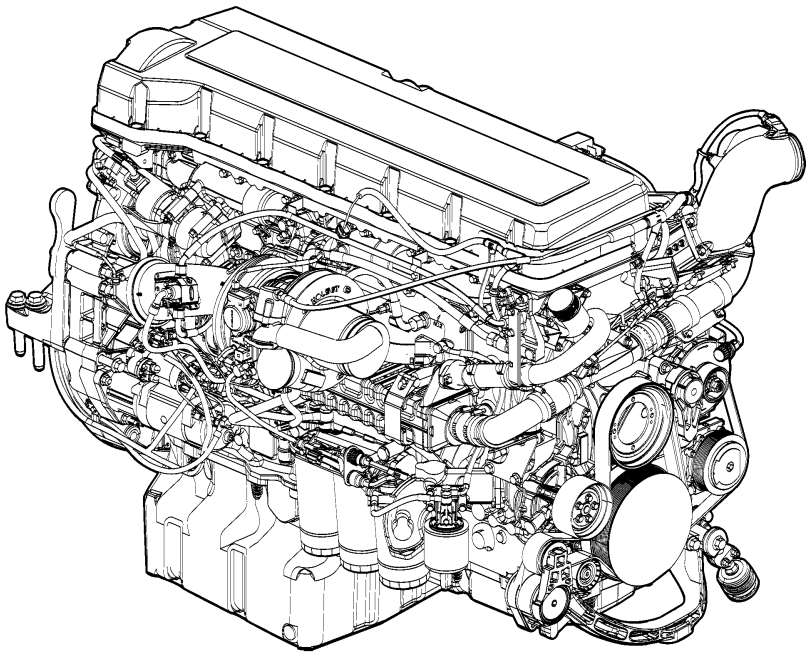
VOLVO
Volvo Trucks North America
Greensboro, NC USA

Service Bulletin Trucks

Date	Group	No.	Page
3.2007	**221**	**49**	1(15)

Piston Cooling
D16F

Piston Cooling



W2005772

This information covers servicing the piston cooling nozzles and control valves on a Volvo D16F engine.

Note: When the engine is running, there usually is a buildup of heat in the piston that, in some cases, requires extra cooling. Piston cooling is set in motion when the oil pressure is sufficient to open the piston cooling opening valve in the cylinder block. The oil is then forced through the engine block drilled galleries into the piston cooling nozzles for piston cooling. There is one nozzle for each piston.

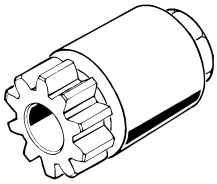
Contents

Note: Information is subject to change without notice.
Illustrations are used for reference only and can differ slightly from the actual vehicle being serviced. However, key components addressed in this information are represented as accurately as possible.

Tools

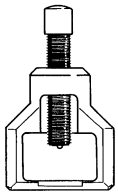
Special Tools

For Special Tools ordering instructions, refer to Tool Information, group 08.



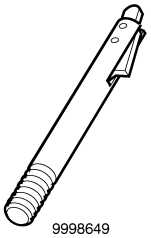
T0012612

88800014
Flywheel Turning Tool



W0001240

9996201
Tie Rod Separating Tool



9998649

W2006137

9998649
Stiffening Frame Retainer Tool

Service Procedures

2219-03-02-02
Piston Cooling Nozzle, Replacement

You must read and understand the precautions and guidelines in Service Information, group 20, "General Safety Practices, Engine" before performing this procedure. If you are not properly trained and certified in this procedure, ask your supervisor for training before you perform it.

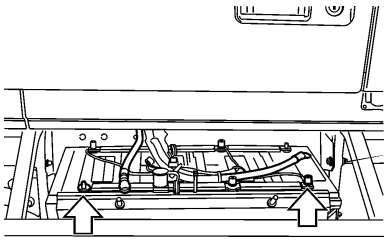
Removal

Note: To prevent the piston cooling nozzles from being damaged, always remove them before removing pistons and cylinder liners.

Special tools: 88800014 , 9996201, 9998649

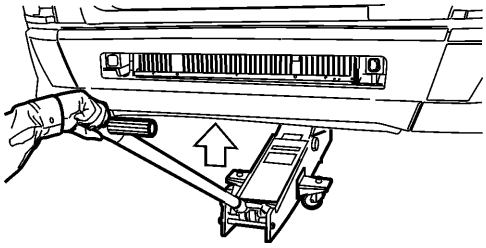
1
Apply the parking brake and place the shift lever in neutral.

2
Remove all cables from ground (negative) battery terminals to prevent personal injury from electrical shock.



W2003815

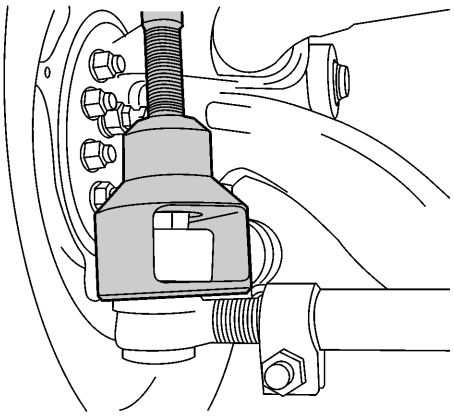
3
Using a hydraulic jack, lift the front axle until the front wheels are off the ground. Position jackstands of a suitable size and capacity under the front axle.



W2003873

4
Depending on chassis installation, remove the cotter pin and locknut from the left-side tie rod end.

Note: This step is required only on a chassis equipped with a rear sump oil pan.



W2004875

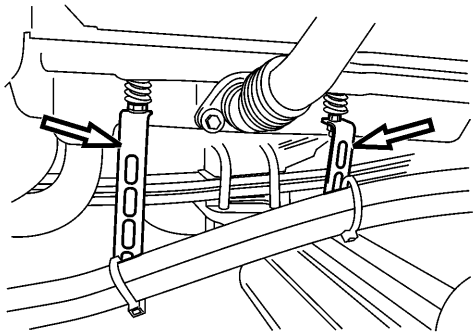
5
Depending on chassis installation, remove the tie rod from the left-side steering knuckle using a tie rod separating tool. Disconnecting the tie rod allows more clearance for oil pan removal.

Note: This step is required only on a chassis equipped with a rear sump oil pan.

9996201

6
Place an approved container under the oil pan. Drain the oil by removing the drain plug. Reinstall the drain plug.

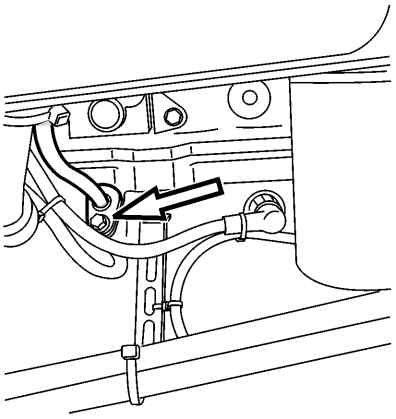
Note: Use only hand tools when removing and tightening the drain plug. Do not use an air ratchet or similar air tool.



W2004874

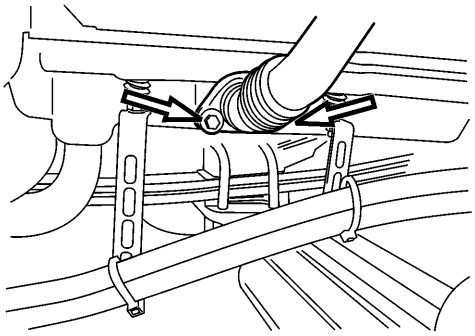
7
Remove the transmission oil cooler line bracket nuts and separate the brackets from the oil pan fasteners. Position the cooler lines out of the way.

Note: Mark the transmission oil cooler bracket stud locations to aid in reassembly.



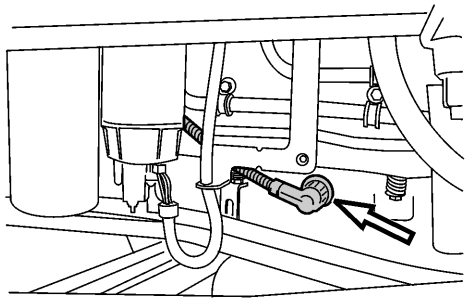
W2005086

8
Pull the dipstick partially out of the dipstick tube. Remove the dipstick tube fastener and tube from the oil pan. Remove and discard the O-ring.



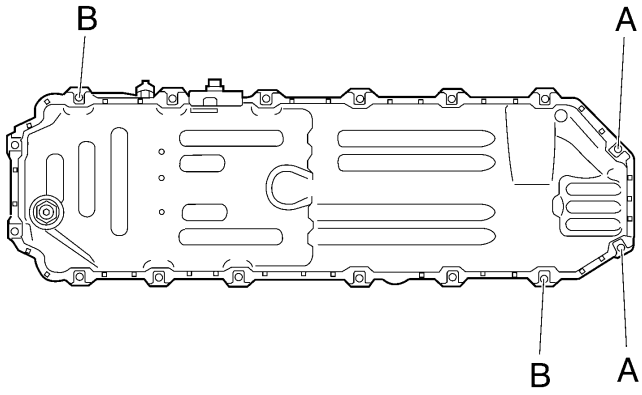
W2004884

9
Remove the oil fill tube fasteners and tube from the oil pan. Remove and discard the tube O-ring.



W2004876

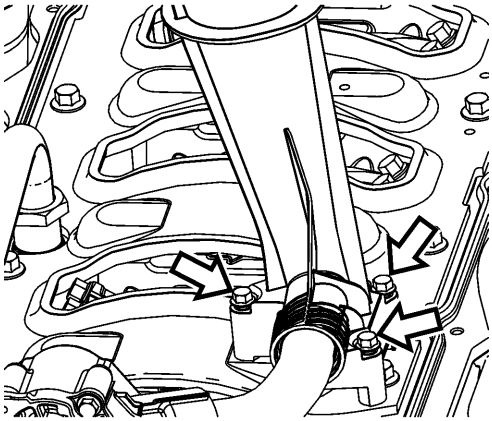
10
Disconnect the oil level/temperature sensor connector.



W2005226

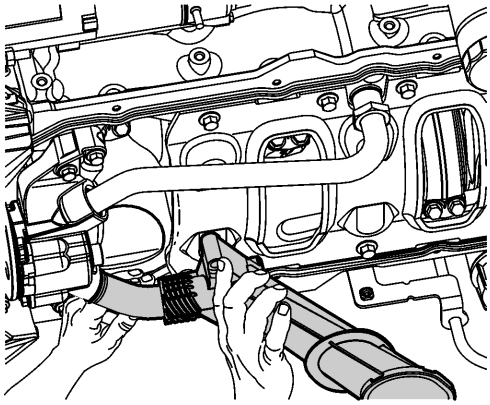
11
Remove the two bolts marked A. Loosen the two bolts marked B but do not remove. Remove all other bolts.

12
With assistance, remove the bolts marked B and carefully lower and remove the oil pan.



W2004952

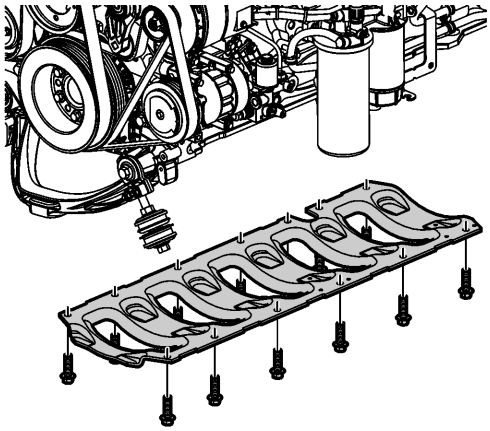
13
Remove the bolts from the oil strainer.



W2004957

14
Remove the oil strainer and suction pipe from the oil pump.

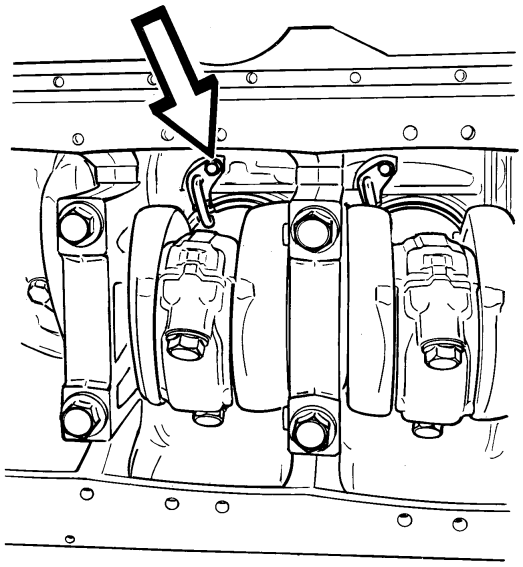
Note: Use care when removing the oil pick up from the oil pump assembly. The plastic oil strainer has an O-ring attached to the pipe that is installed into the oil pump.



W2005149

15
Remove one stiffening bolt on each side and install the stiffening frame retainers to secure the stiffening frame. Then, remove all remaining mounting bolts and remove the stiffening frame.

9998649



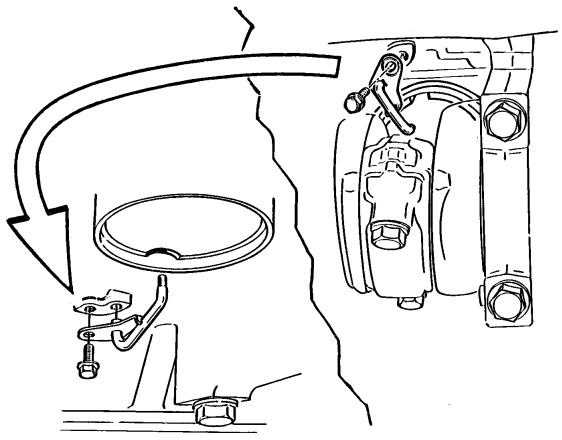
T2006685

16
Using the flywheel turning tool, turn the crankshaft until the piston cooling nozzle to be replaced is easily accessible.

88800014

17
Remove the bolt from the piston cooling nozzle and remove the nozzle. Remove and discard the O-ring from the nozzle.

Installation



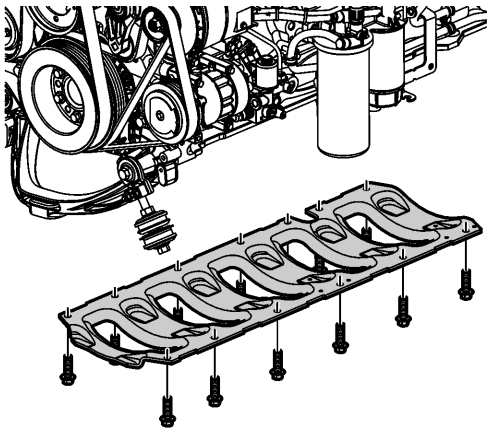
T2006686

1
Install a new piston cooling nozzle with a new O-ring and a new bolt. Tighten the bolt to 24 ± 3 Nm (18 ± 2 ft-lb).

Note: The piston cooling nozzle attachment bolt is coated with a friction-inducing compound. Do not reuse.

Note: Any piston cooling nozzle suspected of damage must be replaced (this also applies to new nozzles). Always make sure the piston cooling nozzle fits correctly in its hole in the cylinder block and that the attachment plate is flush with the cylinder block.

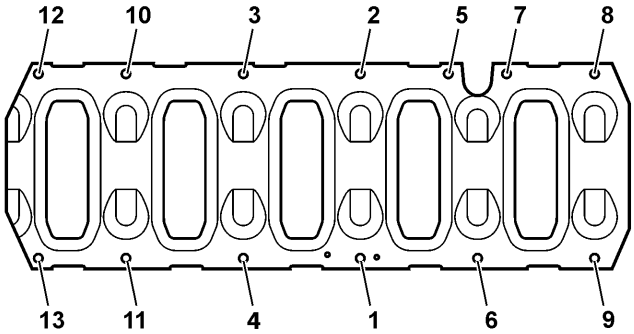
24 ± 3 Nm
(18 ± 2 ft-lb)



W2005149

2
Position the engine stiffening frame against the bottom of the engine block. Install stiffening frame retainers to align and hold the stiffening frame in position and start the bolts. Remove the retainers, then install the remaining bolts and hand tighten.

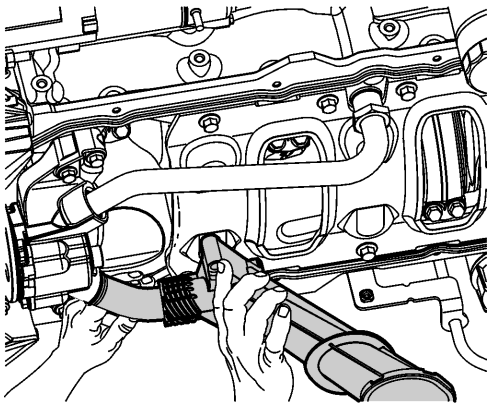
9998649



T2020549

3
Tighten the engine stiffening frame bolts in the sequence shown to 65 ± 5 Nm (48 ± 4 ft-lb) plus 90 ± 5 degrees rotation.

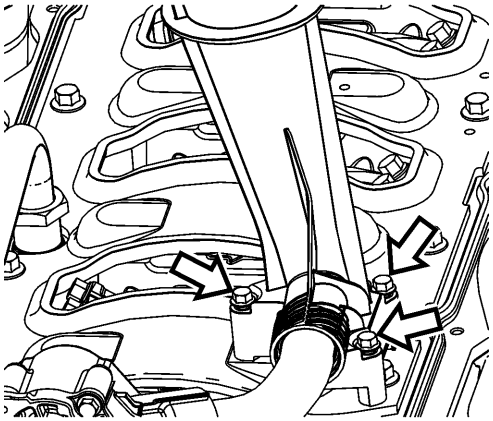
65 ± 5 Nm (48 ± 4 ft-lb)
Plus 90 ± 5 degrees



W2004957

4
Install a new O-ring and lubricate with clean engine oil. Install the oil strainer and suction tube to the oil pump.

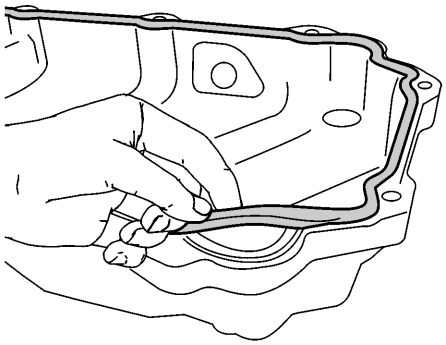
Note: Use care when installing the oil strainer to the oil pump assembly.



W2004952

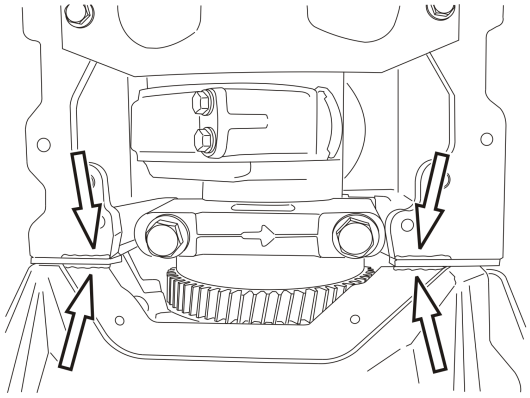
5
Install the bolts to secure the oil strainer. Tighten the bolts to 24 ± 3 Nm (18 ± 2 ft-lb).

24 ± 3 Nm
(18 ± 2 ft-lb)



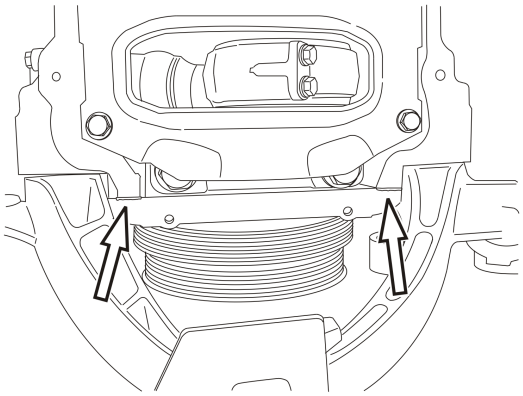
W2004878

6
Inspect the rubber gasket on the oil pan for damage and replace if necessary. Clean the oil pan and the engine block flanges.



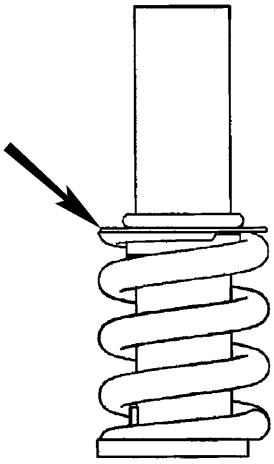
W2005222

7
Apply a two mm (0.079 inch) bead of Volvo sealant to the seams between the flywheel housing and the timing gear mounting plate and between the timing gear mounting plate and the engine block.



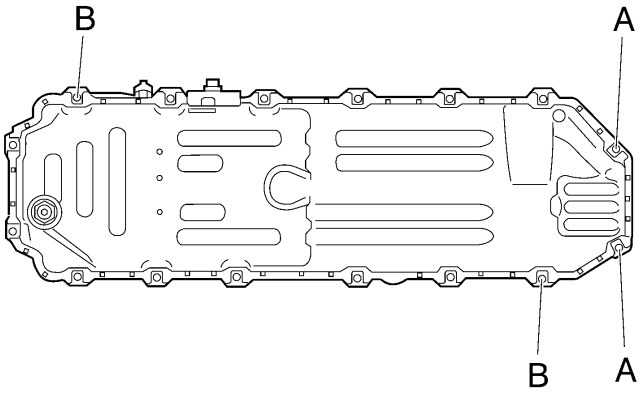
W2005223

8
Apply a two mm (0.079 inch) bead of Volvo sealant to the seam between the front seal cover and the engine block.



T2017887

9
Position the spring assembly on the oil pan bolt so that the washer faces the oil pan end of the assembly.

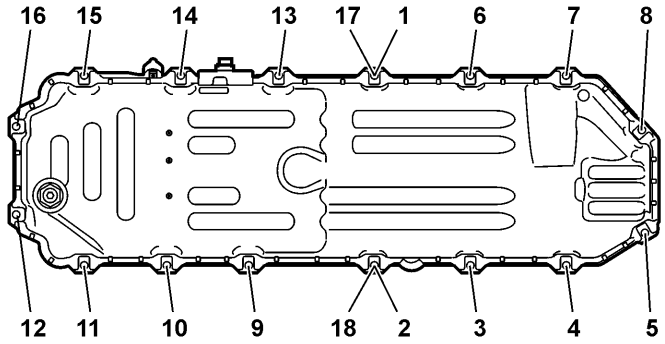


W2005226

10
With assistance, lift the oil pan into position and install the bolts marked B. Install all other bolts including bolts marked A.

Note: Press the pan toward its rearmost position before tightening the bolts.

Note: Use caution not to damage the oil strainer.



T2020557

11
Tighten the bolts to 24 ± 4 Nm (18 ± 3 ft-lb) in the sequence shown.

Note: Before tightening, make sure the oil pan gasket is located properly in the oil pan.

24 ± 4 Nm
(18 ± 3 ft-lb)

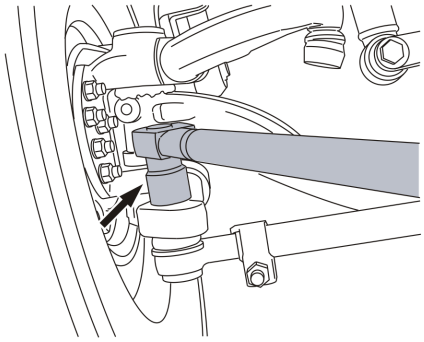
12
Tighten the drain plug to 60 ± 10 Nm (44 ± 7 ft-lb).

Note: The drain plug must not be installed with a copper washer. Always install with the steel washer.

Note: Do not use an air ratchet or similar air tool to tighten the drain plug.

60 ± 10 Nm
(44 ± 7 ft-lb)

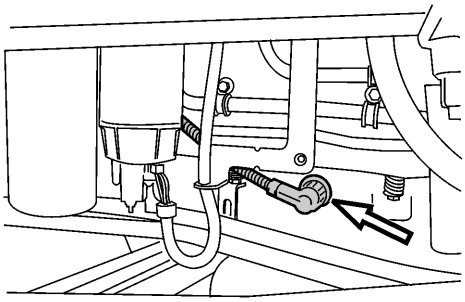
13
If removed, connect the tie rod into the left-side steering knuckle and tighten the locknut to 200 ± 30 Nm (148 ± 22 ft-lb). Insert the cotter pin and bend it to lock it in place.



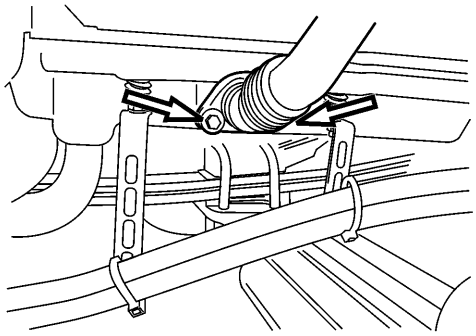
W2005190

200 ± 30 Nm
(148 ± 22 ft-lb)

14
Plug in the oil level/temperature sensor connector.

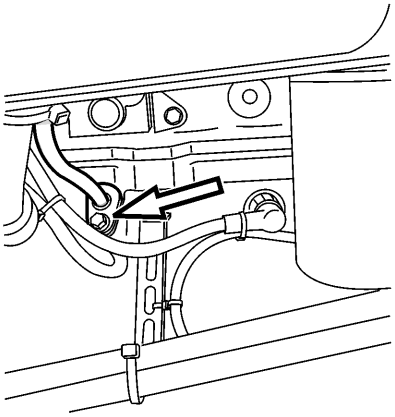


W2004876



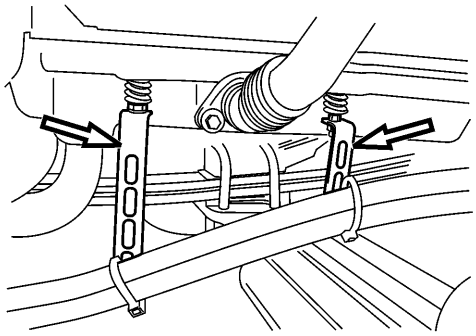
W2004884

15
Install a new fill tube O-ring and position the tube to the side of the oil pan. Install the oil fill tube fasteners and tighten to secure.



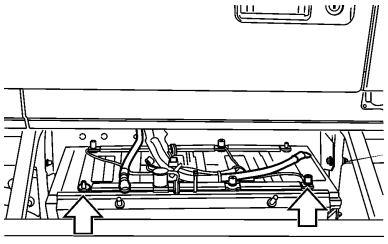
W2005086

16
Install a new O-ring on the dipstick tube, then install the dipstick tube and secure with the fastener. Install the dipstick.



W2004874

17
Position the transmission oil cooler line brackets onto the oil pan stud locations. Install the cooler line bracket nuts and tighten to secure.



W2003815

18
Install all previously removed cables to the ground (negative) battery terminals.

19
Using a hydraulic jack, raise the front axle and remove the jackstands from under the front axle. Lower the front axle and remove the hydraulic jack.

20
Fill the engine with approved oil. Do not overfill.

21
Start the engine, check the oil pressure, run the engine until operating temperature is reached and check for oil leaks. After shutdown, replenish fluids as necessary.

2229-03-02-05
Piston Cooling Valve, Replacement

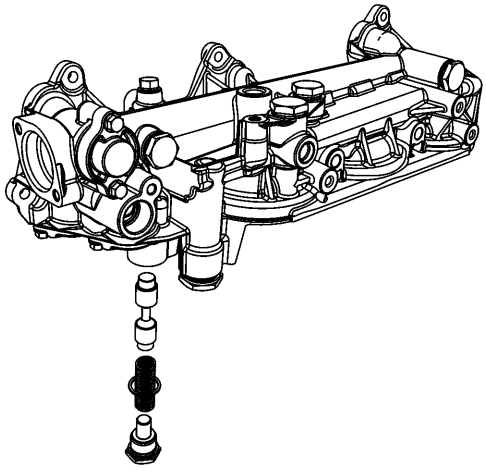
You must read and understand the precautions and guidelines in Service Information, group 20, "General Safety Practices, Engine" before performing this procedure. If you are not properly trained and certified in this procedure, ask your supervisor for training before you perform it.

Removal

1
Clean the oil filter housing area around the piston cooling valve.

2
Remove the spring and valve from the housing.

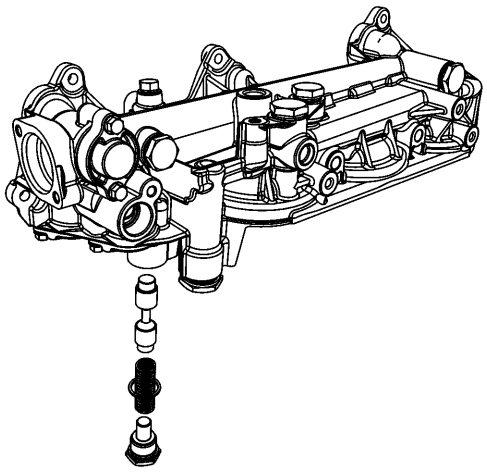
Note: Catch excess oil in an approved container.



W2004975

Installation

1
Clean the valve bore and retainer plug area of the oil filter housing.



W2004975

2
Place a new seal on the retainer plug and lubricate with engine oil.

3
Insert a replacement valve and spring into the valve bore.

Note: The valve can be installed with either end up.

4
Compress the spring and install the retainer plug into the housing.

Note: Make sure that the O-ring is not damaged during installation.

5
Start the engine, check for leaks and proper operation. After shutdown, replenish fluids as necessary.