

Vermeer

*D40x40 Navtec
Navigator*



Maintenance Manual

MMJN98-1
SERIAL NO. 101-
ORDER NO. 105400-P94

Introduction



WARNING: Before performing any maintenance on the machine, use the Shutdown Procedure section unless instructed differently.

This manual contains maintenance instructions for the machine. 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.

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

To provide a better view, certain photographs or illustrations in this section may show an assembly with the safety shield removed. Never operate the machine in this condition. Keep all shields in place. If shield removal becomes necessary, replace the shield before operating the machine.

EN 4024 099

Do not attempt any maintenance which you do not fully understand or that you cannot do accurately and safely with the tools and equipment available to you. If you encounter a problem that you do not understand or cannot solve, contact your Vermeer dealer.

A copy of this manual is supplied with each machine. Keep this manual with the machine and available for reference at all times. Additional copies are available through your dealer. When ordering additional manuals, use the reorder number listed on the front cover and the quantity needed.

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

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.

EN 40M-0215-AP02

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EN 11130 404

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D40x40 / Navtec Navigator Maintenance

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Safety Messages

BE AWARE OF SAFETY INFORMATION

N.L. 0014-AP92

This is the safety-alert symbol. This symbol placed on your machine or in the manual is used to alert you to the potential for bodily injury or death.



EN 60073-2:2002

UNDERSTAND SIGNAL WORDS

N.L. 0045-AP92

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 - Imminent hazards which, if not avoided, will result in serious personal injury or death.

WARNING - Potential hazards or unsafe practices which, if not avoided, could result in serious personal injury or death.

CAUTION - Potential hazards or unsafe practices which, if not avoided, could result in minor personal injury or product or property damage.



EN 60073-2:2002

READ MANUAL

N.L. 0016-AP92

Do not service the machine unless the instructions in this manual have been carefully read and understood.

Failure to follow the safety instructions within this manual could result in serious injury or death.



EN 60073-2:2002

Safety Messages

D40x40 / Navtec Navigator Maintenance

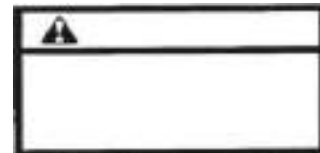
FOLLOW INSTRUCTIONS

ILLUSTRATION: N-L-0286-MR90

Carefully read and understand all safety messages in this manual and on your machine safety decals.

Safety decals located on your machine contain important information that will help you operate your equipment safely. Keep safety decals in good condition. Replace missing or damaged safety decals.

Allow only responsible, properly instructed individuals to operate the machine. Carefully supervise inexperienced operators.



ENR020: 09

PERSONAL PROTECTIVE EQUIPMENT

ILLUSTRATION: N-L-0286-MR90

Wear required personal protective equipment.

Wear close fitting clothing and confine long hair.

Avoid wearing jewelry, such as rings, wrist watches, necklaces, or bracelets.

Always wear:

- A hard hat
- Safety glasses
- Work Shoes



ENR020: 09

Safety Messages

(01-2)

DO NOT MODIFY MACHINE

Make no modifications to your equipment unless specifically recommended or requested by Vermeer Manufacturing Company

ENR0024-11/16

DRIVE SAFELY

Drive the machine on and off the trailer squarely to avoid driving off the side of the trailer

Always be seated with the seat belt securely fastened and the seat rotated to face forward when moving the machine

ENR0024-11/16

Safety Messages

D40x40 / Navtec Navigator Maintenance

AVOID ENTANGLEMENT. STAY AWAY.

5 L-0482 (SLD)

ROTATING DRILL ROD AND CUTTING TOOL CAN CAUSE DEATH OR SERIOUS INJURY

Stay away from rotating drill rod and cutting tool

Do not wear loose clothing that could catch on rotating equipment

Boring and thrust control levers must self center to neutral and stop rod motion.



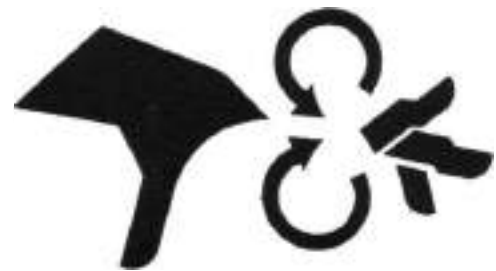
EN 0482 (SLD)

AVOID MOVING PARTS

5 L-0670 (SLD)

Keep hands, feet, and clothing away from power driven parts

Properly install shields after performing maintenance



EN 0670 (SLD)

Safety Messages

(01-4)

THROWN WRENCH

1.0 20-1 12-

Serious injury if struck by pipe wrench on drill rod if rotation is started.

Do not use pipe wrench on drill rod. The wrench could strike a worker or bystander if drill rod rotation is started.

Inspect vise clamp jaws for wear before every use. Worn jaws will not grip rod. Replace jaws if worn or damaged.



EMR201 125

OPERATOR PRESENCE SYSTEM

The machine is equipped with an operator presence system. The rod thrust and rotation drive will not function if the operator is not seated at the controls. This system is intended for your safety and must be maintained in good functional condition.

EMR201 126

Safety Messages

D40x40 / Navtec Navigator Maintenance

ROLLOVER POSSIBLE

Rollover may cause serious crushing injury or death. Take precautions to prevent rollover.

Avoid slopes where rollover could occur.

Avoid operating next to large holes, ditches, steep banks, or other terrain that may cause the machine to suddenly tip sideways.

Operate at speeds and in a manner consistent with terrain and operating conditions.

Refer to "Transporting the Machine" section for instructions on loading and unloading from a trailer.

ENR020015-01

RUNOVER POSSIBLE

Serious injury or death possible if run over.

Start engine and operate only from operator's seat.

Do not start engine by shorting across starter terminals. Machine will move if ground drive is engaged.

ENR020015-02

Safety Messages

(01-6)

RAISED LOAD CAN FALL

PLC 0014-1150

Never lift load of drill rods over personnel. The load may fall or shift, crushing anyone beneath it.



ENR151500

DRILLING FLUID/SPRAY WAND

Do not spray at electrical areas with the high pressure spray gun. The solution may conduct electricity.

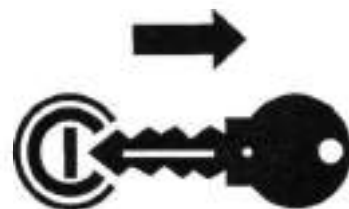
Never use the high pressure spray gun to clean any part of your body or clothes. The pressure at the nozzle could penetrate the skin and cause serious injury.

ENR151500

USE SHUTDOWN PROCEDURE

PLC 0015-4901

Before servicing, cleaning, repairing, inspecting, lubricating, fueling, or transporting the machine, refer to Shutdown Procedure Section for proper instructions.



ENR151196

Safety Messages

D40x40 / Navtec Navigator Maintenance

AVOID COOLANT BURNS

6110-71-0010

Hot fluid under pressure can erupt and scald if opened.

Allow to cool before opening.



74-754019-0000

HANDLE FUEL SAFELY

411003-4090

FIRE OR EXPLOSION

Fuel and fumes can catch fire or explode and cause burns. Shut off engine before fueling.

NO SMOKING. NO FLAME.



84101 0199 4750

Safety Messages

(01-8)

AVOID BATTERY BURNS

ML 0029AP5

Battery contains sulfuric acid which can cause severe burns. Avoid contact with eyes, skin and clothing.

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.



LN0016-05M

AVOID BATTERY EXPLOSION

ML 0029AP5

Battery fumes are flammable and can explode. Keep all burning materials away from battery. Do not smoke. Tools and cable clamps can make sparks. Shield eyes and face from battery.



EM 00010-0100

Safety Messages

D40x40 / Navtec Navigator Maintenance

RELIEVE SYSTEM HYDRAULIC PRESSURE

Relieve all pressure in the hydraulic system before disconnecting the hoses or performing other work on the system.

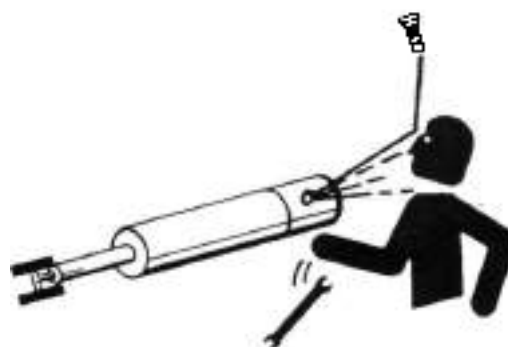
When loosening fittings in hoses where residual pressure may exist, slowly loosen the fitting until oil begins to leak. Wait for leaking to stop before disconnecting the fitting. Make sure all connections are tight and hoses are in good condition before applying pressure to the system.

FINKEC01156

Some residual pressure will probably remain in the outrigger and rack angle hydraulic circuits due to pressure lock valve cartridges in the cylinders.

Use extreme caution when removing a cartridge. The cartridge will be released with great force if residual pressure remains in the cylinder. Do not stand in front of the cartridge when removing it.

SAFETY MESSAGE



Safety Messages

(01-10)

AVOID HIGH PRESSURE LEAKS

K 000-0007

Relieve all pressure in the system before disconnecting the lines, hoses, or performing other work. Make sure all connections are tight and that hoses and lines are in good condition before applying pressure to the system.

Any fluid under pressure can penetrate the skin and cause personal injury, blindness or death. Fluid leaks, under pressure, may not be visible. Use a piece of cardboard or wood to find leaks; never use your bare hand. Wear safety glasses for eye protection. If any fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type of injury.



EN 000-0007

WORK IN VENTILATED AREA

K 000-0002

Exhaust fumes can be fatal.

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



EN 000-0002

Safety Messages

Shutdown Procedure

STOPPING THE MACHINE

When stopping the machine, use the following shutdown procedure:

- Shut off the drilling fluid pump.
- ◆ Reduce engine speed to idle
- ◆ Shut the engine off and remove the key.

For your safety and the safety of others, use the shutdown procedure before servicing, cleaning, unclogging, or inspecting the machine.

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

Fig. 1-11-10

Shutdown Procedure

Fuel and Lubricants

Lubricant / Capacity	Specification / Notes
Fuel 60 gal (227 liters)	Refer to Engine Operation Manual for fuel requirements.
Engine Oil 11.5 qt (10.9 liters) with filter 10 qt (9.5 liters) without filter	Refer to Engine Operation Manual for oil requirements. Check the engine oil level with the machine on a level surface.
Hydraulic Fluid . . . 60 gal (227 liters) NOTE: Do not spill dirt or other contaminants into the reservoir. Filter all fluid through a 10 micron filter before adding. NOTE: Use of any other hydraulic oil without written factory approval will jeopardize warranty. NOTE: ISO 68 oils are recommended and should be used for most applications.	ISO 68 Oil -20°C to 40°C (-4°F to 104°F) Vermeer HyPower 68 Shell Tellus T-68 Mobil DTE-18M Drydene #4225 Exxon Uniris N 68 Chevron AW MV 68 Amoco Rykon 68 ISO 100 Oil -10°C to 50°C (+14°F to 122°F) Vermeer HyPower 100 Shell Tellus T-100 Mobil DTE-18M Drydene #4226 Exxon Uniris N 100 Chevron AW MV 100 Amoco Rykon 100
Drive Gearbox Maintain Check Plug Level	Gear oil must meet specifications API GL-5 or MIL-L-2105C. For temperatures of -10°F to 100°F (-20°C to 39°C), use SAE 80W-90 gear lube. For temperatures of 10°F to 120°F (-12°C to 49°C), use SAE 85W-140 gear lube. (continued on next page)

Fuel and Lubricants

D40x40 / Navtec Navigator Maintenance

Lubricant / Capacity	Specification / Notes
Grease 	EP Grease: Vermeer LF Ultra, Shell Alvania EP2, or equivalent. 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.
General Lubricating Oil as needed	SAE-30 Vermeer Xtra Gold or equivalent
Drilling Fluid Pump Crankcase SC65 8 qt (7.6 liters)	SAE-40 Vermeer Xtra Gold (ISO VG 150) or equivalent.
Drill Rod Thread Compound as needed	Pluaco Thread Compound (#224771-001) or equivalent; must meet requirements of API Bulletin 7A1 (tentative). Compound must contain a zinc base of 40 - 60% by weight to withstand high pressures and remain in the threads

LN11001-95

Fuel and Lubricants

Maintenance - 10 Service Hours or Daily

CUMMINS ENGINE MAINTENANCE

- Check Engine Cooling System
- Check Engine Fan and Drive Belt
- Drain Fuel-Water Separator

Refer to Engine Operation manual supplied with machine for instructions.

Ex-10-10-000

CHECK FLUID LEVELS

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

- Engine Coolant Level:



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

Fill to within $\frac{1}{2}$ " (13 mm) of the bottom of the fill pipe with a low silicate (Ethylene-Glycol) antifreeze and clean water mixture.

Ex-10-10-000

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.

- Crankcase Oil Level:

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

Maintenance - 10 Service Hours or Daily

D40x40 / Navtec Navigator Maintenance

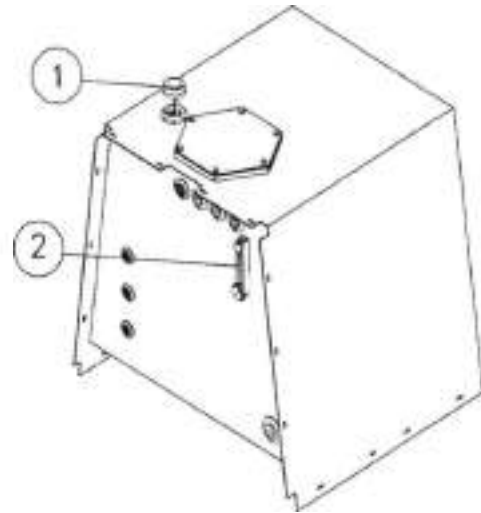
Hydraulic Fluid Level

ENR6644-1-05

Clean hydraulic fluid is very important so do not spill dirt or other contaminants into the reservoir. Filter all hydraulic fluid through a 10 micron filter before adding it to the reservoir. Check hydraulic fluid level.

Keep tank filled to sight gauge level. Machine must be level. Refer to Fuel and Lubricants Section for fluid requirements.

1. Remove fill cap (1).
2. Fill to sight gauge (2) level
3. Install the fill cap.



ENR6644-1-05

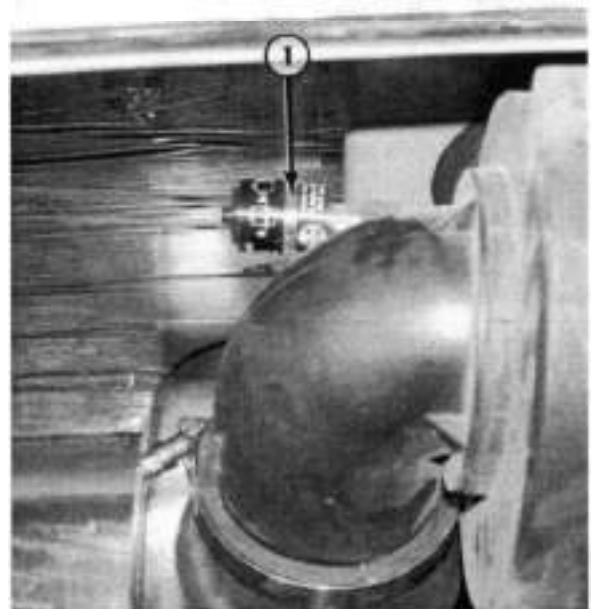
CHECK AIR CLEANER AND RESTRICTION INDICATOR

NR02873-098

Restriction indicator (1) enables you to see when the filter element is dirty. Clean or replace the filter element when the red indicator is visible (Refer to Maintenance - As Required Section). Push button to reset.

The air restriction indicator will not function correctly if the following occurs:

- Element is damaged or not seated properly in inlet housing
- Air cleaner mounting clamps loose.
- Air cleaner body damaged. Will allow unfiltered air to enter the engine
- Air transfer duct between air cleaner and engine is damaged or clamps loose.



ENR02873-098

Maintenance - 10 Service Hours or Daily

(10-2)

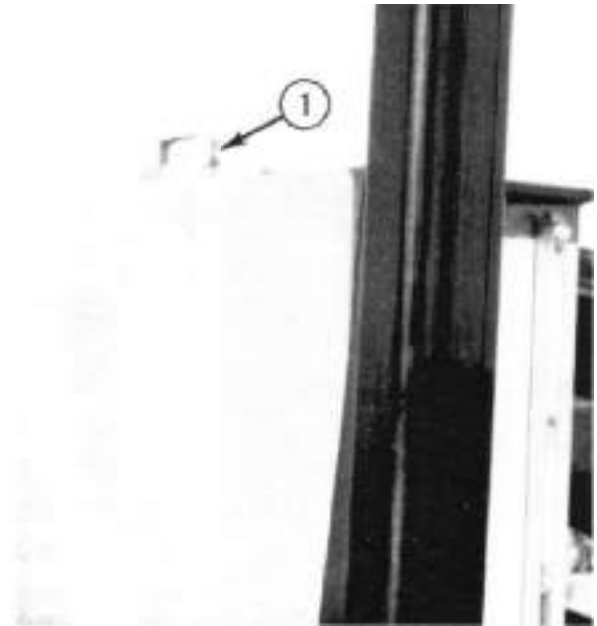
FILL FUEL TANK



WARNING: Never refuel machine while smoking or with engine running. Fill fuel tank outdoors. Clean up spilled fuel. Do not allow any hot or burning material near the machine.

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

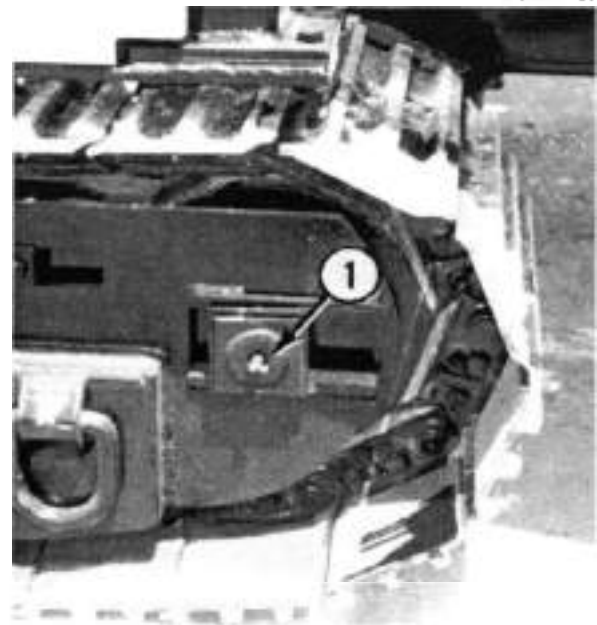
(1) Fill Cap



FN00K1004M290

GREASE TRACK IDLER ROLLER

(1) Six shots of grease. One fitting per roller on each track frame.



FN00K1004M290

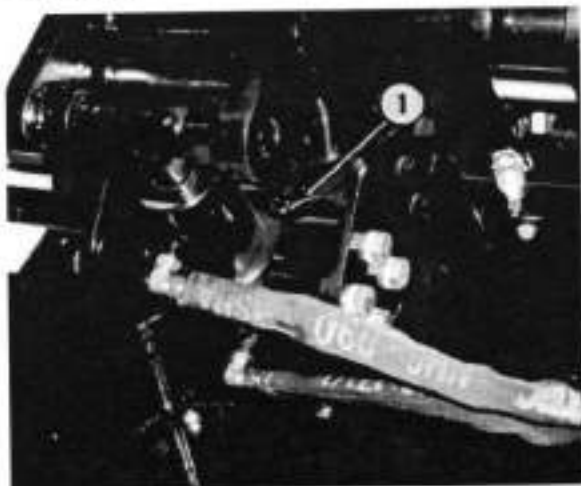
Maintenance - 10 Service Hours or Daily

(10-3)

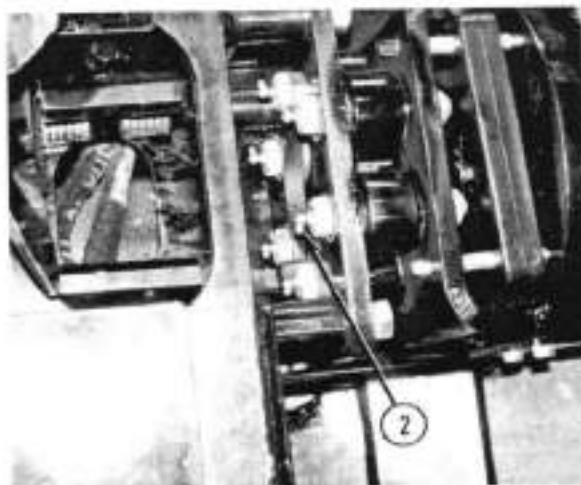
D40x40 / Navtec Navigator Maintenance

POWER VISE AND ROLLERS - GREASE

NH07460.1B7 NH07461.1B7



(1) Slide
Two shots two fittings (one each side)



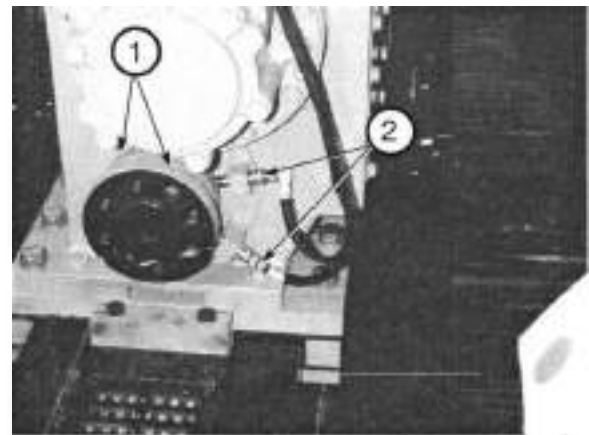
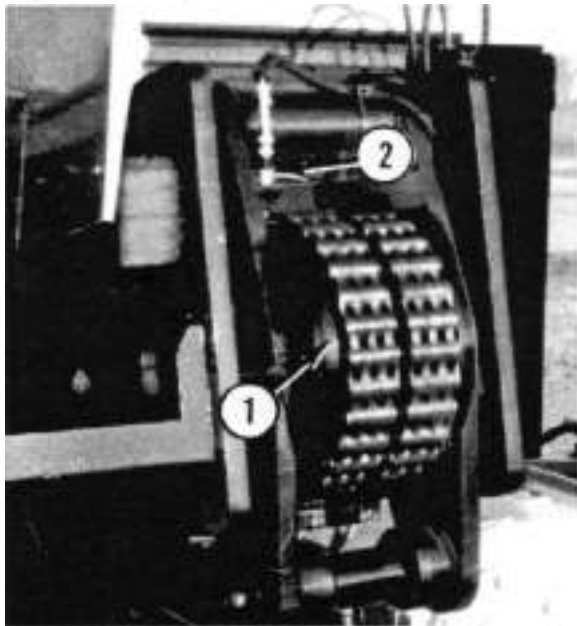
(2) Rollers
Two shots six fittings

1 R 012919

Maintenance - 10 Service Hours or Daily

NAVTEC - MAINTAIN SENSORS AND PULSE RINGS

UJ 120650 10/07



- Use a rag to clean dirt and metal particles from pulse rings (1). Do not scar the rings.

- Check for a 0.030-0.060 inch (0.75-1.5 mm) gap between sensors (2) and pulse rings (1).

NOTE: A full turn of the sensor equals approximately 0.060 inch (1.5 mm) travel.

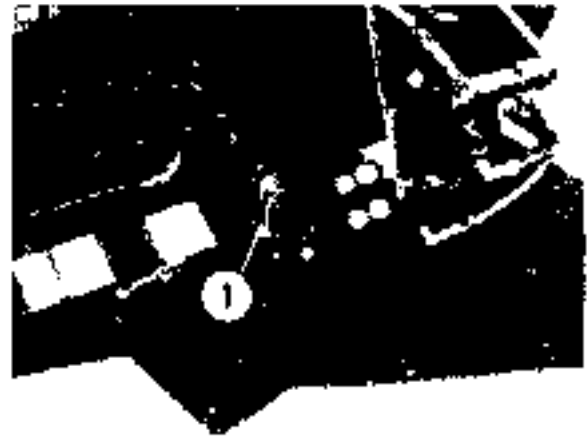
UJ 120650 10/07

Maintenance - 10 Service Hours or Daily

Maintenance - 50 Service Hours or Weekly

GREASE RACK FRAME END BEARING

- (1) One shot of grease. One grease fitting on front chain roller.



TR-DM-130-5FA2

GREASE FRONT CYLINDER ROLLERS

NOTE: Line up rollers with holes.

- (1) One shot of grease. One fitting per roller.



TR-DM-130-5FA2

Maintenance - 50 Service Hours or Weekly

D40x40 / Navtec Navigator Maintenance

MAINTAIN DRILL THRUST DRIVE CHAINS AND GUIDE PLATE

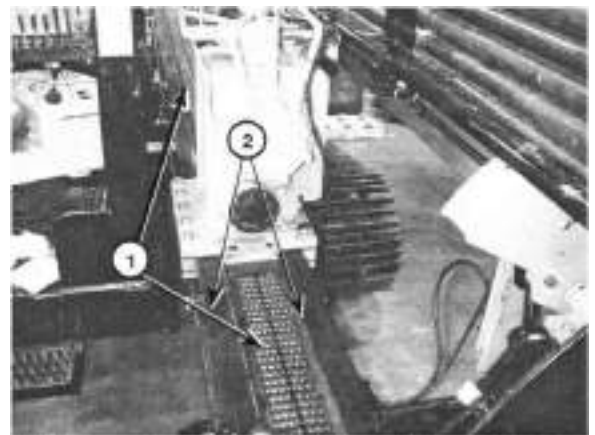
11-100177 Rev

- Clean mud and dirt from chains (1) with water or steam

IMPORTANT: If machine is washed with a high pressure washer keep nozzle away from sealed bearings.

- Clean with diesel fuel or WD-40 to flush out moisture and fine particles
- Coat the chains (1) and guide plate (2) with drill rod lubricant
- Check chain tension (refer to "Maintenance - As Required" section).

NOTE: If the chains are not kept clean and lubricated, they may have to be removed and soaked in solvent or replaced

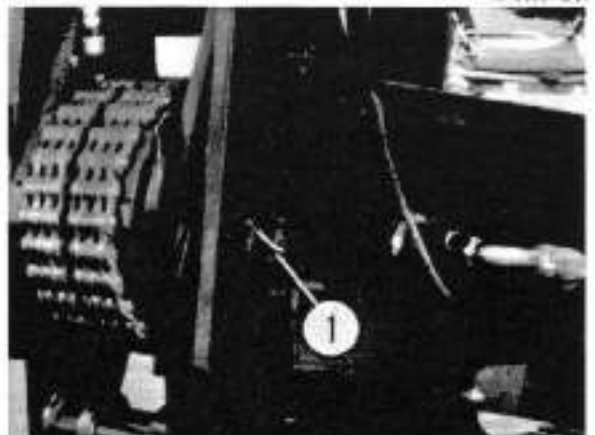


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GREASE REAR CHAIN ROLLER

11-100687 D97

- (1) One shot of grease.

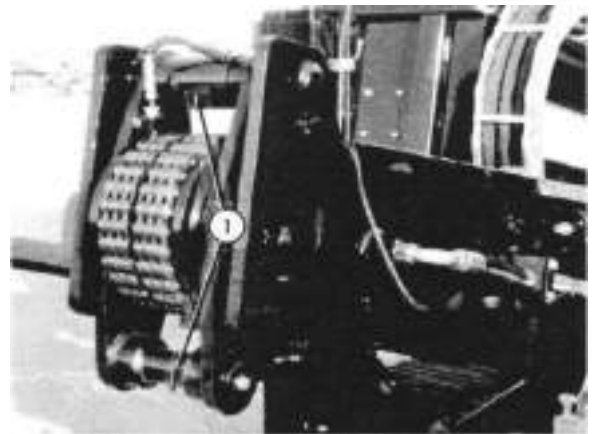


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Maintenance - 50 Service Hours or Weekly

GREASE CHAIN TENSION PIVOT

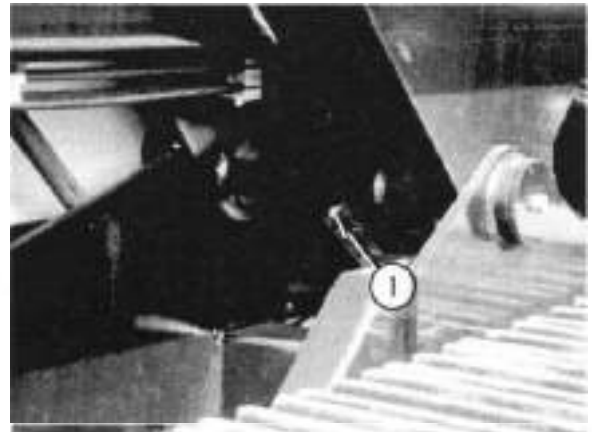
- (1) One shot of grease.



EN06473-440

GREASE RACK FRAME PIVOT

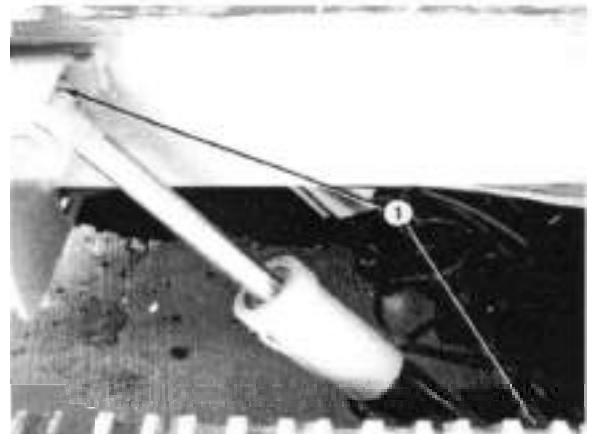
- (1) One shot of grease.



EN06474-440

GREASE RACK FRAME ANGLE CYLINDER

- (1) One shot of grease. One grease fitting on each end of cylinder. Two cylinders.



EN06475-440

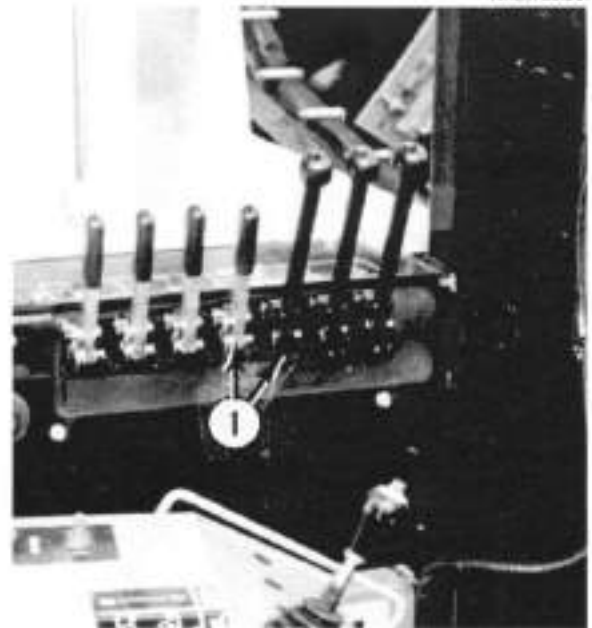
Maintenance - 50 Service Hours or Weekly

D40x40 / Navtec Navigator Maintenance

OIL CONTROL LEVERS LINKAGE

NH06700.D97

- (1) Place a light coating of oil on linkage attachment points.

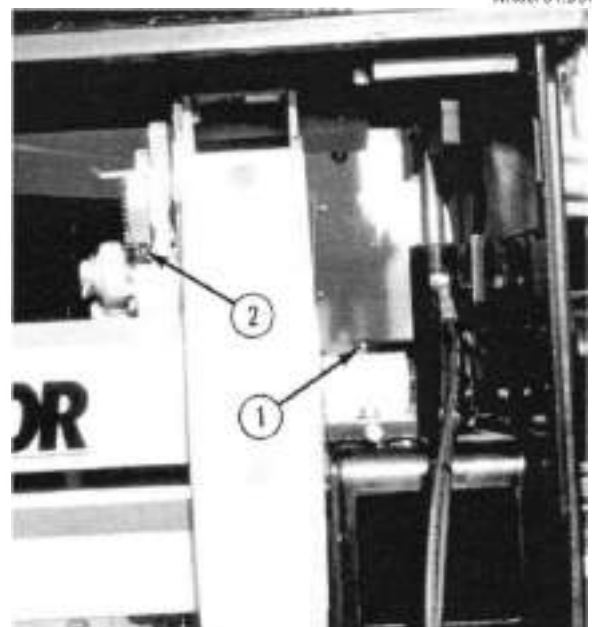


RE CM-1129 (4/95)

GREASE ROD LOADER

NH06701.D97

- (1) **Rod Loader Pivot**
Two shots of grease. One grease fitting on each end.
- (2) **Rod Loader Flippers**
One shot of grease. One grease fitting on each flipper.



ER09205 U

Maintenance - 50 Service Hours or Weekly

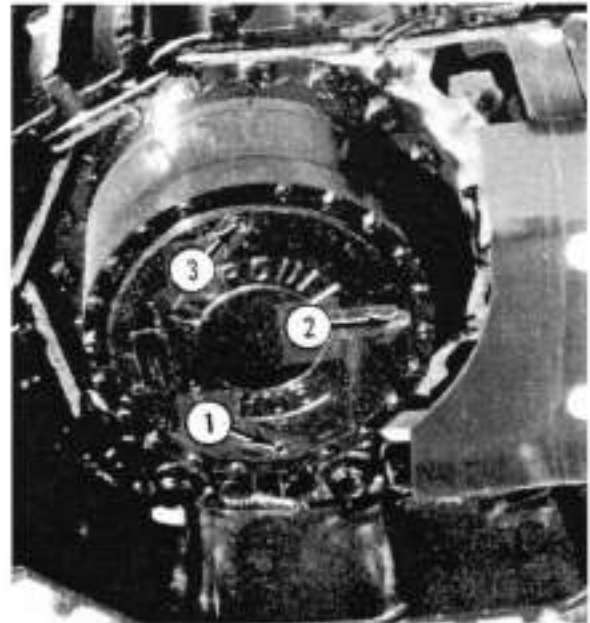
(15-4)

CHECK PLANETARY GEARBOX OIL

Make sure drain plug is on the bottom when checking oil level.

Maintain check plug level (Refer to Fuel and Lubricants Section).

- (1) Drain plug
- (2) Check Plug
- (3) Fill Plug



NH406700 D97

EN50126 00

CHECK DRILLING FLUID PUMP CRANKCASE OIL LEVEL

Fill to full mark on dipstick (1) (refer to 'Fuel and Lubricants' section).



NH406716 F26

EN50126 00

Maintenance - 50 Service Hours or Weekly

Maintenance - 100 Service Hours

CLEAN RADIATOR AND OIL COOLER - CUMMINS ENGINE

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

EN-OM-2422-06/07

CHECK DRILLING FLUID SYSTEM

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

LN-UM-2422-06/07

Maintenance - 100 Service Hours

D40x40 / Navtec Navigator Maintenance

CHECK OVERALL MACHINE

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

Decals - Check the machine for any worn or missing safety and operating decals (Refer to Safety Decals section and Controls section).

Hardware - Check the machine for loose, worn, or missing parts and hardware. Tighten any loose parts and replace any worn or missing parts (refer to Parts Manual for replacement parts).

Frame - check frame and contact dealer immediately if you notice any bending or cracking.

EN-2772P-A96

CHECK HYDRAULIC SYSTEM

NAE-0157-A112



WARNING: Fluid escaping under pressure can be almost invisible and can have enough force to penetrate the skin. When searching for suspected leaks, use a piece of wood or cardboard rather than your hands. If injured, seek medical attention immediately to prevent serious infection or reaction.

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



EN-CM 241, SE99

Maintenance • 100 Service Hours

(20-2)

Clean hydraulic fluid is very important for longer life and good operation of the hydraulic components. Take care not to spill dirt or other contaminants into the reservoir when checking or adding hydraulic fluid. Filter all hydraulic fluid through a 10 micron filter before adding it to the reservoir.

EN-05-0555-0000

NOTE: Low battery voltage will be indicated by a loss of hydraulic power at the boring unit. A solenoid valve shuts off the hydraulic functions if the voltage is too low for the stroke alert system to operate.

EN-05-0555-0000

CHECK CONTROL LEVERS

Check control levers for freedom of movement.

Check that levers spring return to neutral.

EN-05-0555-0000

CHANGE HYDRAULIC FLUID FILTER

The hydraulic fluid filter element on a new machine needs to be changed after the first 100 service hours of operation and every 500 service hours thereafter. To change filter element, refer to Change Hydraulic Fluid Filter, Maintenance - 500 Service Hours section for proper procedure.

EN-05-0112-0000

Maintenance - 100 Service Hours

D40x40 / Navtec Navigator Maintenance

CHECK THE GROUND DRIVE SYSTEM

ENCL 20-41-001

Track Wear Plates (1)

Check for sufficient thickness. Replace if any part of wear plate is missing or if thickness is less than 1/4 inch (6 mm).



ENCL 20-41-001

Track Pads and Bolt Tension.

Check for loose or damaged track pads.

Replace damaged pads. Tighten any loose bolts (Refer to Recommended Torque Values section).

ENCL 20-39-003

Track Chain Tension

Refer to Adjusting Track Tension in Maintenance - As Required Section.

ENCL 20-41-001

Maintenance - 100 Service Hours

CHANGE PLANETARY GEARBOX OIL

Change planetary gearbox oil after first 100 hours then at normal 1000 hour service intervals. Refer to Maintenance -- 1000 Service Hours.

EN 201 2719 2053

CHECK THE BATTERY VOLTAGE

The strike alert and hydraulic systems will not function with a low battery voltage.

Low battery voltage will be indicated by a loss of hydraulic power at the boring unit. Low battery voltage can interfere with the proper functioning of the electrical strike alert system. If low voltage is suspected, follow the normal shutdown procedure and determine the cause.

LN 00-5105 1493

Maintenance - 100 Service Hours

D40x40 / Navtec Navigator Maintenance

CHECK OPERATOR PRESENCE SYSTEM

After starting the machine, check that Operator Presence System operates correctly.

The drill or tracks must not move when the Drill/Transport lever is stroked if the operator is not seated.

Test Operator Presence System

Start the machine and push rotation control #1 forward to rotate the boring rod. Remove operator weight from seat. The rod rotation must stop.

Repeat the test for rod thrust and for each track drive.

Contact Vermeer dealer if system does not work correctly.



1-800-999-9999

Maintenance - 100 Service Hours

CHECK NEUTRAL START INTERLOCK

Neutral start interlock system must operate correctly for safety.

Check that the engine will not start unless the track control levers are in neutral.

Contact Vermeer dealer if engine will start when a track control is out of neutral.

140612010*

Maintenance - 100 Service Hours

Maintenance - 250 Service Hours

CUMMINS ENGINE MAINTENANCE

- Change Engine Oil
- Change Engine Oil Filter
- Inspect Air Intake System

Refer to Engine Operation Manual supplied with machine for instructions.

ENR250-120

ADD COOLING SYSTEM ADDITIVE

UJ-017-0000



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



ENR250-120

- Add 11 1/2 ounces (333 cc) of Fleetguard DCA4. Finish filling radiator. System capacity is approximately 45 quarts (43 liters)

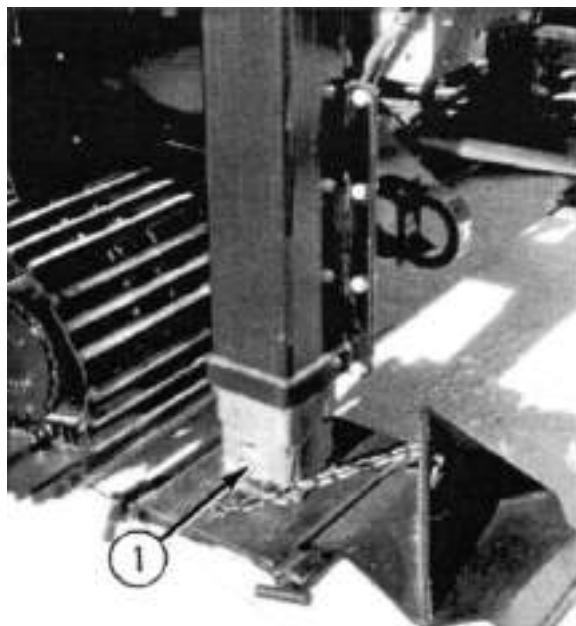
ENR250-120

Maintenance - 250 Service Hours

D40x40 / Navtec Navigator Maintenance

GREASE REAR OUTRIGGERS

(1) Apply grease to the slides.



ENR04001-006

CHANGE HYDRAULIC FLUID FILTERS

Change hydraulic fluid filters:

- after first 250 service hours
- at normal 500 service hour intervals
- whenever hydraulic fluid is changed

(Refer to Change Hydraulic Fluid Filters, Maintenance - 500 Service Hours Section)

ENR04001-006

Maintenance - 250 Service Hours

Maintenance - 500 Service Hours

CUMMINS ENGINE MAINTENANCE

- ◆ **Check Engine Coolant Concentration**
- ◆ **Change Fuel Filters** - change sooner if engine loses power

Refer to Engine Operation manual supplied with machine for instructions.

TRM 04 01 04

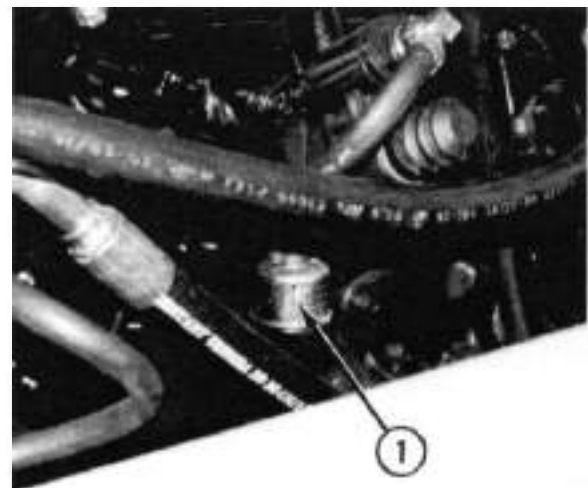
CHANGE IN-LINE FUEL FILTER

TRM 04 01 07



WARNING: Keep heat, flames, and sparks away from fuel. Always clean up spilled fuel.

- Clean area around fuel filter #1. Place a bucket under the filter to catch fuel.
2. Slide the two hose clamps back.
 3. Remove the hoses from fuel filter.
 4. Install a new filter as shown.
 5. Slide hose clamps into position.
 6. Start the engine and check for leaks.



TRM 04 01 07

Maintenance - 500 Service Hours

CHECK BATTERY ELECTROLYTE LEVELS AND TERMINALS

ILLUSTRATION 1



WARNING: Battery contains highly explosive hydrogen gas.

Battery contains sulfuric acid which can cause severe burns.

Remember safety rules whenever working with a battery:

- Wear safety glasses or face shield and rubber gloves.
- 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.

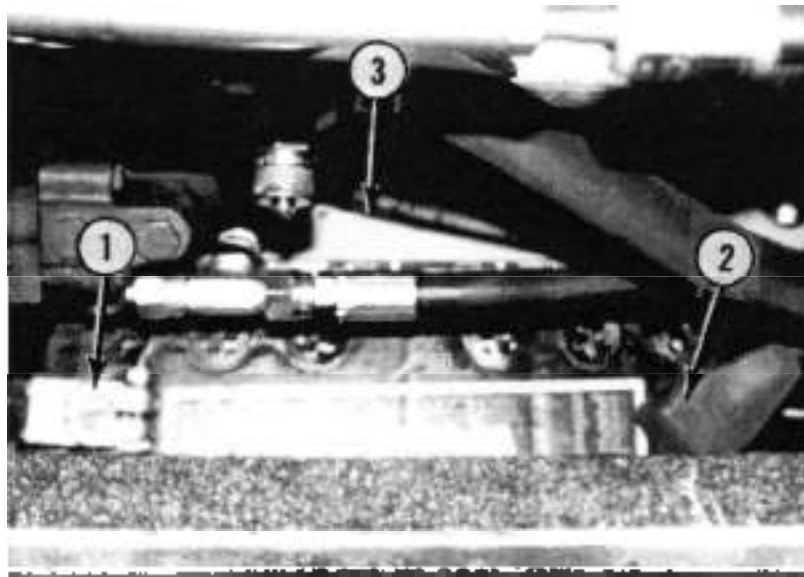
INTERNAL: Drink large quantities of water or milk, follow with milk of magnesia, beaten egg, or vegetable oil. Call a physician immediately.



ENR07041 0259

To clean terminals and check electrolyte level:

RTIC0441PS



- Remove negative (-) cable #1, then positive (+) cable #2.
- Clean terminals and clamps with a stiff wire brush.
- Apply a light coating of petroleum jelly around the base of each terminal.
- Remove cell caps #3, fill each cell with distilled water (never add acid), then replace cell caps.

IMPORTANT: In freezing weather, run the engine immediately after filling the battery to allow water and electrolyte to mix.

- Install the positive (+) cable #2 and red cover; then the negative (-) cable #1.

RTIC0450 HPS

Maintenance - 500 Service Hours

D40x40 / Navtec Navigator Maintenance

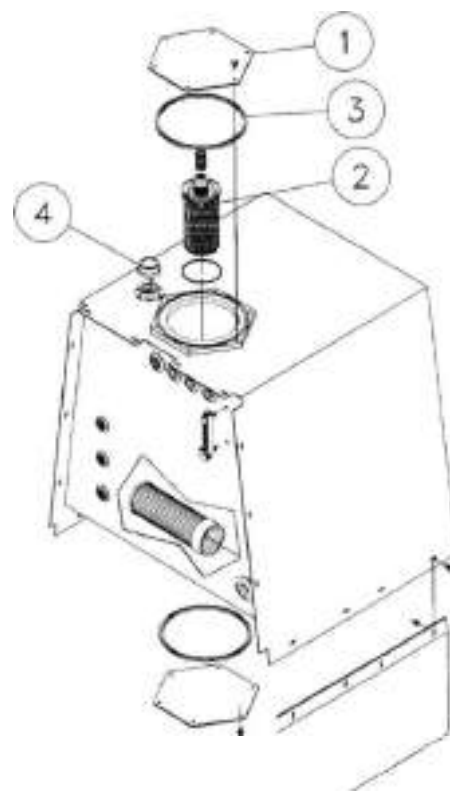
CHANGE HYDRAULIC FLUID TANK FILTER

REU1202-400

Replace the hydraulic tank filter.

The hydraulic fluid filter will need to be changed earlier if the machine is in storage for a long period of time, such as through the winter.

- Remove the fill cap #4 to release reservoir pressure.
- Remove cover #1. Do not dislodge o-ring #3 in the cover.
- Pull the filter #2 out of the reservoir.
- Clean the magnets on the filter.
- Replace the element and install the filter.
- Install the cover and the fill cap.



REU1202-400

Maintenance - 500 Service Hours

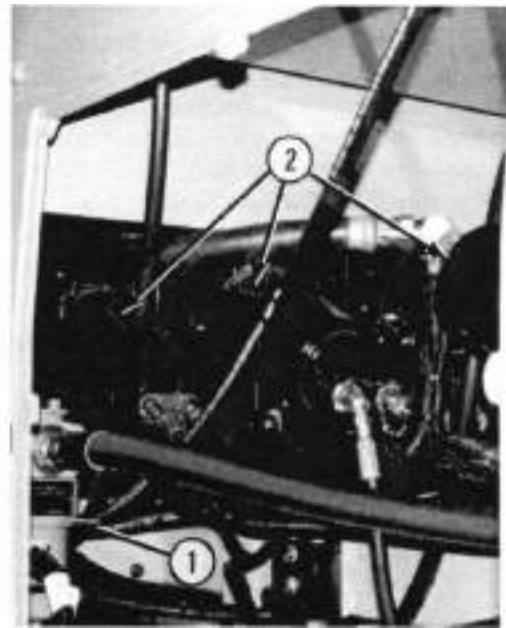
CHANGE HYDRAULIC FLUID FILTERS

MHD7463 197

Change hydraulic fluid filters:

- after first 250 service hours
- at normal 500 service hour intervals
- whenever hydraulic fluid is changed

1. High Pressure Filter
2. Charge Filters



ENR750 016

The charge filter is a specialized filter. Using "will fit" filters can damage the hydrostatic and hydraulic systems.

To change filter:

1. Thoroughly clean area around filter to keep contaminants out of the hydraulic system.
2. Use a filter wrench to turn the filter counterclockwise to remove.
3. Clean the filter head surface.
4. Apply a thin film of oil to gasket of new filter.
5. Install filter onto filter head. Tighten by hand until snug.
6. Tighten with filter wrench 1/10 turn.
7. Start engine and allow the engine to idle for one minute before moving the machine.
8. Stop the engine. Check hydraulic fluid level. Check for leaks around filter. Tighten filter only enough to stop leak.

ENR750 027 - MF95

Maintenance - 500 Service Hours

D40x40 / Navtec Navigator Maintenance

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

The filter head has arrows on the head to indicate direction of oil flow. If the filter head needs to be replaced, be sure the arrow on the new filter head is positioned the same as the one that was removed.



ENR0495-F9S

DRILLING FLUID PUMP CRANKCASE INITIAL OIL CHANGE

Change the oil after the first 500 hours of use and every 1000 hours thereafter (refer to "Maintenance - 1000 Service Hours" section).

ENR0495-F9S

Maintenance - 500 Service Hours

(30-6)

Maintenance - 1000 Service Hours

CUMMINS ENGINE MAINTENANCE

- Check Drive Belt Wear and Tension
- Adjust Valves

Refer to Engine Operation manual supplied with machine for instructions.

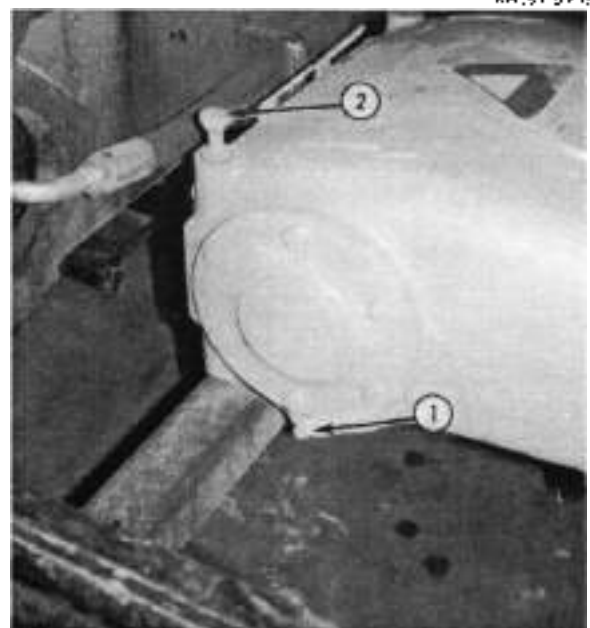
EM2013 097

CHANGE DRILLING FLUID PUMP CRANKCASE OIL

1. Drain Plug
2. Dipstick/Fill port

Fill to full mark on dipstick (refer to 'Fuel and Lubricants' section).

If the oil appears milky, contact your dealer. Water is seeping past the plunger rod seals.



EM2013 097

EM2013 097

Maintenance -1000 Service Hours

D40x40 / Navtec Navigator Maintenance

CHANGE HYDRAULIC FLUID

Change hydraulic fluid and inspect strainer at 1000 hours.

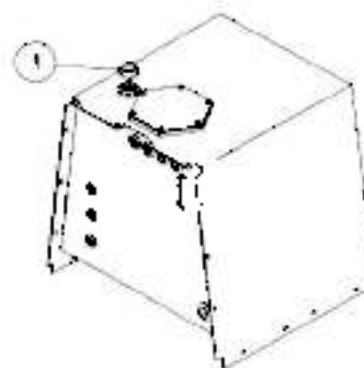
NOTE: If the fluid smells burned, contains air bubbles, or appears contaminated, consult Vermeer dealer immediately.

IMPORTANT: Hydrostatic systems require absolutely clean fluid. Any dirt, water, sand, or other contaminants allowed into hydraulic lines or fittings could cause complete failure of a pump or motor.

Hy-Cat 200-859

- Run engine until it reaches operating temperature to warm hydraulic fluid before draining. Follow shutdown procedure.
- Remove fill cap (1).

MLD126-105



511-0110-725-0002

Maintenance -1000 Service Hours

- Remove the drain plug from the bottom of the hydraulic reservoir and allow fluid to drain.
- Clean and inspect drain plug. Install drain plug.

ENCL0001000

Service Hydraulic Filters

- Replace the charge pressure filters and hydraulic reservoir return filters (Refer to Change Charge Pressure & Hydraulic Fluid Filters, Maintenance - As Required Section).
- Inspect the hydraulic strainers. (Refer to Inspect Hydraulic Oil Strainers).

ENCL0001000

Clean hydraulic fluid is very important for longer life and good operation of the hydraulic components. Take care not to spill dirt or other contaminants into the reservoir when checking or adding hydraulic fluid. Filter all hydraulic fluid through a 10 micron filter before adding it to the reservoir.

ENCL0001000

Maintenance -1000 Service Hours

D40x40 / Navtec Navigator Maintenance

- Fill hydraulic fluid reservoir (Refer to Fuel and Lubricants Section)
- Install and tighten fill cap
- Start engine and operate hydraulic system
- Check fluid level. Fluid level must be within the upper half of the sight gauge

FIGURE 44-1

Remove Strainer

KU-1097-00

- Remove drain plug(s) (4). Drain tank.
- Remove access cover(s) (1). Do not dislodge o-rings (3) in the cover.
- Remove strainer(s) (2) by turning counterclockwise.

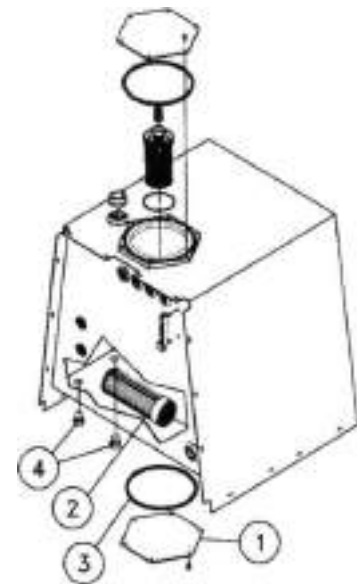


FIGURE 44-1

Maintenance - 1000 Service Hours

(35-4)

Clean and Inspect Strainer

Clean strainer with a petroleum base paint thinner or other good cleaning solvent. Scrub the strainer with a soft-bristled brush. Inspect strainer; consult Vermeer dealer for service recommendations 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 screen mesh
- any evidence of hydraulic system failure
- any evidence of holes or other damage that would allow unfiltered oil to circulate in hydraulic system

EN-001-0016 Rev



WARNING: Wear proper clothing, including a face shield, when using compressed air for blowing solvent coated parts dry.

- Rinse strainer with clean solvent or thinner. Using compressed air, blow it clean.

EN-001-0016 Rev

Maintenance - 1000 Service Hours

D40x40 / Navtec Navigator Maintenance

Install Strainer and Fill Tank

- Apply paste type thread sealer to strainer and tube fitting threads (do not use tape type sealer). Screw strainer and fitting back into tank and install hoses.
- Change fluid filters (Refer to Change Fluid Filters Maintenance - 500 Service Hours Section).
- Fill tank (filter fluid through a 10 micron filter when filling).

RE CH 19/4/99/1

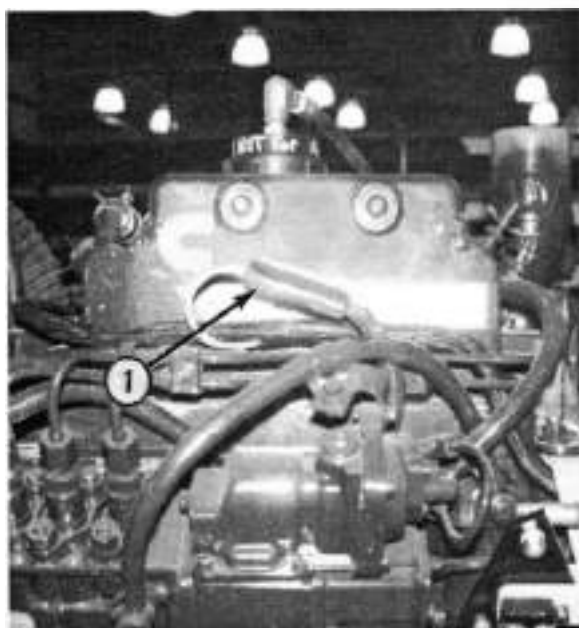
Restore System

1. Disconnect fuel solenoid (1). Crank engine for 15 seconds.
2. Connect solenoid and start engine. Idle engine for four minutes while checking for leaks.

IMPORTANT: Do not operate any hydraulic attachment, or ground drive controls, or raise engine speed above idle for four minutes.

3. Follow shutdown procedure. Check hydraulic fluid level (refer to "Fuel and Lubricants" section).

Tighten filter, if necessary, only enough to stop leak.



MF02580 F02

Maintenance - 1000 Service Hours

(35-6)

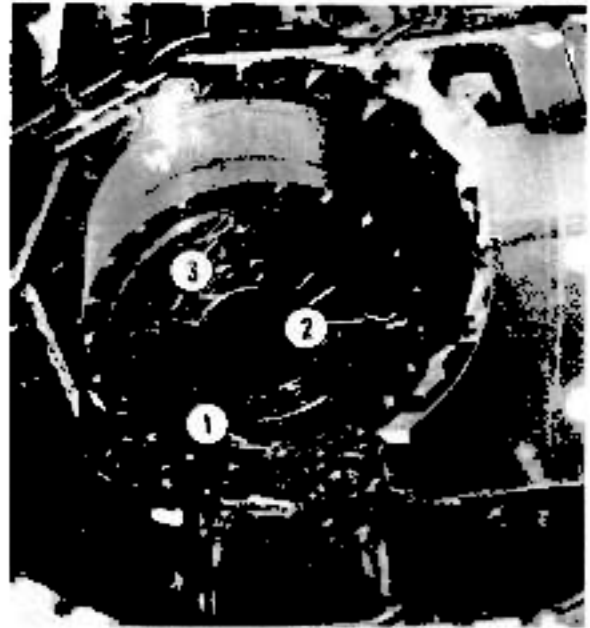
CHANGE PLANETARY GEARBOX OIL

Make sure drain plug is on the bottom when draining oil

Refer to Fuel and Lubricants Section for oil requirements

Fill to check plug level

1. Drain plug
2. Check plug
3. Fill plug



74-001276-0000

Maintenance - 1000 Service Hours

Maintenance - 2000 Service Hours or Yearly

DRAIN AND CLEAN COOLING SYSTEM



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

1. Drain the old coolant from the system
2. Fill radiator with clean water. Check for signs of rust and add a cooling system cleaner to the water if necessary
3. Run the engine long enough to be sure thermostat has opened, allowing the engine and radiator to receive fresh water. Allow the system to cool, then drain the water

EN 001 5002 (7/01)

- Add a 50/50 mixture of low silicate Ethylene-Glycol antifreeze and clean water to the radiator. Do not fill completely. Run the engine until mixture has circulated in the system.

FN 001 0154 (00)

Maintenance - 2000 Service Hours or Yearly

D40x40 / Navtec Navigator Maintenance

- Add 45 quarts (13 liters) of Fleetguard DCA4. Finish filling radiator. System capacity is 45 quarts (43 liters).

161612-42

Recheck radiator after engine has cooled overnight. Fill as necessary. Continue to check each time machine is run and cooled off until radiator remains full.

CA 04 1289 02.15

Maintenance - 2000 Service Hours or Yearly

Maintenance - As Required

CHECK ENGINE SYSTEM

An Engine Operation manual is supplied with each machine. Refer to the manual for service requirements.

RM1108-493

AIR CLEANER ELEMENT - REPLACE

RM1108-501 1405261 F15

When the air cleaner restriction indicator (1) shows the colored band (usually red) the air cleaner element must be replaced.

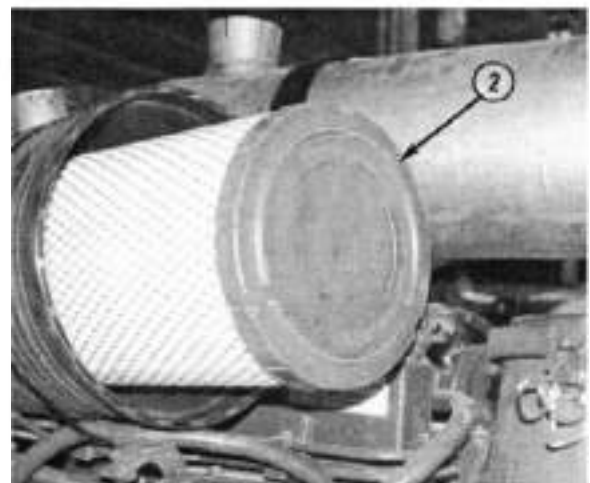
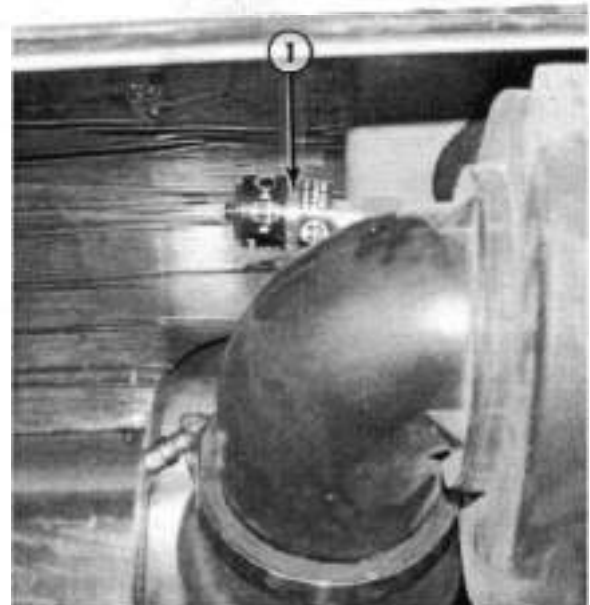
NOTE: Replace the element. Do not attempt to clean and return a used element to service.

To replace the element:

1. Unclamp and remove the back cover of the air cleaner assembly.
2. Remove the dirty element (2).

NOTE: Refer to the engine manual that is supplied with the machine to determine the make and number of the correct replacement filter.

3. Check the replacement air cleaner element for damage.
4. Install the replacement air cleaner element.
5. Install the end of the air cleaner assembly, ensure all fasteners and/or clamps are tight.



RM1108-145

Maintenance - As Required

(45-1)

D40x40 / Navtec Navigator Maintenance

REPLACE BATTERY

The machine has a 12-volt electrical system. Replacement battery must meet standard battery specifications.

Battery Specifications

BCI Group Size: 31 31P

ISB Type: 31P-PHD

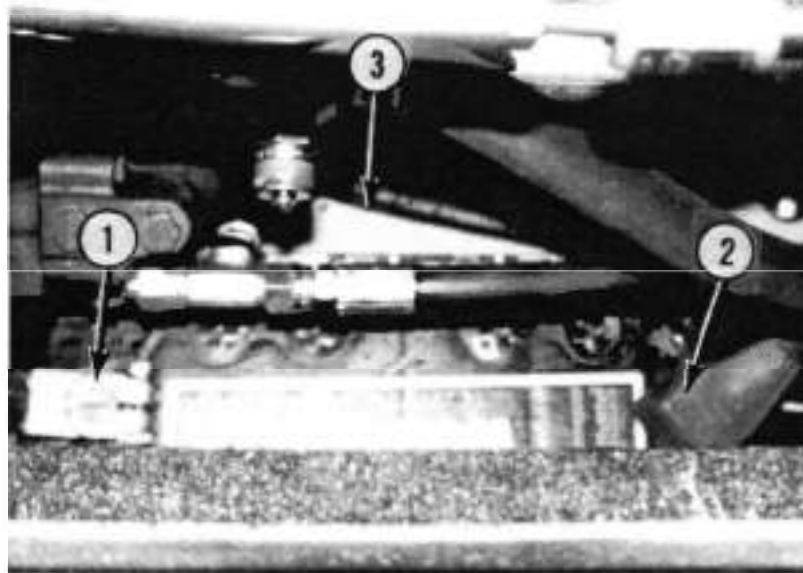
Cold Cranking Amps
(30 sec. -- 0°F (-18°C)): 800

Reserve Capacity (Minutes of 25 amp output at
80°F (27°C)): 360

Dimensions: Length	13	in (33 cm)
Width:	7.25	in (18 cm)
Height:	8.75	in (22 cm)

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Maintenance - As Required



- Remove the negative (-) cables (1) first. Then remove the positive (+) cables (2).
- Remove hold-down bracket (3).
- Lift batteries out of compartment. The use of a battery lifting strap is recommended.
- Apply a light coating of petroleum jelly around the base of each terminal on the replacement batteries.
- Install batteries with the cell caps toward the front of the machine.
- Install hold-down bracket (3).
- Install the positive (+) cables (2) first. Then install the negative (-) cables (1) and tighten. Install the plastic caps over the positive cable clamps.

RM24547-01

Maintenance - As Required

D40x40 / Navtec Navigator Maintenance

CHECK SEAT BELTS



WARNING: Seat belts are to be worn at all times whenever driving the machine, including when loading and unloading from a trailer. These seat belts must be properly maintained as explained below:

- Immediately replace any belts that have been cut, weakened, or become inoperable. If in doubt, replace the part.
- If it is necessary to clean the belts, use a mild soap solution and lukewarm water. Do not use bleach, dye, solvents, or other chemicals which may weaken the belts.

EN6577-040

REPLACE LOWER ROLLERS

The lower track rollers are filled with oil. The oil does not need to be checked or replaced. If the oil leaks out of the rollers, the entire roller assembly must be replaced.

EN6577-0204-0000

Maintenance - As Required

(45-4)

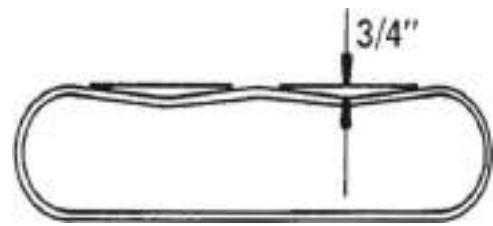
ADJUST TRACK TENSION

KLCT54002

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

The tracks must be clear when checking track tension.

The proper tension is 3/4" (2 cm) of slack when measured as shown.

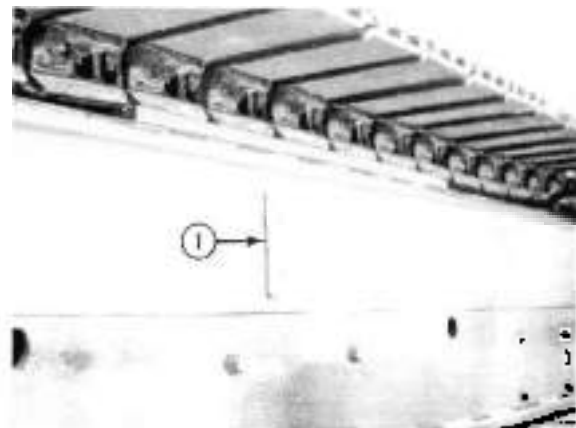


EN 014 0004 0002

To increase track tension:

- Remove access cover (1) from the track frame.
- Attach a grease gun to the ball check (2) and add grease to the grease cylinder until the track is properly tensioned.
- Install the access cover.

KL - TRACK TENSION 045-0093



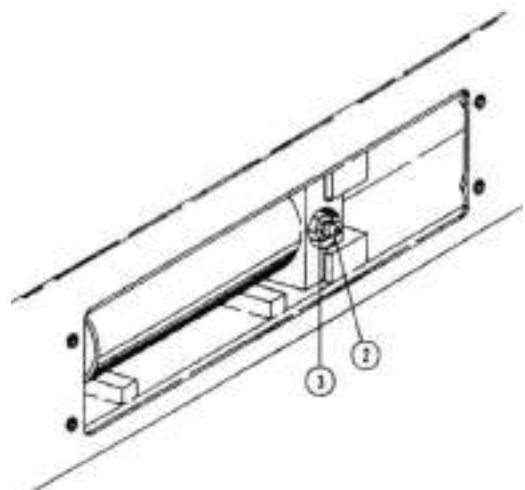
To decrease track tension:

- Remove access cover (1) from the track frame.



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

- Loosen cartridge (3) about one-half turn. Allow grease to come out until track tension is correct. Tighten cartridge. Remove expelled grease from the track frame.
- Install access cover.



KL004 0001 0000

Maintenance - As Required

D40x40 / Navtec Navigator Maintenance

ADJUST THRUST DRIVE CHAIN TENSION

44-102, F-1

Keep the chains adjusted so the belleville washers (1) are flat. To adjust tension:

- 1 Lower drill rack to the ground and follow shutdown procedure.
- 2 Loosen jam nut (2)
- 3 Turn nut (3) until washers are flat, then tighten jam nut

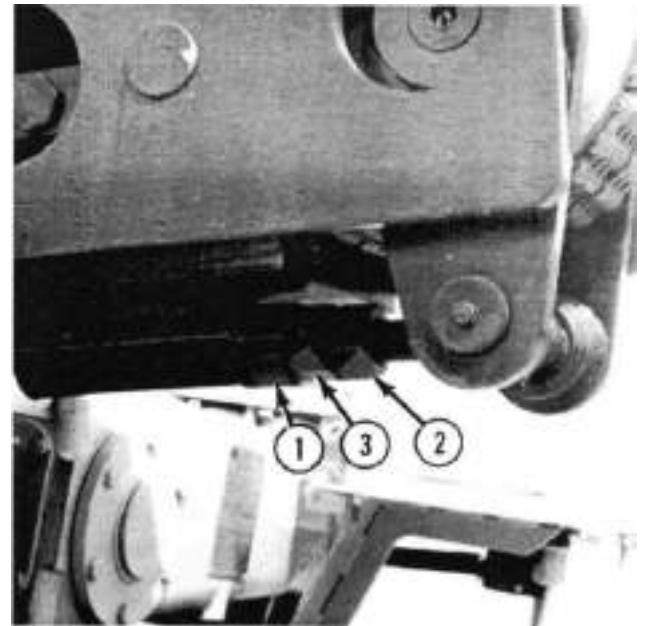
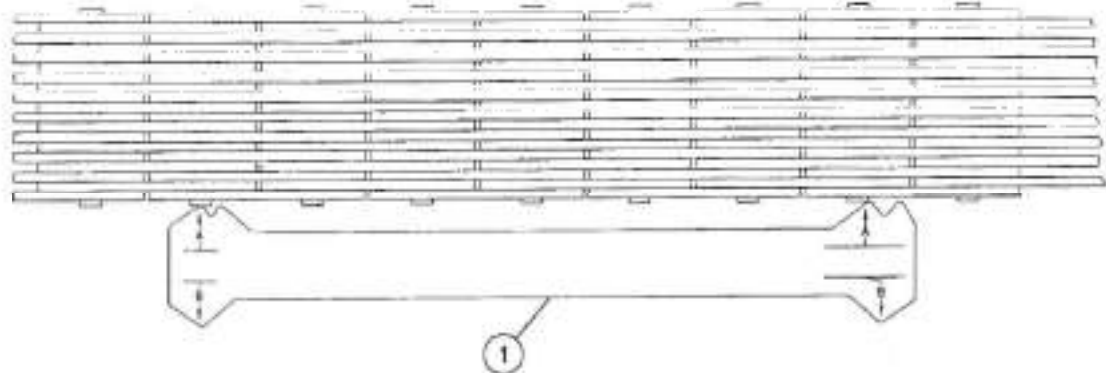


FIGURE 092

REPLACE THRUST DRIVE CHAINS

44-102, A-1



NOTE: Chain pitch is 1 inch (25 mm).

Wear scale (1) (p/n 224632-001) is available to check chain wear.

- Align the left "A" with the center of a chain pin.
- When the right "A" is aligned with the center of a pin, replace the chain. Refer to the Service Manual or contact your dealer.

FIGURE 093

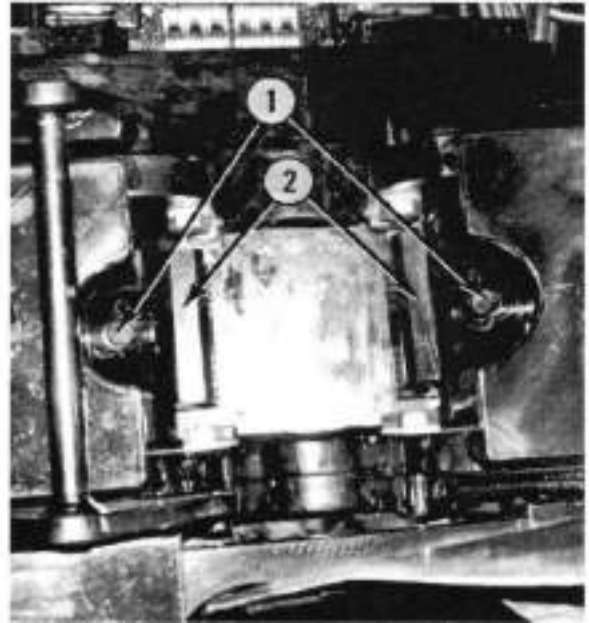
Maintenance - As Required

(45-6)

REPLACE VISE JAW GRIP

NH07465.097

- Extend cylinder just far enough to access pin (1) then shut off engine.
- Remove pin (1) and jaw grip (2).
- Install new grip and pin (1).



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Maintenance - As Required

CHECK ROLLOVER PROTECTION STRUCTURE



WARNING: The rollover protection structure (ROPS) is intended to protect the tractor operator in the event of a rollover. In order for you to be protected by the ROPS, you must wear the seat belts. Follow the instructions below relating to ROPS safety precautions:

1. Do not remove the ROPS.
2. Do not modify the ROPS in any manner. Unauthorized modifications, such as welding, drilling, cutting, or adding attachments, could weaken the structure and reduce your protection.
3. If the ROPS has been damaged or subjected to a rollover, the ROPS must be replaced. Do not attempt any repairs.
4. The roll bars have been certified to a maximum gross machine weight as stated on the ROPS label located on the ROPS. Under no circumstances may the total gross weight of the machine exceed the weight specified on the ROPS label.
5. If the ROPS must be replaced, be sure to use original parts ordered from Vermeer Manufacturing Company.

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Maintenance - As Required

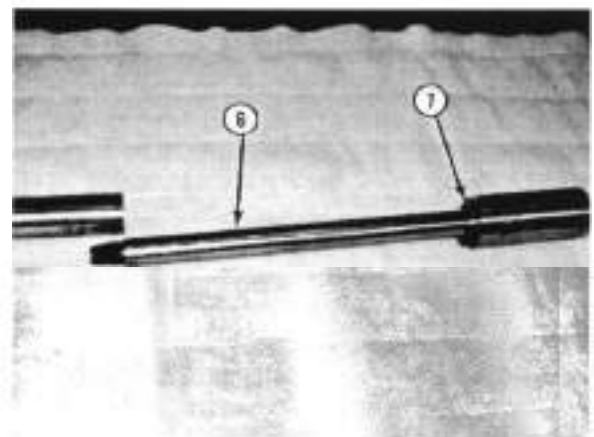
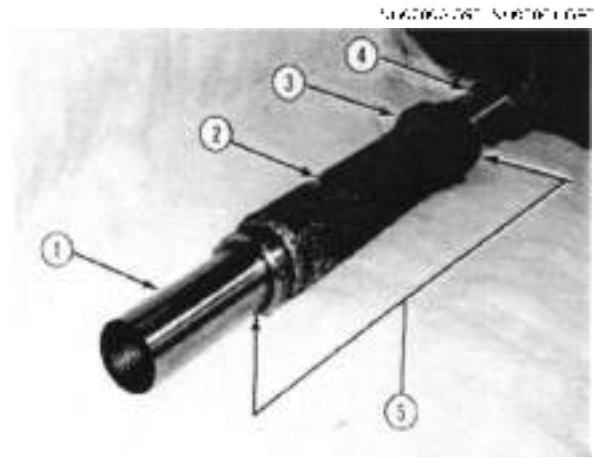
KLONDIKE™ DRILL HEAD HOUSING - SERVICE

Check Seals

Ensure seals (5) contact subs (1) and (4), and are not torn or damaged.

Disassemble Housing

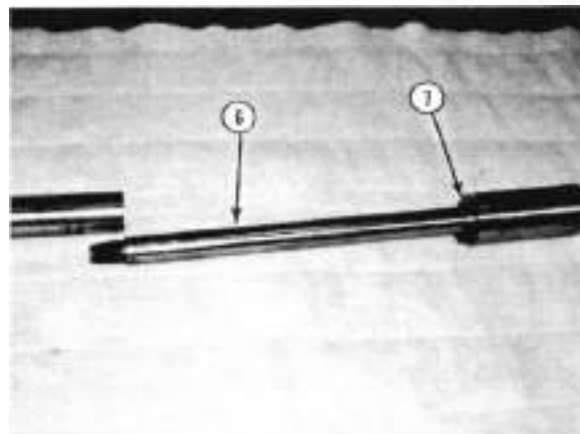
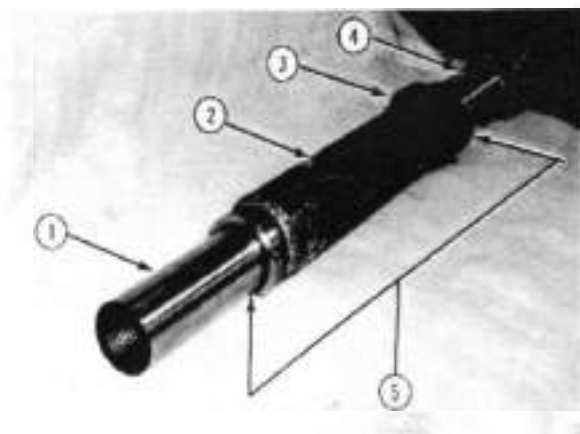
1. Engage the jaw clutch by pushing lower sub (4) into housing.
2. Hold housing (2) and turn upper sub (1) counterclockwise; either sub may unthread from the shaft.
3. Slide drive shaft (6) out of the housing. To ensure proper lubrication, check that the two mud holes are not plugged.



LN10137 R7

Maintenance - As Required

D40x40 / Navtec Navigator Maintenance

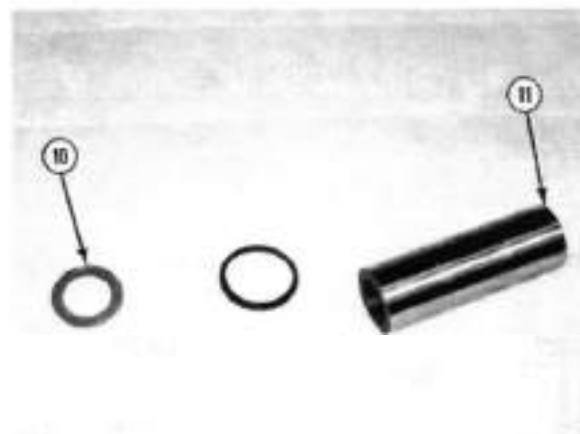
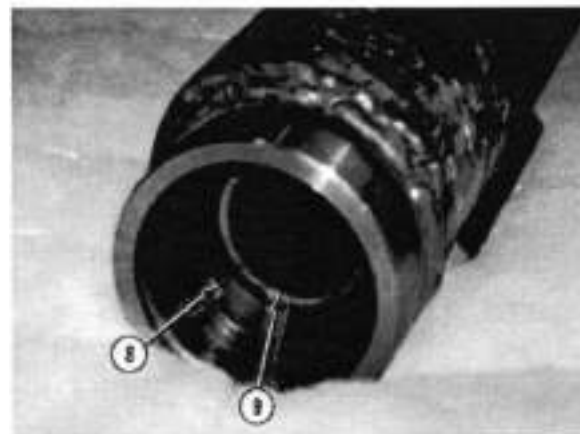


Replace Wear Items

NOTE: Excessive wear can lead to equipment damage or loss of control during a bore.

Replace the following items if worn beyond specification:

- **Upper sliders** (not shown) . . . 3/16" (5mm)
(measure the height above housing)
- (3) **Lower sliders** 21/32" (17mm)
(measure the height above housing)
- (6) **Drive shaft** 3.575 (91mm)
- (7) **Jaw clutch teeth** worn or rounded
- (8) **Wear ring** scored, galled, or damaged
(Also known as thrust face.)
- (9) **Bushings** 3.740 (95mm)
(measure both ends)
- (10) **Thrust washer** 0.125" (3mm)
(After a long bore, the thrust washer could be worn entirely away.)
- (11) **Upper sub** scored, galled, or damaged



69102402

Maintenance - As Required

(45-10)

KLONDIKE™ ROLLER CONE BIT - SERVICE

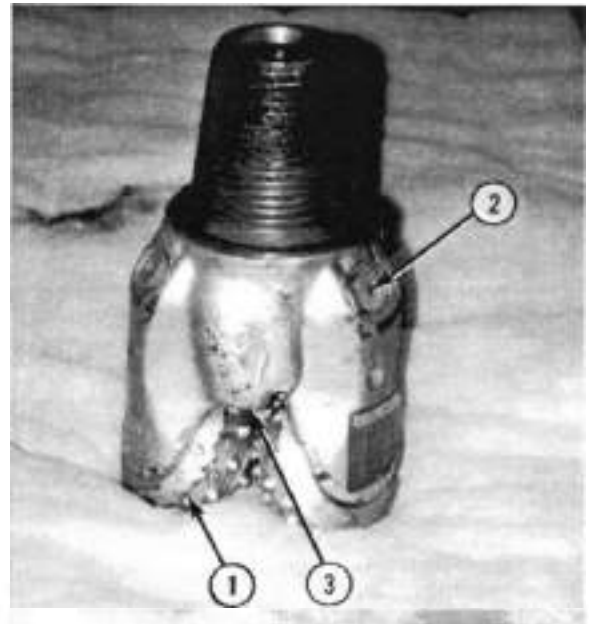
RM02462 97

Cutter Seals - Inspect

To check, slowly rotate each cutter (1). If little or no resistance is felt, the head must be rebuilt.

Cutter Bearings - Grease

- 1 Remove plugs (2) and install grease zerks.
- 2 Grease with approximately two shots of grease until slight resistance is felt. **Be careful not to over-grease and blow out the seals.**
- 3 Remove zerks and install plugs

**Mud Nozzles - Inspect**

Check nozzles (3) (three sides) for excessive wear and/or damage; replace as necessary.

RM 02462

Maintenance - As Required

Troubleshooting

POWER SYSTEM		
PROBLEM	CAUSE	SOLUTION
Engine Won't Turn Over	Weak battery.	Check condition of battery and replace if defective.
	Defective ignition switch	See your Vermeer dealer.
	Defective starter solenoid	See your Vermeer dealer
Engine hard to start or will not start.	Emergency stop switch ON	Pull switch button out.
	Ground drive lever is out of neutral.	Return lever to neutral.
	No fuel.	Add fuel
	Wrong fuel.	Use correct fuel
	Leak in fluid line.	Check fuel line and connection
	Dirt or water in fuel system.	Remove fuel, clean tank, and replace fuel filter.
	Air in fuel system.	Remove air from fuel system.
	Fuel filter is dirty.	Replace fuel filter.
	Wrong weight engine oil.	Use correct oil.
	Restricted air filter.	Clean or replace air filter.
	Low cranking speed weak battery or poor connections	Check condition of battery and replace if defective. Clean terminals and cables.
	Fuel shutdown solenoid failed	Replace solenoid.
	Reset engine high temperature shut down system (Cummins Engine Option).	See your Vermeer dealer.

(continued on next page)

Troubleshooting

D40x40 / Navtec Navigator Maintenance

POWER SYSTEM (CONT.)		
PROBLEM	CAUSE	SOLUTION
Lack of engine power.	Wrong fuel.	Use correct fuel.
	Dirt or water in fuel system.	Remove fuel, clean tank, and replace fuel filter.
	Air in fuel system	Remove air from fuel system.
	Fuel filter is dirty.	Replace fuel filter
	Wrong weight engine oil	Use correct oil.
	Restricted air filter	Clean or replace air filter.
	Low engine compression	See your Vermeer dealer.
	Engine is too hot	See your Vermeer dealer.
	Fuel rack not fully open because fuel shutdown solenoid improperly adjusted.	See your Vermeer dealer.
	Incorrect valve clearance.	See your Vermeer dealer.

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Troubleshooting

ELECTRICAL SYSTEM

PROBLEM	CAUSE	SOLUTION
Low battery output	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
	DSR relay fails.	Replace relay
Battery uses too much water.	Cracked battery case.	Replace battery
	Overcharged battery.	See your Vermeer dealer
Low battery charge.	Alternator not charging.	See your Vermeer dealer.
	Loose or corroded battery cables.	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.

ELECTRICAL

Troubleshooting

D40x40 / Navtec Navigator Maintenance

HYDRAULIC SYSTEM		
PROBLEM	CAUSE	SOLUTION
No hydraulic power.	No hydraulic fluid.	Fill with fluid.
	Battery voltage is too low to shift the solenoid.	Check battery, alternator, and charging circuit
	The voltage dropout relay is bad.	Replace dropout relay.
	Damaged or worn hydraulic pump.	See your Vermeer dealer.
	Relief valve damaged	See your Vermeer dealer.
Slow hydraulic power.	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.
Noisy Hydraulic Pump	Cold Hydraulic Fluid.	Warm up machine at reduced engine speed.

(continued on next page)

Troubleshooting

HYDRAULIC SYSTEM (CONT.)

PROBLEM	CAUSE	SOLUTION
Hydraulic power loss.	Low hydraulic fluid level	Add hydraulic fluid.
	Plugged hydraulic filter.	Replace filter.
	Plugged 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.
	DSR relay fails.	Replace relay.
Oil foams.	Low hydraulic fluid level.	Add hydraulic fluid.
	Water in hydraulic fluid	Change fluid.
	Air leak between tank and pump.	Repair leak.

ENCLOSURE

Troubleshooting

D40x40 / Navtec Navigator Maintenance

DRILLING FLUID SYSTEM		
PROBLEM	CAUSE	SOLUTION
No hydraulic power.	No hydraulic fluid	Fill with fluid
	The transport/drilling fluid circuit switch is in the transport position.	Move the switch to the mixing circuit position to turn the hydraulic system on.
	Damaged or worn hydraulic pump	See your Vermeer dealer.
	Relief valve damaged	See your Vermeer dealer.
Slow hydraulic power.	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.
Noisy hydraulic pump.	Cold Hydraulic Fluid.	Warm up machine at reduced engine speed.

ENCL 144-5783

Troubleshooting

Service Specifications

ENGINE

Model Cummins 4BTA 3.9 - C
Max. horsepower . . . 125 (93.2 kw) @ 2200 rpm
Engine oil capacity . . 11.5 qt (10.9 liters) w/ filler
10 qt (9.5 liters) w/o filler
Fuel type diesel
Cooling medium liquid
System coolant capacity . . 26 qt (25 liters)
Maximum engine inclination . 30° all directions
Electrical system 12 volt
Battery ■ BCI Group Size 31
■ 950 CCA (30 sec -0° F (-18° C))
■ 185 minutes of reserve capacity
(25 amp output at 80° F (27° C))

HYDROSTATIC AND HYDRAULIC SYSTEMS

Pump Relief Settings:
Rotation/Left Track Pump
(Closest to Engine) . . . 6000 psi (408 bar)
Thrust/Pullback/Right Track Pump
(2nd from Engine)
A Side 4100 psi (283 bar)
B Side 3200 psi (221 bar)
PFC Pump (3rd from Engine)
Low Pressure Standby . . . 400 psi (28 bar)
High Pressure Standby . . 3000 psi (207 bar)
Reservoir capacity 60 gal (227 liters)

TRACK DRIVE PLANETARY GEARBOX

Oil capacity Check Plug Level

ENR110F-9

Service Specifications

Recommended Torque Values

HYDRAULIC FITTINGS

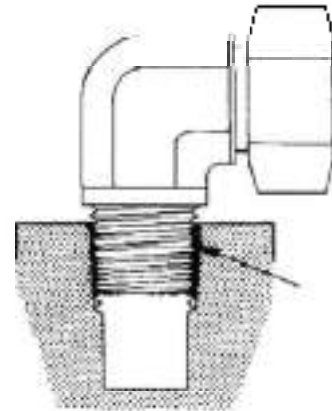
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Pipe Thread Fittings

Make sure the threads are free from nicks, burrs, dirt, etc.

Tighten the fitting approximately 3 turns past finger tight

Using a thread sealant such as "Loctite Vibra-Seal" is recommended over pipe dope or teflon tape. Teflon tape can plug filters, drain orifices, etc. and can cause hydraulic system failures.



EN-20M-0005-AUG

Recommended Torque Value

D40x40 / Navtec Navigator Maintenance

O-ring Fittings

NL-0100-JL92 EN-L-0101-JL92

Make sure the threads and sealing surfaces are free of burrs, nicks, scratches, or any foreign material.

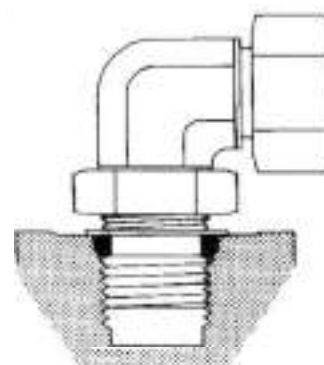
Lubricate the o-ring with a light coat of oil.

Adjustable o-ring fittings

Hold fitting, tighten nut

Non-adjustable o-ring fittings:

Tighten fitting



Size	Thread	Torque
2	5/16"-24	7 - 8 ft. lbs (10 - 11 Nm)
3	3/8"-24	14 - 16 ft. lbs (19 - 21 Nm)
4	7/16"-20	16 - 19 ft. lbs (21 - 24 Nm)
5	1/2"-20	22 - 24 ft. lbs (29 - 30 Nm)
6	9/16"-18	24 - 26 ft. lbs (33 - 35 Nm)
8	3/4"-16	40 - 43 ft. lbs (54 - 49 Nm)
10	7/8"-14	68 - 70 ft. lbs (93 - 95 Nm)
12	1 1/16"-12	98 - 102 ft. lbs (135 - 138 Nm)
16	1 5/16"-12	146 - 154 ft. lbs (197 - 209 Nm)

EN-26457 Rev. 1.0

Recommended Torque Value

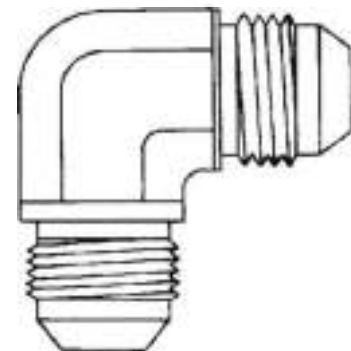
JIC Fittings

FIG. 10. 13 461 000 000

Make sure the threads and sealing surfaces are free of burrs, nicks, scratches, or any foreign material

Tighten the fitting finger tight. Then tighten the fitting an additional number of flats as the chart indicates. One flat equals 1/8 of a turn.

Overtightening the fitting may deform or break the female side of the fitting, restricting oil flow or causing a leak.



Flats from Finger Tight

Size	New Fittings	Loose Fittings
4 (1/4")	2 - 2 1/2	3/4 - 1
6 (3/8")	2 - 2 1/4	1
8 (1/2")	1 1/2 - 1 3/4	1
10 (5/8")	1 1/2 - 1 3/4	3/4
12 (3/4")	1 1/2	3/4
14 (7/8")	2	1 1/4
16 (1")	1 1/4 - 1 1/2	3/4 - 1
20 (1 1/4")	1 1/2	3/4 - 1
24 (1 1/2")	1 1/4 - 1 1/2	1 - 1 1/4
32 (2")	1 1/4	3/4 - 1

ENCL 0000 0000

Recommended Torque Value




D40x40 / Navtec Navigator Maintenance

FASTENERS

W-0154-0107

For SAE Grade 2, Grade 5 & Grade 8 Cap Screws & Bolts

NOTE: Torque values specified in text take precedence over values shown below. *These values do not apply when used with lock nuts.

BOLT SIZE						
	GRADE 2		GRADE 5		GRADE 8	
	FT. LBS	NEWTON METERS	FT. LBS	NEWTON METERS	FT. LBS	NEWTON METERS
1/4 - 20 NC	4	5	6	8.5	10	13
1/4 - 28 NI	5	6	8	11	11	15
5/16 - 18 NC	9	12	13	18	20	27
5/16 - 24 NF	10	13	15	20.5	22	29.5
3/8 - 16 NC	16	22	25	35	35	47
3/8 - 24 NF	18	24	30	40	40	55
7/16 - 14 NC	25	35	40	55	55	75
7/16 - 20 NF	30	40	45	60	65	85
1 - 13 NC	40	55	60	80	90	120
1 - 20 NF	45	60	70	95	95	130
9/16 - 12 NC	55	75	90	120	120	165
9/16 - 18 NF	60	80	95	130	135	185
5/8 - 11 NC	75	100	120	165	180	245
5/8 - 18 NF	80	110	145	200	195	265
3/4 - 10 NC	130	175	210	285	300	405
3/4 - 16 NF	145	200	240	325	340	460
7/8 - 9 NC	150	205	320	435	500	680
7/8 - 14 NF	170	230	350	475	550	760
1 - 8 NC	180	245	450	650	800	1085
1 - 14 NF	200	270	560	780	920	1250
1 1/8 - 7 NC	240	325	700	950	1180	1600
1 1/8 - 12 NF	275	375	780	1060	1340	1815

(Continued on the next page)

Recommended Torque Value

(60-4)

D40x40 / Navtec Navigator Maintenance

1 1/4 - 7 NC	340	460	1020	1385	1720	2350
1 1/4 - 12 NF	370	500	1140	1535	1900	2575
1 3/8 - 6 NC	460	625	1360	1815	2280	3090
1 3/8 - 12 NF	540	730	1580	2140	2620	3550
1 1/2 - 6 NC	640	870	1840	2495	3060	4150
1 1/2 - 12 NF	740	1000	2190	2850	3460	4690

FIGURE 11A

For Metric Grade 5.8, 6.9, 8.8, 10.9, & 12.9 Cap Screws and Bolts

FIGURE 11B






Bolt Size	 Grade 5.8		 Grade 6.9		 Grade 8.8		 Grade 10.9		 Grade 12.9	
	FT. LBS.	NEWTON METERS	FT. LBS.	NEWTON METERS	FT. LBS.	NEWTON METERS	FT. LBS.	NEWTON METERS	FT. LBS.	NEWTON METERS
M4	1.1	1.5	1.7	2.3	2	2.7	2.9	4	3.6	5
M5	2.3	3.1	3.5	4.7	4	5.4	6	8	7	9.6
M6	3.9	5.3	5.8	7.8	7	9.5	10	13.5	11	15
M7	5.5	7.5	9.4	12.7	11	15	16	22	20	27
M8	10	13.5	14	19	18	24	25	34	29	39
M10	20	27	29	39	32	43	47	64	58	79
M12	34	46	50	68	58	79	80	112.5	100	136
M14	54	73	79	107	94	127	133	180	159	216
M16	80	108.5	122	165	144	195	196	266	235	319
M18	114	155	170	230.5	190	258	269	365	323	436
M20	162	220	220	298	260	353	366	496	440	597
M22	202	274	318	431	368	499	520	705	628	852
M24	245	332	410	556	470	637	664	900	794	1077
M27	360	488	606	822	707	959	996	1351	1205	1634
M30	500	678	815	1103	957	1311	1357	1840	1630	2210

FIGURE 11B

Recommended Torque Value





(60-5)

D40x40 / Navtec Navigator Maintenance

For Grade B, C, F, and G Lock Nuts

11-01-2014

NOTE: Torque values specified in list takes precedence over values shown below

NUT SIZE								
	GRADE B (GRADE 5)		GRADE C (GRADE 6)		GRADE F (GRADE 5 FLANGE)		GRADE G (GRADE 6 FLANGE)	
	FT. LBS.	NEWTON METERS	FT. LBS.	NEWTON METERS	FT. LBS.	NEWTON METERS	FT. LBS.	NEWTON METERS
1/4 - 20 NC	7.5 - 10	10 - 13	10 - 14	14 - 19	3 - 10	11 - 14	12 - 16	16 - 21.5
1/4 - 28 NF	8 - 10	11 - 14	10 - 14	14 - 19	9 - 12	12 - 16	12 - 17	16 - 23
5/16 - 18 NC	14 - 17.5	18 - 24	17.5 - 22.5	24 - 30.5	15 - 20	20 - 27	18.5 - 27	27 - 36
5/16 - 24 NF	15 - 18	20 - 26	18 - 23	25 - 32	16 - 22	21.5 - 29	19.5 - 26	27 - 35
3/8 - 16 NC	21 - 27	28.5 - 37	20 - 27	29 - 50	22.5 - 32.5	30.5 - 44	30 - 41	41 - 56
3/8 - 24 NF	27.5 - 38	37 - 51.5	22.5 - 31	30.5 - 42	23.5 - 31.5	32 - 43	31 - 42	42 - 57
7/16 - 14 NC	31 - 40	42 - 54	30 - 53	53 - 77	35 - 50	48 - 68	45 - 62	61 - 84
7/16 - 20 NF	29 - 51	53 - 69	41 - 56	56 - 76	38 - 53	51.5 - 72	51 - 71	69 - 90
1 - 13 NC	49.5 - 62.5	67 - 85	62 - 79.5	84 - 108	50.5 - 63.5	69.5 - 84	72 - 100	96 - 138
1 - 22 NF	50 - 65	68 - 88	67 - 87	91 - 118	56.5 - 78.5	77 - 106	67 - 106	91 - 144
5/16 - 12 NC	67 - 87	91 - 118	95 - 120	129 - 163	72 - 102	98 - 138	106 - 145	142 - 197
9/16 - 18 NF	74.5 - 94.5	101 - 120	95 - 120	129 - 163	79 - 111	107 - 150.5	113 - 167	153 - 213
5/8 - 11 NC	95 - 120	129 - 163	125 - 157.5	169.5 - 214	100 - 137	136 - 166	130 - 178	176 - 241
5/8 - 16 NF	97.5 - 127.5	132 - 165	125 - 160	169.5 - 217	102 - 142	142 - 197	150 - 210	203 - 285
3/4 - 10 NC	160 - 202	217 - 271	202 - 254	271 - 348	170 - 220	230.5 - 312	202 - 282	276 - 386.5
3/4 - 16 NF	155 - 200	210 - 271	200 - 256	271 - 346	163 - 227	221 - 308	215 - 315	291.5 - 427
7/8 - 9 NC	235 - 300	319 - 407	285 - 387.5	400 - 519				
7/8 - 14 NF	250 - 320	339 - 434	295 - 382.5	400 - 519				
1 - 8 NC	340 - 440	468 - 603	450 - 512.5	610 - 695				
1 - 14 NF	370 - 470	502 - 637	452.5 - 590	617 - 690				

11-01-2014

Recommended Torque Value

(60-6)

