Disable R.A.T.T. mode. Lights (1), (2) and (3) will be OFF.
- Step 2:** Disconnect drill string from drive chuck.
- Step 3:** Position carriage at most rearward position on rack.
- Step 4:** Remove four bolts (4) and swing control station outward to access jam nut and sensor.

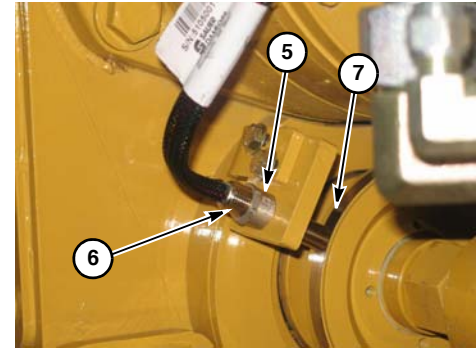




**Step 5:** With the drive chuck stopped, loosen sensor jam nut (5) and rotate sensor (6) clockwise until it touches the metal pulse ring (7).

**IMPORTANT: Do not** rotate the drive chuck with the sensor in contact with the pulse ring. The pulse ring can be damaged from the sensor rubbing on it.

**Step 6:** Rotate sensor 1/8 turn counterclockwise, away from pulse ring.



**Step 7:** Press *Buttons* (8), then (9). Rotate console so that technician adjusting the phase sensor can see the phase angle display (10).

**Step 8:** The technician in the seat begins rotating the drive chuck slowly in forward drilling direction.

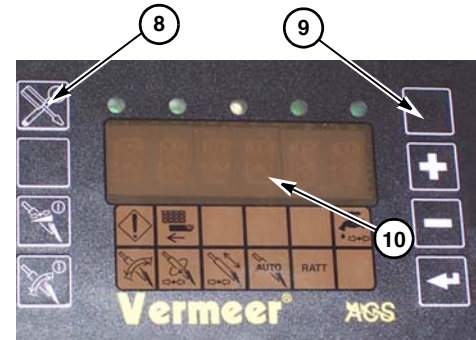
**Step 9:** The second technician slowly rotates the sensor counterclockwise until phase angle at display reads a positive 85–95°.

**Step 10:** Tighten jam nut.

**Step 11:** Verify that phase is in correct range.

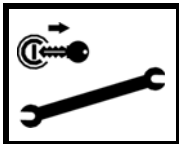
**Step 12:** To test: press *R.A.T.T. Mode Button* and pull on *Rotation Handle*. Drive chuck will oscillate.

**Step 13:** Move control station back into place and install bolts.



# STORAGE

## Preparing for Storage



**WARNING:** Use Shutdown Procedure when preparing the machine for storage. Refer to [Shutdown Procedure](#), page 12-1, for instructions.

- Store machine inside or under cover.
- Clean off foreign material and wash machine. Repaint bare metal to inhibit rust.
- Repair or replace worn or broken parts or damaged decals.
- Refer to the Engine Operation Manual for engine storage instructions.
- Disconnect battery cables. If necessary, remove battery. Refer to “Battery - Replace,” [page 60-4](#), and store where the temperature will not drop below freezing. Check fluid level and charge fully; recheck every 30 days and charge if necessary.
- Remove Remote Lockout system batteries from remote transmitter and charging compartment. Unplug docking station to keep batteries from discharging.
- **Pneumatic drill head:** Pour 5 oz (150 ml) of Hammerhead Anti-Rust Storage Oil into tool. (Refer to [“Lubricants,” page 80-1](#)). Oil should be added with tool nose down. Wait 30 seconds for oil to get into tool. To disperse oil, tip tool back and forth 20–30 times while rotating tool. Tape or cap tool inlet end to prevent dirt and sand from entering tool.
- **R.A.T.T. tool:** Fill with 24 oz (710 ml) of DEXRON III or MERCON transmission fluid, clean and regrease threads.

## Removing from Storage

- Remove all protective coverings.
- Drain any water and sediment from fuel tank that may have built up during storage. Fill fuel tank.
- Check battery fluid level. Charge battery and install in machine if removed.
- Plug in Remote Lockout system docking station. Charge batteries fully. Install charged battery in remote transmitter.
- Refer to the Engine Operation Manual for restoring engine to operation.

**NOTE:** Disable fuel system by disconnecting wire to fuel shutoff solenoid (refer to Step 5 of “Engine Oil and Filter - Initial Change/Replacement,” [page 30-1](#)) and crank engine to provide crankshaft lubrication. Reconnect fuel shutoff solenoid.

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# Section 70: Troubleshooting

## ENGINE SYSTEM

Refer to the Engine Operation Manual supplied with each machine for troubleshooting procedures.

<b>Electrical System</b>		
<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
<b>Low battery output</b>	Low water level	Add water.
	Loose alternator belt	Tighten belt.
	Defective alternator	Replace alternator.
	Corroded or loose battery cable	Clean and tighten battery cables.
	Defective battery cell	Replace battery.
	Cracked battery case or broken terminal	Replace battery.
	Dirty or wet battery top, causing discharge	Clean battery top.
<b>Battery uses too much water.</b>	Cracked battery case	Replace battery.
	Overcharged battery	See your Vermeer dealer.
<b>Low battery charge</b>	Alternator not charging	See your Vermeer dealer.
	Corroded or loose battery cable	Clean and tighten battery cables.
	Poor wiring connections in battery charging circuit	Check wiring connections.
	Defective battery cell	Replace battery.
	Faulty regulator	Replace regulator.
	Excessive engine idling	Reduce engine idle.
	Continuous drain on battery—dirty battery top or electrical components shorted or grounded	Clean battery top.

<b>HYDRAULIC SYSTEM</b>		
<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
<b>No hydraulic power</b>	Operator not seated when using drilling functions	Sit in the operator's seat.
	No hydraulic fluid	Fill with fluid.
	Battery voltage too low to shift the solenoid	Check battery, alternator and charging circuit.
	Defective voltage dropout relay	Replace the dropout relay.
	Damaged or worn hydraulic pump	See your Vermeer dealer.
	Relief valve damaged	See your Vermeer dealer.
	Remote Lockout system activated	Put Remote Lockout system in RUN mode.
<b>Slow hydraulic power</b>	Low hydraulic fluid level	Add hydraulic fluid.
	Plugged hydraulic filter	Replace filter.
	Plugged hydraulic strainer	Clean strainer.
	Worn pump	See your Vermeer dealer.
	Improper pressure relief setting	See your Vermeer dealer.
	Hydraulic fluid cold	Let machine warm up and operate hydraulic system.
<b>Noisy hydraulic pump</b>	Cold hydraulic fluid	Warm up machine at reduced engine speed.
<b>Hydraulic power loss</b>	Low hydraulic fluid	Add hydraulic fluid.
	Plugged hydraulic filter	Replace filter.
	Pugged hydraulic strainer	Clean strainer.
	Wrong viscosity of hydraulic oil	Change hydraulic fluid to correct viscosity.
	Worn pump or motor	See your Vermeer dealer.
	Improper pressure relief setting	See your Vermeer dealer.
	Poor engine performance	Check engine.
	Dropout relay fails	Replace relay.
Operator not in the seat.	Sit in the operator's seat.	

## HYDRAULIC SYSTEM (CONTINUED)




<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
<b>Oil foams.</b>	Low hydraulic fluid	Add hydraulic fluid.
	Water in hydraulic fluid	Change fluid.
	Air leak between tank and pump	Repair leak.
<b>Remote Lockout system not responding</b>	Cold weather operation causing greater hydraulic oil viscosity, preventing pressure switches from confirming lockout	To achieve lockout confirmation, move throttle to its lowest setting.

(Page 2 of 2)

## DRILLING FLUID SYSTEM

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
<b>No hydraulic power</b>	No hydraulic fluid	Fill with fluid.
	Damaged or worn hydraulic pump	See your Vermeer dealer.
	Relief valve damaged	See your Vermeer dealer.
<b>Slow hydraulic power</b>	Low hydraulic fluid level	Add hydraulic fluid.
	Plugged hydraulic filter	Replace filter.
	Plugged hydraulic strainer	Clean strainer.
	Worn pump	See your Vermeer dealer.
	Improper pressure relief setting	See your Vermeer dealer.
<b>Noisy hydraulic pump</b>	Hydraulic fluid cold	Let machine warm up and operate hydraulic system.
		Warm up machine at reduced engine speed.

## STRIKE ALERT

Indicator	Indication	Significance
Two-Tone Horn	On	Electrical strike occurred or <i>Test Button</i> pressed.
	Silent	No voltage detected above threshold.
Green Light	Off	Test in progress, light burned out, or wiring harness problem
	Flashing 	Ground stake is not in the ground.
	Double Flashing 	Current sensor failed.
	Triple Flashing 	Ground stake wiring problem
	<b>On</b>	Power-up check or test passed. System is ready.
Control	Function	
Alarm Cancel Button	Turns alarm off (only when voltage and current are not present)	
Test Button	Tests sensors, controller, and alarm	

**NOTE:** The alarm will sound when the *Test Button* is pressed. A successful test is indicated when the green light remains steady ON after the test button is released. If there is a flashing green light after releasing the test button, the Strike Alert system is not functioning correctly. Confirm the voltage stake is fully inserted into the ground. The soil at the stake may need to be moistened to improve conductivity of the earth. Retest the system. If the test fails to pass, contact your Vermeer dealer.

**NOTE:** The Strike Alert system automatically runs a system check whenever the machine is powered up (ignition key turned from OFF to RUN). If the system is properly set up, a successful check is indicated by a steady ON green light. Failure to properly insert the voltage stake into the ground will result in a flashing green light. ***The alarm does not sound during the power-up system check.***



<b>REMOTE LOCKOUT SYSTEM</b>		
<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
<b>Remote Lockout system not responding</b>	Operator not in seat when system is turned on	Sit in seat and select RUN or LOCKOUT mode.
	Cold weather operation causing greater hydraulic oil viscosity, preventing pressure switches from confirming lockout	To achieve lockout confirmation, move throttle to its lowest setting.
	Lockout not confirmed due to machine in Transport mode	To achieve lockout confirmation, change from Transport mode to Drill mode.
	Out of range	Move into range.
	Low battery	Change battery.

**NOTE:** The Remote Lockout system controls thrust, rotation, and fluid functions together. If one function is working and the others are not, then the Remote Lockout system is not the source of the problem. The Remote Lockout system cannot disable one function independent of the others. Contact your Vermeer dealer for troubleshooting assistance.

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# Section 80: Specifications

## LUBRICANTS

Lubricant	Capacity	Specifications / Notes
<b>Engine Oil</b>	Refer to engine specifications	An Engine Operation Manual is supplied with each machine. Refer to the manual for engine service requirements.
<b>Hydraulic Fluid</b> <i>Vermeer HyPower 46 or</i> <i>Vermeer HyPower 68 or</i> <i>Vermeer HyPower 100</i>	55 gal (208 L)	<b>ISO 46:</b> -13° to 86°F (-25° to 30°C) <b>ISO 68:</b> -4° to 104°F (-20° to 40°C) <b>ISO 100:</b> 14° to 122°F (-10° to 50°C) Use caution not to get dirt or other contaminants into the system(s). Filter all fluid through a 5-micron filter before adding to tank. <b>IMPORTANT:</b> Use of any oils other than those recommended without written factory approval will jeopardize warranty.
<b>All-Purpose Gear Lube</b>	Maintain check plug level	Oils must conform to API GL5 or MIL-L-2105D specifications. -20° to 100°F (-30° to 40°C): 80W-90 20° to 120°F (-10° to 50°C): 85W-140
<b>General Lubricating Oil</b> <i>Vermeer Xtra Gold 10W30</i>	As required	SAE10W30
<b>Grease</b> <i>Vermeer Ultra LC Grease</i>	As required	Lithium complex, extreme pressure NLGI Grade 2 To minimize condensation in bearings, grease machine after it is shut down for the day. Fittings and grease applicator nozzle must be clean before applying grease. Replace all missing fittings.
<b>R.A.T.T. Lubricant</b>	24 oz (710 ml)	DEXRON III or MERCON transmission fluid

<b>Lubricant</b>	<b>Capacity</b>	<b>Specifications / Notes</b>
<b>Drilling Fluid Pump Crankcase</b> <i>Vermeer Xtra Gold 40</i>	4.5 qt (4.3 L)	SAE- 40 (Classification MM or better)
<b>Drill Rod Thread Compound</b>	As required	BioStick thread lubricant (P/N 296337339)
<b>RockFire Pneumatic Drill Head Oil</b> <i>Hammerhead Summer Oil</i> <i>Hammerhead Anti-Rust Oil</i>	As required	SAE-10W/ISO22 zinc and paraffin additives SAE-20W/ISO68 anti-rust in a paraffin base

## MACHINE SPECIFICATIONS

<b>Engine</b>	
Model	John Deere 4045 HF275
Maximum power	125 hp (93 kW) at 2400 rpm
Fuel capacity	45 gal (170 L)
Oil capacity	<b>with filter:</b> 15.5 qt (14.6 L) <b>without filter:</b> 14.0 qt (13.2 L)
Maximum engine inclination	30° continuous, 45° intermittent <b>NOTE:</b> Engine operating angles do not indicate safe machine operating angles.
Cooling medium	Mixture of 50% water and 50% ethylene glycol-base antifreeze to -34°F (-37°C) protection
Engine coolant capacity	4.5 gal (17 L)
Electrical system	12-volt
Alternator	65 amps
<b>Battery</b>	
Required	1
BCI group size	31
Cold cranking amps (CCA)	950 cold cranking amps, 30 seconds, 0°F (-18°C)
Reserve capacity	185 min, 25 amp output at 80°F (27°C)
Length	13" (33 cm)
Width	6-3/4" (17 cm)
Height	9-3/8" (24 cm)
<b>Hydraulic Systems Pressure Settings</b>	
Rotation pump flow	32 gpm (121 L/min)
System pressure	6000 psi (413 bar)
Charge pressure	350 psi (24 bar)
Thrust pump flow	32 gpm (121 L/min)

System pressure	6000 psi (413 bar)
Charge	350 psi (24 bar)
Implement pump flow	32 gpm (121 L/min)
System pressure	3000 psi (207 bar)
Hydraulic tank capacity	55 gal (208 L)
<b>General, Basic Machine Dimensions</b>	
Weight empty	14,090 lb (6391 kg)
Weight w/ rod box	18,440 lb (8364 kg)
Overall length	19 ft 5" (5.92 m)
Overall width	81" (206 cm)
Overall height (at top of exhaust)	76" (193 cm)
Overall height (cab option)	89" (226 cm)
<b>Drilling Fluid System - Water Pump Performance</b>	
Pump flow	50 gpm (189 L/min) maximum
System pressure	2500 psi (172 bar) maximum

## REMOTE LOCKOUT FREQUENCIES

United States: 900 MHz

International: 2.4 GHz

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# Revision History

Revision	Date	Page(s)	Description
m1_00	2/05	All	First Edition Maintenance Manual released.
m2_00	05/05	11-1, 35-2, 65-4	Updated information, new strike alert added.
m2_01	07/06	20-10, 35-3, 35-8, 40-3, 60-9, 60-10, 60-11, 60-12, 65-4	R.A.T.T. and AutoDrill information added; hydraulic hose sleeve information added; pages renumbered; stakedown information added
m3_00	03/07	Cover, 11-1, 20-5, 20-10, 20-11, 35-3, 35-6, Section 40, 55-9, 55-10, 55-11, 60-9, 60-10, 60-11, 70-1, 70-3, back cover	Updated information and photos; added checking rotation gearbox oil level; Tier III engine.
m3_01	09/08	25-5, 25-6, 40-4, 40-6, 55-5, 60-8, 80-3 80-4	Updated information; added battery access in cab machine; vise jaw grips replacement procedure updated; specs updated
m3_02	10/09	Introduction, 10-1, 10-3, 20-12, 60-10, 70-4	DVD information added; signal words definitions updated; safety messages added; added bolt tightness check for gearbox and drilling fluid pump; added procedure for replacing rotation gearbox guide rollers; Strike Alert test procedure corrected.
m3_03	03/11	Sections 20, 80	Greaseable rollers, BioStick grease
m3_04	10/12	Sections 20, 35	R.A.T.T. pressure correction



## **WARNING**

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

## **CALIFORNIA**

### **Proposition 65 Warning**

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

When operated in California, any off-road diesel vehicle may be subject to the California Air Resources Board In-Use Off-Road Diesel Vehicle Regulation. It therefore could be subject to retrofit or accelerated turnover requirements to reduce emissions of air pollutants. For more information, please visit the California Air Resources Board website at <http://www.arb.ca.gov/msprog/ordiesel/ordiesel.htm>.