Section i - Introduction

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General Safety Instructions

Important Safety Notice

∆ *WARNING* ∆

Improper practices or carelessness can cause burns, cuts, mutilation, asphyxiation or other bodily injury or death.

Read and understand all of the safety precautions and warnings before performing any repair. This list contains the general safety precautions that **must** be followed to provide personal safety. Special safety precautions are included in the procedures when they apply.

- Make sure the work area surrounding the product is dry, well lit, ventilated, free from clutter, loose tools, parts, ignition sources and hazardous substances. Be aware of hazardous conditions that can exist.
- Always wear protective glasses and protective shoes when working.
- Rotating parts can cause cuts, mutilation or strangulation.
- Do not wear loose-fitting or torn clothing. Remove all jewelry when working.
- Disconnect the battery (negative [-] cable first) and discharge any capacitors before beginning any repair work. Disconnect the air starting motor if equipped to prevent accidental engine starting. Put a "Do Not Operate" tag in the operator's compartment or on the controls.
- Use ONLY the proper engine barring techniques for manually rotating the engine. Do not attempt to rotate the crankshaft by pulling or prying on the fan. This practice can cause serious personal injury, property damage, or damage to the fan blade(s) causing premature fan failure.
- If an engine has been operating and the coolant is hot, allow the engine to cool before you slowly loosen the filler cap and relieve the pressure from the cooling system.
- Do not work on anything that is supported ONLY by lifting jacks or a hoist. Always use blocks or proper stands to support the product before performing any service work.
- Relieve all pressure in the air, oil, fuel and the cooling systems before any lines, fittings, or related items are removed or disconnected. Be alert for possible pressure when disconnecting any device from a system that utilizes pressure. Do not check for pressure leaks with your hand. High pressure oil or fuel can cause personal injury.
- To prevent suffocation and frostbite, wear protective clothing and ONLY disconnect fuel and liquid refrigerant (freon) lines in a well ventilated area. To protect the environment, liquid refrigerant systems must be properly emptied and filled using equipment that prevents the release of refrigerant gas (fluorocarbons) into the atmosphere. Federal law requires capturing and recycling refrigerant.
- To avoid personal injury, use a hoist or get assistance when lifting components that weigh 23 kg [50 lb] or more. Make sure all lifting devices such as chains, hooks, or slings are in good condition and are of the correct capacity. Make sure hooks are positioned correctly. Always use a spreader bar when necessary. The lifting hooks must not be side-loaded.
- Corrosion inhibitor, a component of SCA and lubricating oil, contains alkali. Do not get the substance in your eyes. Avoid prolonged or repeated contact with skin. Do not swallow internally. In case of contact, immediately wash skin with soap and water. In case of contact, immediately flood eyes with large amounts of water for a minimum of 15 minutes. IMMEDIATELY CALL A PHYSICIAN. KEEP OUT OF REACH OF CHILDREN.
- Naptha and Methyl Ethyl Ketone (MEK) are flammable materials and must be used with caution. Follow the manufacturer's instructions to provide complete safety when using these materials. KEEP OUT OF REACH OF CHILDREN.
- To avoid burns, be alert for hot parts on products that have just been turned off, and hot fluids in lines, tubes, and compartments.
- Always use tools that are in good condition. Make sure you understand how to use them before performing any service work. Use ONLY Case approved replacement parts.
- Always use the same fastener part number (or equivalent) when replacing fasteners. Do not use a fastener of lesser quality if replacements are necessary.
- Do not perform any repair when fatigued or after consuming alcohol or drugs that can impair your functioning.
- Some state and federal agencies in the United States of America have determined that used engine oil can be carcinogenic and can cause reproductive toxicity. Avoid inhalation of vapors, ingestion, and prolonged contact with used engine oil.

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Specifications

General Specifications

Horsepower ..... (Refer to engine dataplate)
Bore and Stroke ..... 102 mm [402 in] X 120 mm [4.72 in]
Displacement ..... 5.9 Liters [359 C.I.C.]
Firing Order 1-5-3-6-2-4
Engine Weight (with standard accessories):
Dry Weight ..... 480 kg [1010 lb]
Crankshaft Rotation (viewed from the front of the engine) ..... **Clockwise**
Valve Clearance:
Intake ..... 0.025 mm [0.010 in]
Exhaust ..... 0.051 mm [0.020 in]

NOTE: The Case 5.9 Liter engine features a no-adjust overhead. The 5.9 Liter valve train is designed such that adjustment of the valve lash is **not** required for normal service during the first 241,502 km [150,000 mi]. The valve train operates acceptably within the limits of 0.152 to 0.381 mm [0.006 to 0.015 in] intake valve lash and 0.381 to 0.762 mm [0.015 to 0.030 in] exhaust valve lash.

Fuel System

Engine Idle Speed ..... 700 to 1000 rpm
Maximum Fuel Inlet Restriction to Lift Pump ..... 20 kPa [6 in Hg]
Minimum Lift Pump Inlet Pressure at Rated ..... 28 to 55 kPa [4 to 8 psi]
Maximum Fuel Pressure at Fuel Filter Outlet (enging cranking) ..... 254 mm Hg [10 in Hg]
Minimum Fuel Pressure at Fuel Filter Inlet (engine running) ..... 55 to 117 kPa [8 to 17 psi]
Maximum Pressure Drop Across Fuel Filter ..... 34 kPa [5 psi]
Fuel Drain Line Maximum Restriction ..... 34 kPa [10 psi]
Fuel Inlet Maximum Temperature ..... 74 °C [165 °F]
Engine Minimum Cranking Speed ..... 150 rpm

Lubricating Oil System

Oil Pressure:
at Low Idle (Minimum Allowable) ..... 103 kPa [15 psi]
at Rated Speed (Minimum Allowable) ..... 310 kPa [45 psi]
Regulated Pressure ..... 414 kPa [60 psi]
Oil Capacity Of Standard Engine:
Standard Oil Pan
Pan **Only** ..... 14.2 liters [15 qts]
Total System ..... 16.4 liters [17 qts]
Deep Sump
Pan **Only** ..... 16.1 liters [17 qts]
Total System ..... 18.3 liters [19 qts]
Oil Pan High to Low:
Standard Oil Pan ..... 12 to 14.2 liters [13 to 15 qts]
Deep Sump Oil Pan ..... 14.2 to 16.1 liters [15 to 17 qts]

NOTE: Some applications may use a slightly different lubricating oil pan capacity. Refer to the machine operators manual.

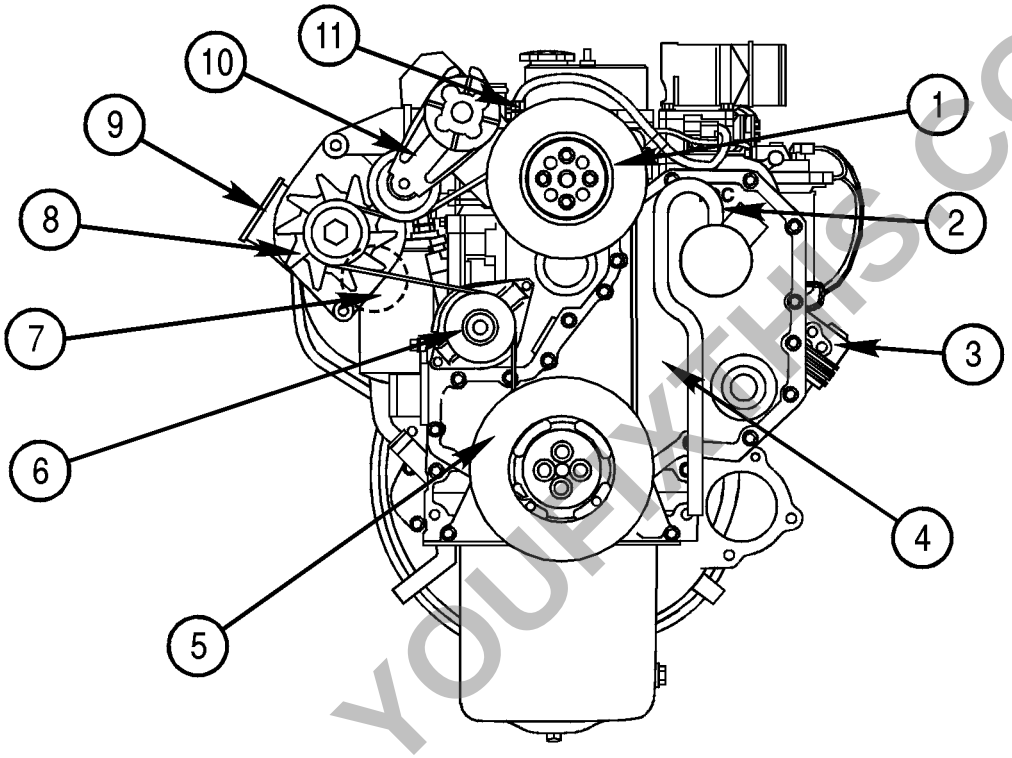
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Engine Diagrams

Engine Views

The following illustrations show the locations of the major external engine components, filters, and other service and maintenance points. Some external components will be at different locations for different engine models.

NOTE: The illustrations are **only** a reference showing a typical engine.



00900035

Front View

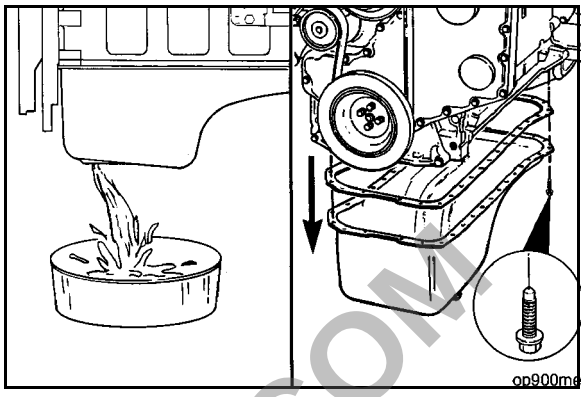
1. **Fan pulley**
2. **Top dead center indication**
3. **Air compressor**
4. **Front gear cover**
5. **Vibration damper**
6. **Water pump**
7. **Turbocharger air inlet**
8. **Alternator**
9. **Turbocharger air outlet**
10. **Automatic belt tensioner**
11. **Coolant temperature sensor**

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Bearings, Connecting Rod (001-005)

Remove (001-005-002)



∆ **WARNING** ∆

Some state and federal agencies in the United States of America have determined that used engine oil can be carcinogenic and can cause reproductive toxicity. Avoid inhalation of vapors, ingestion, and prolonged contact with used engine oil.

∆ **WARNING** ∆

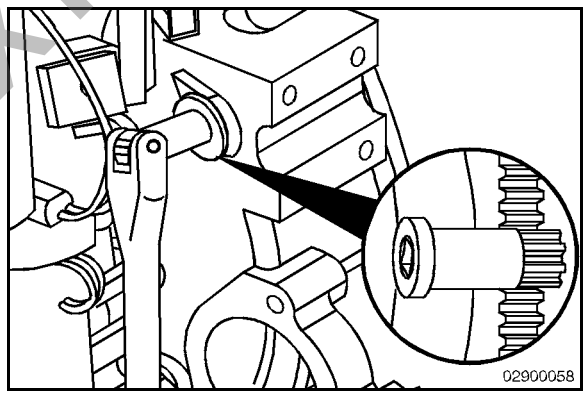
Avoid direct contact of hot oil with your skin. Hot oil can cause personal injury.

Drain the lubricating oil. Refer to Procedure 007-025.

Remove the lubricating oil pan and gasket. Refer to Procedure 007-025.

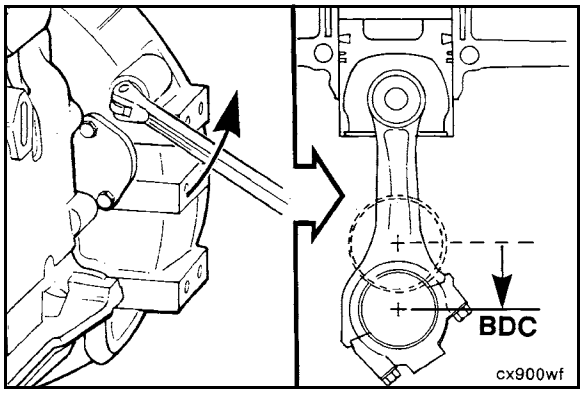
Barring Tool

The barring tool inserts into the flywheel housing and engages the flywheel ring gear. The crankshaft can then be rotated by hand using a 1/2-inch ratchet or breaker bar.



Barring Tool

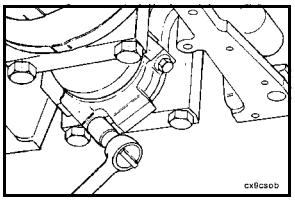
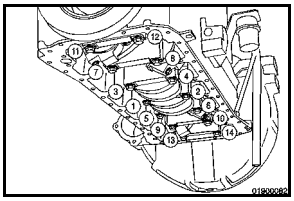
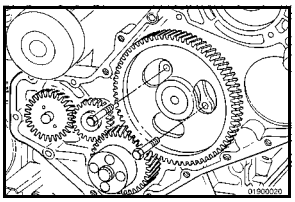
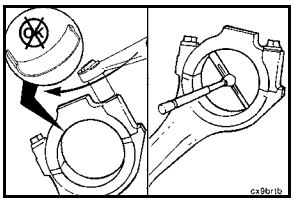
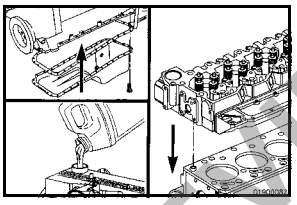
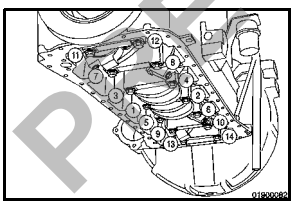
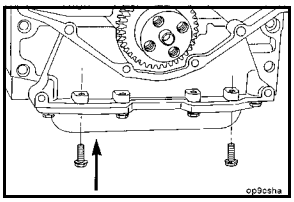
Using the barring tool, rotate the crankshaft to the bottom dead center (BDC) position of the connecting rod.



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Cylinder Block - Torque Values

	Component or Assembly (Procedure)	Ref.No./Steps	Metric	U.S.
	**Bearings, Connecting Rod (001-005)**			
	Connecting Rod Capscrew Torque	1	30 N•m	22 ft-lb
		2	60 N•m	44 ft-lb
		3	60 degrees	
	**Bearings, Main (001-006)**			
	Main Bearings	1	50 N•m	37 ft-lb
		2	80 N•m	59 ft-lb
		3	Turn all capscrews through 90 degrees clockwise	
	**Camshaft (001-008)**			
	Thrust Washer Capscrew Torque		24 N•m	18 ft-lb
	**Connecting Rod (001-014)**			
			100 N•m	73 ft-lb
	**Oil Pan and Gasket Torque**		24 N•m	18 ft-lb
	**Crankshaft (001-016)**			
	Main Bearing Cap Capscrews	1	50 N•m	37 ft-lb
		2	80 N•m	59 ft-lb
		3	Turn all capscrews through 90 degrees clockwise	
	**Gear Housing, Front (001-033)**			
			24 N•m	18 ft-lb

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Communication Error Electronic Service Tool or Control Device

Cause		Correction
Keyswitch is in the OFF position	.....	Turn on the keyswitch.
OK		
Keyswitch circuit is malfunctioning	.....	Check the vehicle keyswitch circuit. Refer to Procedure 019-064 in the Troubleshooting and Repair Manual, Fuel System, 5.9 Engine.
OK		
Datalink circuit is malfunctioning	.....	Check the datalink circuit. Refer to the appropriate on-board diagnostics system user's manual.
OK		
INLINE adapter (datalink adapter) is **not** connected to the battery voltage supply	.....	Check the power light on the INLINE adapter. If the light is **not** illuminated, connect the battery voltage to the INLINE adapter. Refer to the appropriate on-board diagnostic system user's manual.
OK		
The on-board diagnostic systeis addressing the wrong communication port	.....	Select System Menu/User Options and change the communication port setting. Refer the appropriate on-board diagnostic system user's manual.
OK		
Verify that the electronic service tool is working and that the correct software or cartridge is being used	.....	Refer to the appropriate electronic service tool and software or cartridge manuals
OK		
Fuse(s) malfunctioning	.....	Replace the fuse(s) in the OEM interface harness. Refer to Procedure 019-198 in the Troubleshooting and Repair Manual, Fuel System, 5.9 Engine.
OK		

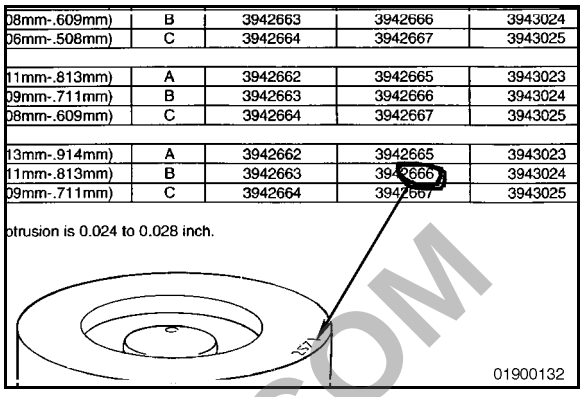
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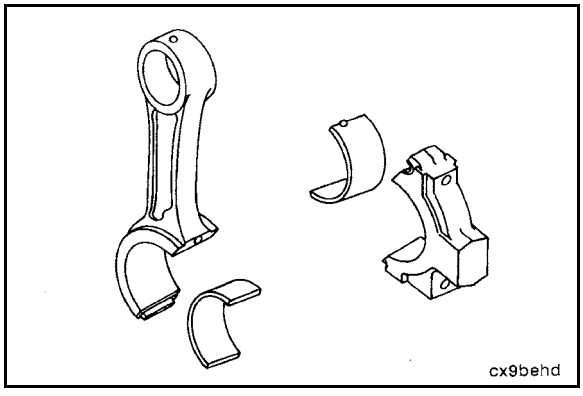
NOTE: The four digits on top of the piston are the last four digits of the part number.

Using the measured piston protrusion and the grade of the piston, which was measured, determine the piston grade required to obtain protrusion from the following table:



Piston Protrusion					
Pistion	**Protrusion**	**Use Grade**	**Single-Ni**	**Dual-Ni Hard Anodized**	**Dual-Ni**
A	**0.609 to 0.711 mm [0.024 to 0.028 in]**	**A**	**3943708**	**3942665**	**3944073**
A	**0.508 to 0.609 mm [0.020 to 0.024 in]**	**B**	**3943709**	**3942666**	**3944074**
A	**0.406 to 0.508 mm [0.016 to 0.020 in]**	**C**	**3943710**	**3942667**	**3944075**
B	**0.711 to 0.813 mm [0.028 to 0.032 in]**	**A**	**3943708**	**3942665**	**3944073**
B	**0.609 to 0.711 mm [0.024 to 0.028 in]**	**B**	**3943709**	**3942666**	**3944074**
B	**0.508 to 0.609 mm [0.020 to 0.024 in]**	**C**	**3943710**	**3942667**	**3944075**
C	**0.813 to 0.914 mm [0.032 to 0.036 in]**	**A**	**3943708**	**3942665**	**3944073**
C	**0.711 to 0.813 mm [0.028 to 0.032 in]**	**B**	**3943709**	**3942666**	**3944074**
C	**0.609 to 0.711 mm [0.024 to 0.028 in]**	**C**	**3943710**	**3942667**	**3944075**

Install (001-054-025)



∆ **CAUTION** ∆

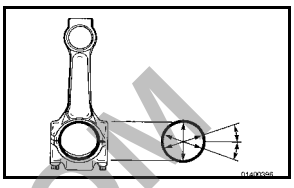
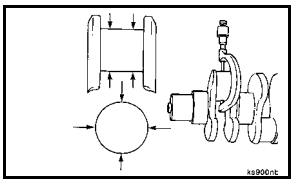
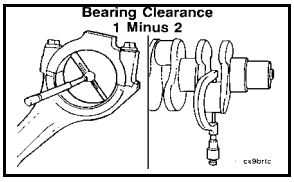
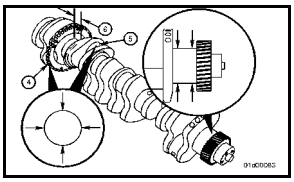
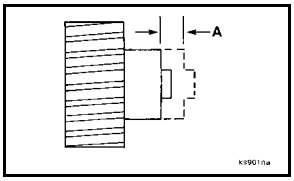
The connecting rods and connecting rod caps are not interchangeable. The connecting rods and connecting rod caps are machined as an assembly. Failure will result if the connecting rods and caps are mixed.

Install the bearing shells into both the connecting rod and the connecting rod cap.

NOTE: Make sure the tangs on the bearing shells are in the slot of the connecting rod and connecting rod cap.

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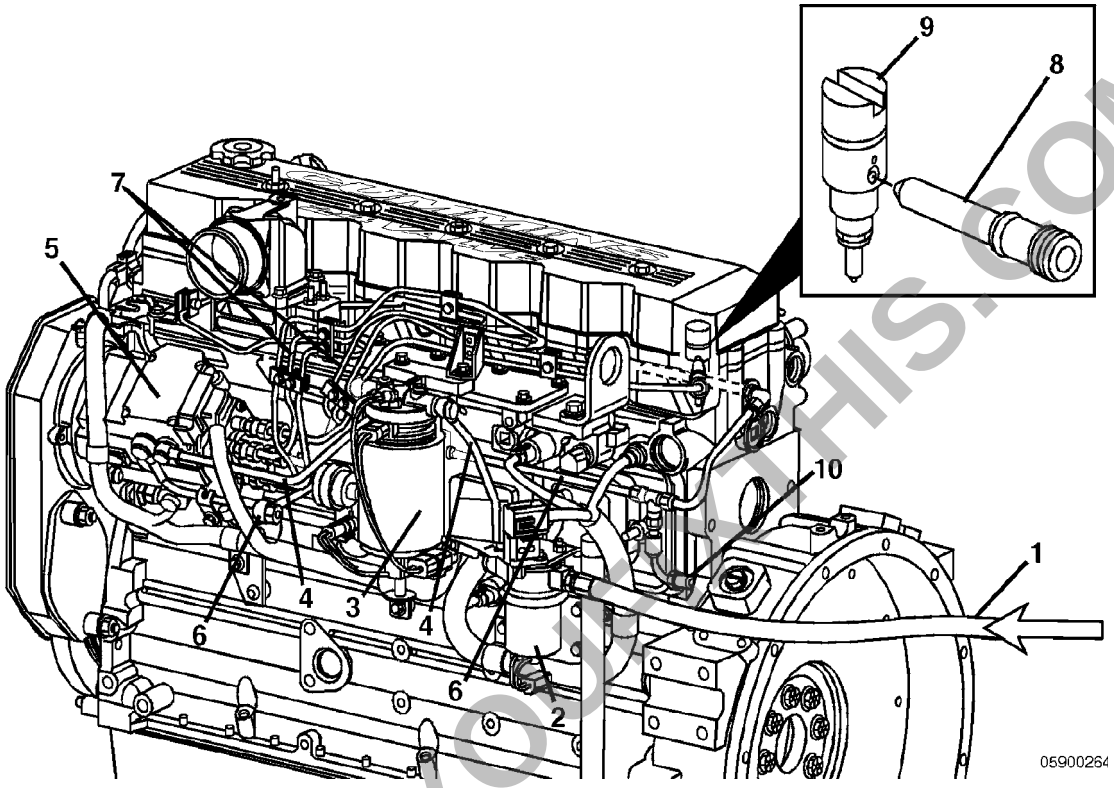
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Component or Assembly (Procedure)	Ref.No./Steps	Metric		U.S.	
Connecting Rod Crankshaft Bore Diameter With Bearings Installed					
Standard		69.05 mm	MIN	2.719 in	
		69.10 mm	MAX	2.720 in	
0.25 mm [0.010 in] Oversize		68.80 mm	MIN	2.709 in	
		68.85 mm	MAX	2.711 in	
0.50 mm [0.020 in] Oversize		68.55 mm	MIN	2.699 in	
		68.60 mm	MAX	2.701 in	
0.75 mm [0.030 in] Oversize		68.30 mm	MIN	2.689 in	
		68.35 mm	MAX	2.691 in	
1.00 mm [0.040 in] Oversize		68.05 mm	MIN	2.681 in	
		68.10 mm	MAX	2.683 in	
Crankshaft Connecting Rod Journal Diameter					
Standard		68.96 mm	MIN	2.715 in	
		69.01 mm	MAX	2.717 in	
0.25 mm [0.010 in] Undersize		68.71 mm	MIN	2.705 in	
		68.76 mm	MAX	2.707 in	
0.50 mm [0.020 in] Undersize		68.46 mm	MIN	2.695 in	
		68.51 mm	MAX	2.697 in	
0.75 mm [0.030 in] Undersize		68.21 mm	MIN	2.685 in	
		68.26 mm	MAX	2.688 in	
1.00 mm [0.040 in] Undersize		67.96 mm	MIN	2.676 in	
		68.01 mm	MAX	2.678 in	
Connecting Rod to Crankshaft Bearing Clearance		0.04 mm	MIN	0.002 in	
		0.12 mm	MAX	0.005 in	
Crankshaft (001-016)					
Rod Bearing Journal Outside Diameter (4)		68.96 mm	MIN	2.715 in	
		69.01 mm	MAX	2.717 in	
Main Bearing Journal Outside Diameter (5)		82.962 mm	MIN	3.2662 in	
		83.013 mm	MAX	3.2682 in	
Thrust Distance (6)		0.065 mm	MIN	0.003 in	
		0.432 mm	MAX	0.017 in	
Crankshaft End Play		0.102 mm	MIN	0.004 in	
		0.432 mm	MAX	0.017 in	

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Flow Diagram, Fuel System



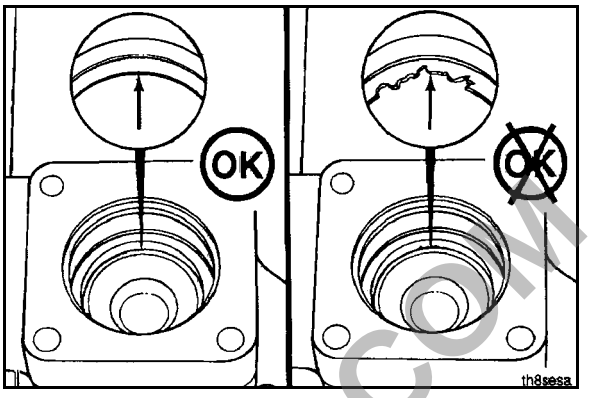
1. **Fuel from Supply Tank**
2. **Electronic Lift Pump**
3. **Fuel Filter/Water Separator**
4. **Low-Pressure Supply Lines**
5. **Robert Bosch® VP44 Injection Pump**
6. **Fuel Drain Line**
7. **High-Pressure Supply Lines**
8. **Fuel Connector**
9. **Robert Bosch® Closed-Nozzle Injectors**
10. **Fuel Return to Supply Tank**

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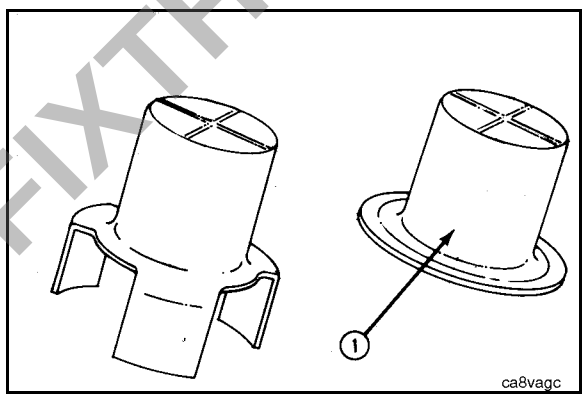
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Illustrations

Some of the illustrations throughout this manual are generic and will **not** look exactly like the engine or parts used in your application. The illustrations can contain symbols to indicate an action required and an acceptable or **not** acceptable condition.



The illustrations are intended to show repair or replacement procedures. The procedure will be the same for all applications, although the illustration can differ.



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Coolant Temperature Above Normal - Gradual Overheat (Continued)

Cause		Correction
Lubricating oil is contaminated with coolant or fuel	.....	Refer to the Lubricating Oil Contaminated symptom tree.
OK ↓		
Water pump is malfunctioning	.....	Check the water pump using the diagnostic test in Procedure 008-020. Replace water pump if necessary. Refer to Procedure 008-062.
OK ↓		
Radiator core is internally obstructed or damaged, or the check valve or J-tube is malfunctioning	.....	Inspect the radiator and clean if necessary. Refer to Procedure 008-042.
OK ↓		
Torque converter is malfunctioning	.....	Check the torque converter. Refer to the OEM service manual.
OK ↓		
Vehicle cooling system is **not** adequate	.....	Verify that the engine and vehicle cooling systems are using the correct components. Refer to the OEM specifications.
OK ↓		
Engine is overfueled	.....	Check the engine fuel rate. See Service Manual.
OK ↓		
Cylinder head gasket is leaking	.....	Check the cylinder head gasket. Refer to Procedure 002-004 or 002-021.

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Engine Shuts Off Unexpectedly or Dies During Deceleration

Cause		Correction
Engine will not restart	.....	Refer to the Engine Difficult to Start or Will **Not** Start symptom tree.
OK ⬇		
Fuel level low in the tank	.....	Fill the supply tank.
OK ⬇		
Electronic fault codes active or high counts of inactive fault codes	.....	Refer to Section TF in the Troubleshooting and Repair Manual, Fuel System, 5.9 liter Engine, for fault code troubleshooting.
OK ⬇		
Idle shutdown or PTO shutdown features are activated	.....	Check the time limit on idle and PTO shutdown with an electronic service tool. Refer to the appropriate electronic service tool manual.
OK ⬇		
Keyswitch circuit is malfunctioning	.....	Check the vehicle keyswitch circuit. Refer to Procedure 019-064 in the Troubleshooting and Repair Manual, Fuel System, 5.9 liter Engine.
OK ⬇		
Fuel injection pump voltage supply circuit is malfunctioning	.....	Check the fuel injection pump voltage supply circuit. Refer to Fault Code 364 and Fault Code 391.
OK ⬇		
Moisture in the wiring harness connectors	.....	Dry the connectors with electronic cleaner.
OK ⬇		
OEM engine protection system is malfunctioning	.....	Isolate the OEM engine protection system. Follow the OEM service manuals to check for a malfunction.
OK ⬇		

(Continued)

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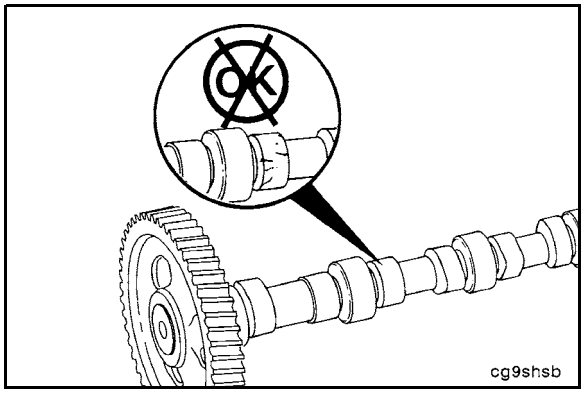
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Lubricating Oil Pressure High

Cause		Correction
Electronic fault codes active or high counts of inactive fault codes	.....	Refer to Section TF in the Troubleshooting and Repair Manual, Fuel System, 5.9 liter Engine for fault code troubleshooting.
OK ↓		
Coolant temperature is below specification	.....	Refer to the Coolant Temperature Below Normal symptom tree.
OK ↓		
Lubricating oil does **not** meet specifications for operating conditions	.....	Change the oil and filters. Refer to Procedure 007-025. Use the oil type recommended in Section V of the operation and maintenance manual.
OK ↓		
Lubricating oil pressure switch, gauge, or sensor is malfunctioning or is **not** in the correct location	.....	Check the oil pressure switch, gauge, or sensor for correct operation and location. Refer to Procedure 007-052.
OK ↓		
Lubricating oil pressure sensor or circuit is malfunctioning (electronic controlled fuel system)	.....	Check the lubricating oil pressure sensor and circuit. Refer to Procedure 019-066 in the Troubleshooting and Repair Manual, Fuel System, 5.9 liter Engine.
OK ↓		
Main oil pressure regulator is malfunctioning	.....	Check the main oil pressure regulator assembly. Refer to Procedure 007-029.

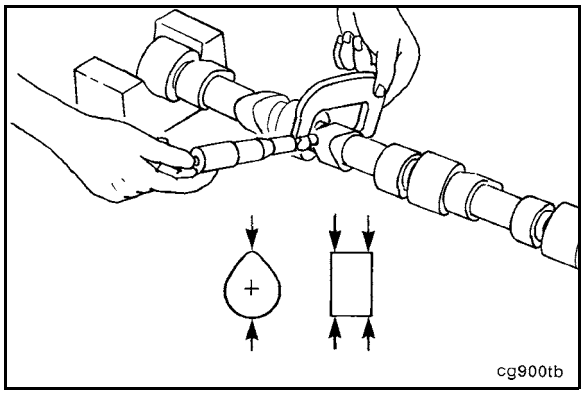
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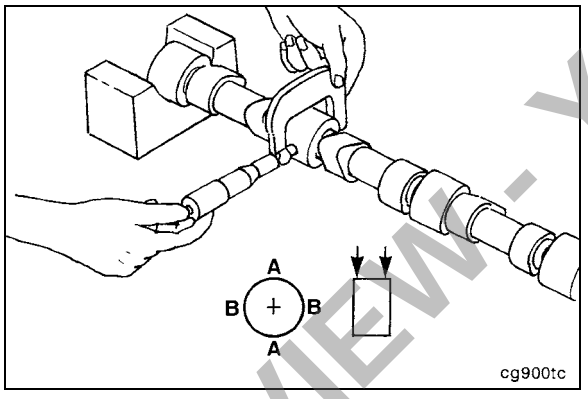
Inspect for Reuse (001-008-007)

Inspect the valve lobes and bearing journals for cracking, pitting, or scoring.



Measure the valve lobes.

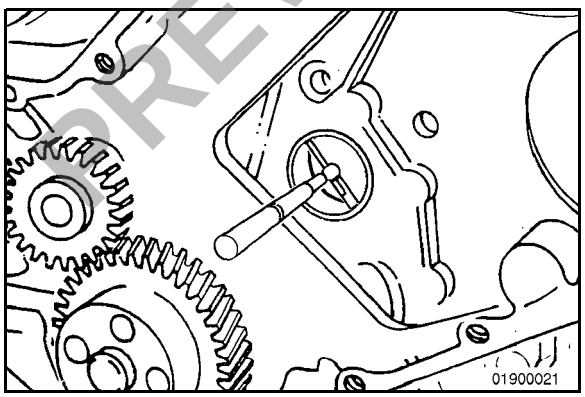
Diameter of Peak of Lobe			
	mm		in
Intake	47.163	MIN	1.857
	47.853	MAX	1.884
Exhaust	45.636	MIN	1.796
	46.316	MAX	1.823



Measure the bearing journals.

Journal Diameter (No. 1)		
mm		in
54.028	MIN	2.127
54.048	MAX	2.128

Journal Diameter (No. 2 through No. 7)		
mm		in
53.962	MIN	2.1245
54.013	MAX	2.1265



Measure the camshaft bore.

Camshaft Bore Diameter (Maximum)			
	mm		in
No. 1 only (without bushing)	59.248	MAX	2.3326
No. 1 (with bushing)	54.147	MAX	2.1318
No. 2 through 7	54.164	Max	2.1324

NOTE: Camshaft bores No. 2 through 7 do **not** use a bushing.

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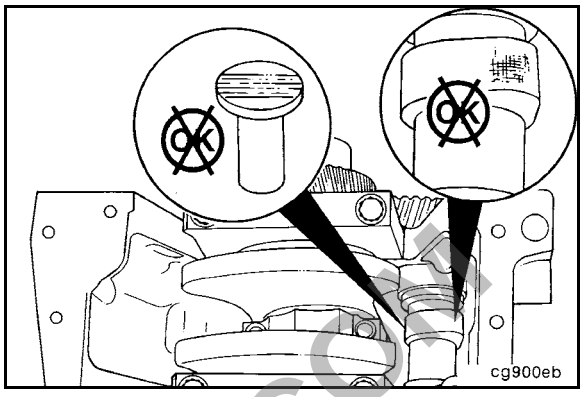
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∆ **WARNING** ∆

Use skin and eye protection when handling caustic solutions to avoid personal injury.

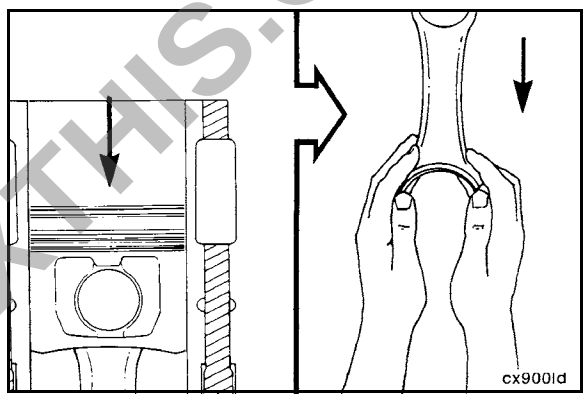
Inspect the camshaft lobes and tappet faces for signs of wear or damage. Refer to Procedure 001-008 and 004-015.

Use a solvent and a brush to clean any residue that could have splashed on the camshaft.



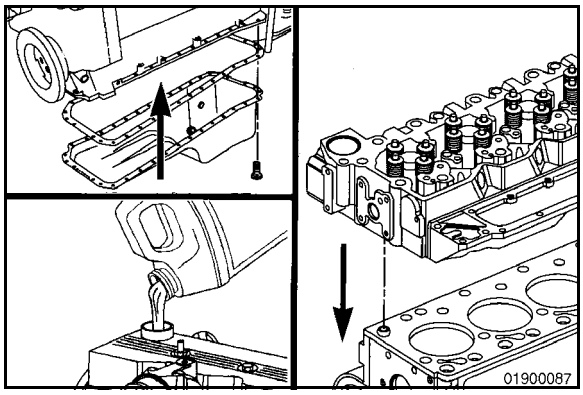
Assemble (001-026-025)

Install the piston and connecting rod assemblies. Refer to Procedure 001-043.



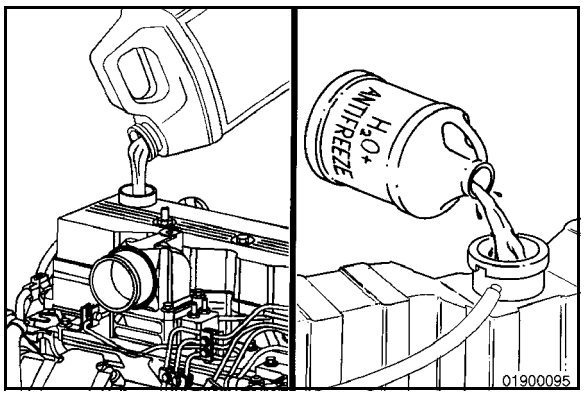
Install the lubricating oil pan and gasket. Refer to Procedure 007-025.

Install the cylinder head. Refer to Procedure 002-004.



Fill the lubricating oil pan. Refer to Procedure 007-025 and Section 7, General Information, for the correct lubricating oil specification.

Fill the engine with coolant. Refer to Procedure 008-018.



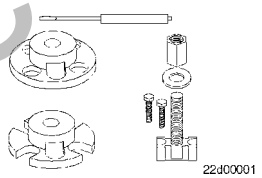
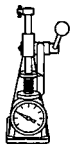
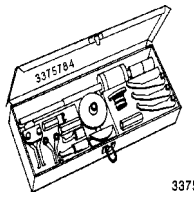
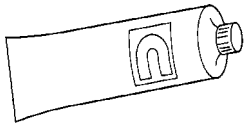
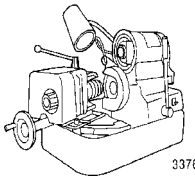
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Service Tools

Cylinder Head

The following special tools are recommended to perform procedures in this section. The use of these tools is shown in the appropriate procedure. These tools can be purchased from your local CASE Authorized Repair Location.

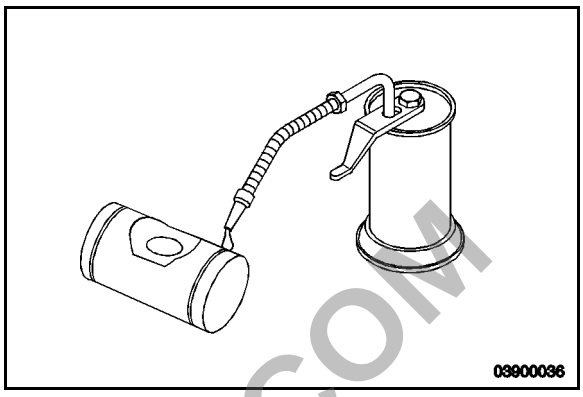
Tool No.	Tool Description	Tool Illustration
OEM6414	**Valve Spring Compressor** Used to compress the valve spring and remove/install the collet.s	
OEM1281	**Valve Spring Tester** Used to compress the valve spring to the proper height; then check the pressure tension on the scale face.	
CAS 10471	**Light-Duty Puller Kit** Used to remove small seals, sleeves, bearings, grease retainers, bronze or oil-lite bushings, bearing races, and bushings.	
	Valve Lapping Compound An abrasive compound used to lap the valves.	
	Valve Facing Machine Used to grind the valves.	
	Cup Plug Driver Used to install new cup plugs to their proper depth.	

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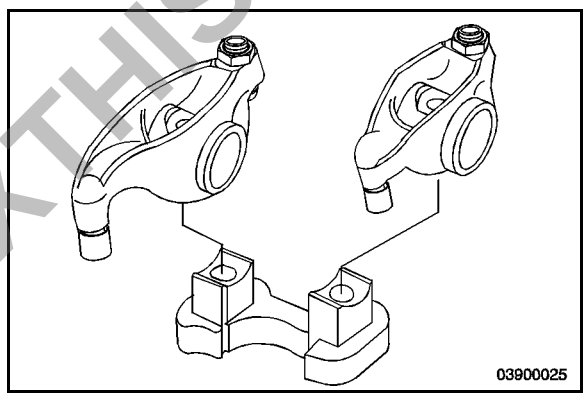
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Lubricate the rocker lever shafts with clean 15W-40 engine lubricating oil.

Install the rocker lever shafts into the rocker levers.

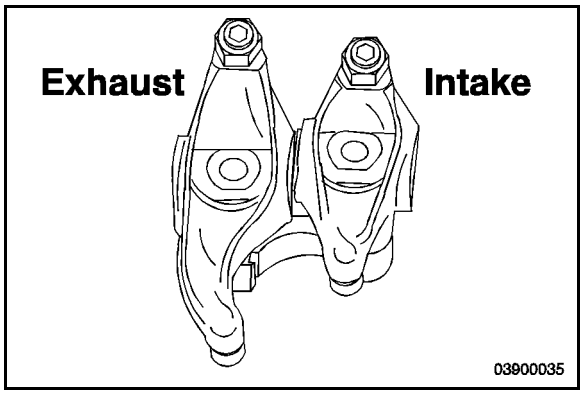


Position the rocker levers on the rocker pedestal.



Δ **WARNING** Δ

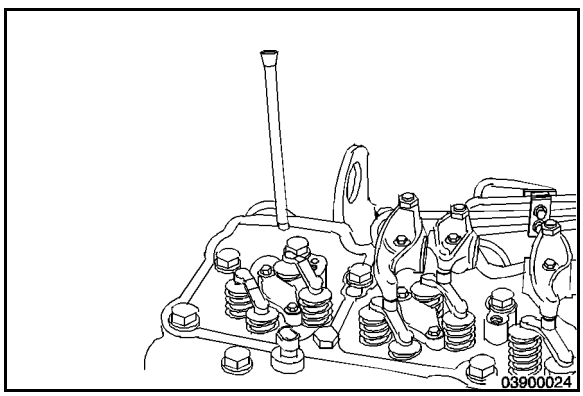
Be sure to assemble the intake and exhaust rocker levers in the correct location. Failure to do so will result in engine damage.



Install (003-008-026)

Install the crossheads in their original location and position.

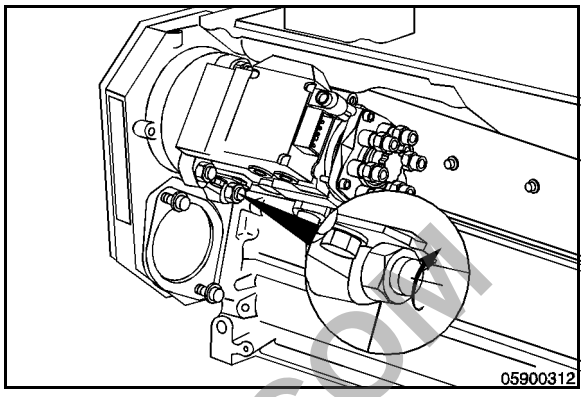
Install push rods as marked during removal.



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Hand-tighten the four mounting nuts.

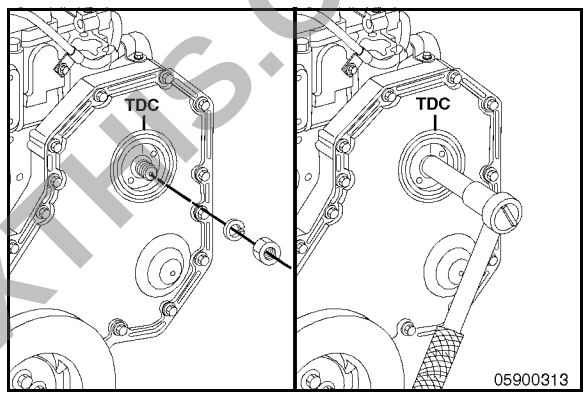


24 mm

Install the pump driveshaft nut and spring washer.

Torque Value: 30 N•m [22 ft-lb]

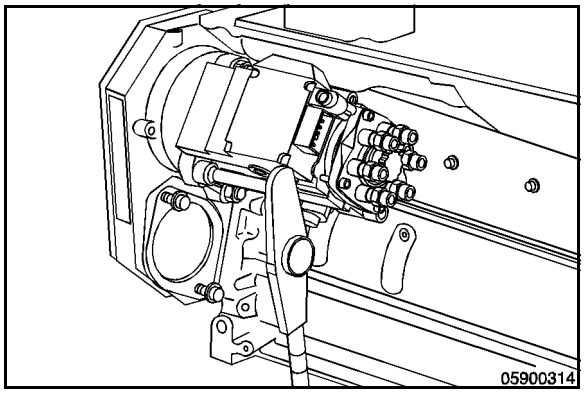
NOTE: Do **not** overtighten; this is **not** the final torque.



15 mm

Tighten the fuel injection pump mounting nuts.

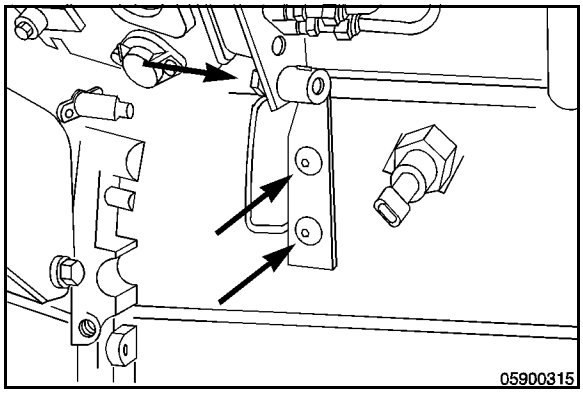
Torque Value: 43 N•m [32 ft-lb]



Install the injection pump support bracket. Finger-tighten all capscrews before final tightening.

Tighten the brackets in the following sequence:

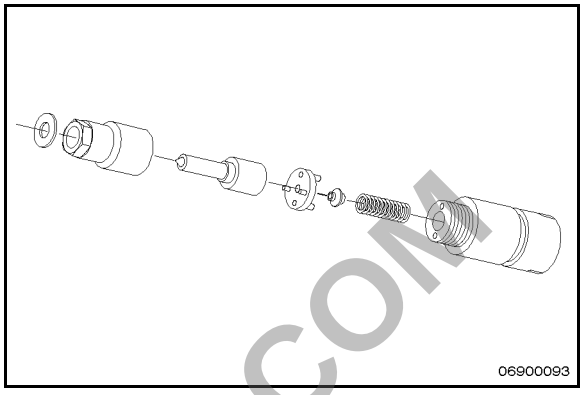
1. Bracket-to-fuel pump capscrews.
2. Brace-to-block capscrews.
3. Bracket-to-fuel pump brace capscrews.



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Remove the nozzle, intermediate plate, spring, and shims from the injector.



Inspect (006-026-062)

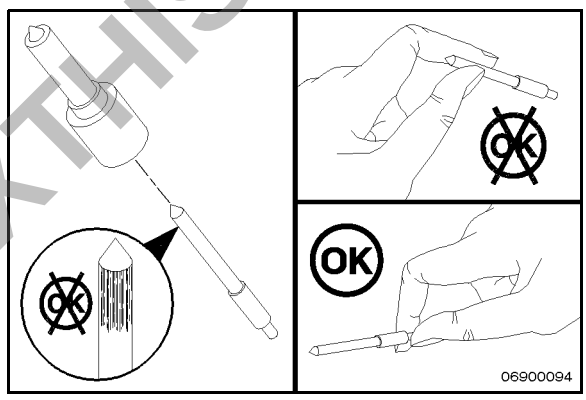
Δ CAUTION Δ

Do not touch the needle with your fingertips. Oil from your fingers will damage the needle. Hold the needle by the stem. If the needle is touched, wipe clean with a soft cloth and dip in clean diesel fuel.

Remove the needle from the nozzle tip, and inspect the color.

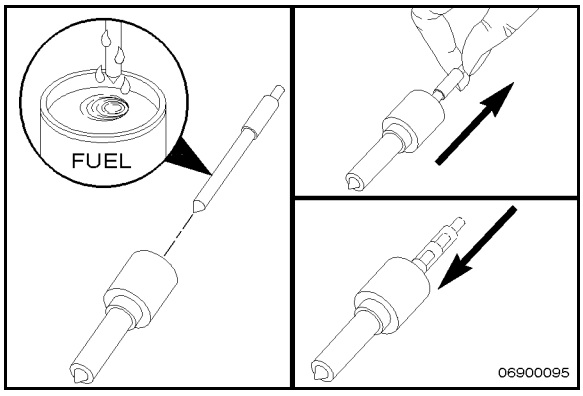
Check for signs of excessive carbon or overheating (dark yellow/tan or blue needle color).

Check for scuff marks on the needle.



Dip the needle in clean diesel fuel, and insert it into the nozzle.

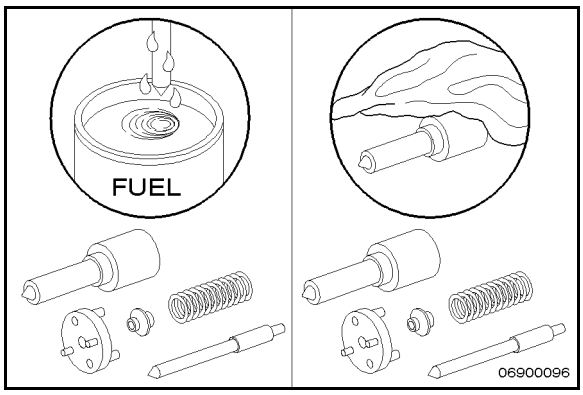
Hold the nozzle at a 45-degree angle, and pull the needle 2/3 of the way out. Under its own weight, the needle should slide smoothly back into the nozzle.



Assemble (006-026-025)

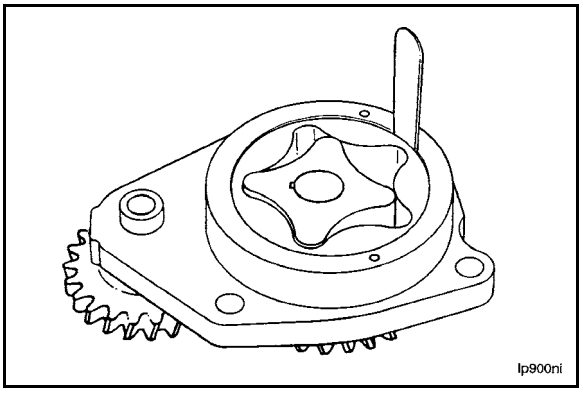
Clean the injector's internal components with clean diesel fuel and a clean rag.

Make sure there are **no** debris in the internal parts of the injector.



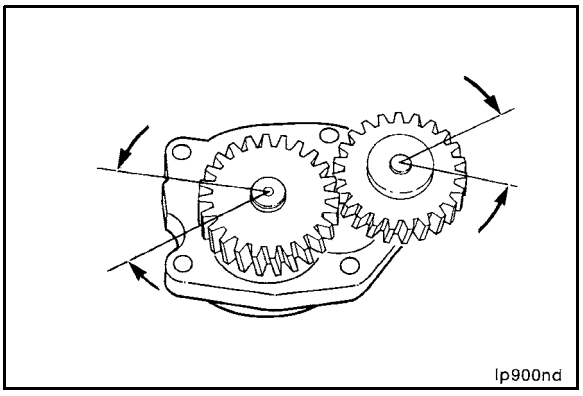
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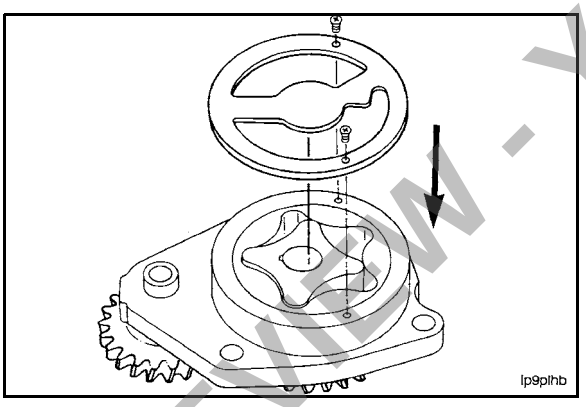
Measure the clearance of the gerotor planetary to the body bore.

Limit		
mm		**in**
0.381	MAX	0.015



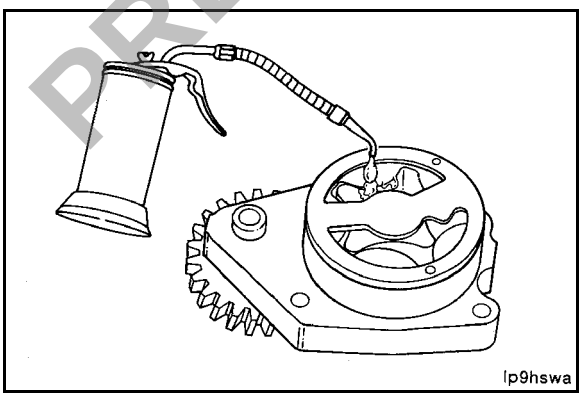
Measure the gear backlash.

Limit (Used Pump)		
mm		**in**
0.75	MIN	0.030
0.85	MAX	0.033



Install (007-031-026)

Install the back plate.



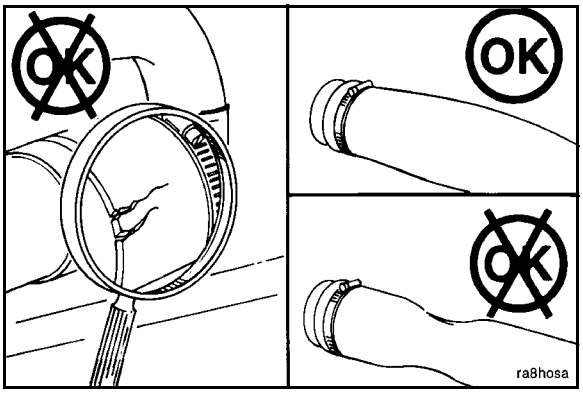
Δ **CAUTION** Δ

Failure to fill the pump with oil during installation can result in a slow prime at initial engine start-up, resulting in severe engine damage.

Lubricate the lubricating oil pump with clean 15W-40 engine oil.

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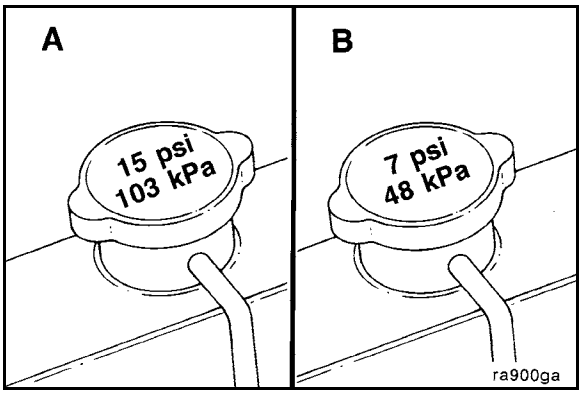


Radiator Hoses (008-045)

Inspect for Reuse (008-045-007)

Inspect all hoses for cracks, cuts, or collapsing.

NOTE: The silicone engine coolant hose will exhibit swelling because of the elasticity of the hose.



Radiator Pressure Cap (008-047)

General Information

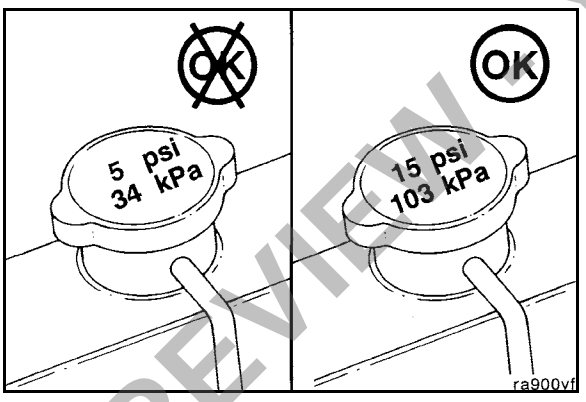
The system is designed to use a pressure cap to prevent boiling of the coolant.

Different caps are specified for the two recommended systems:

Radiator Cap Pressure Test

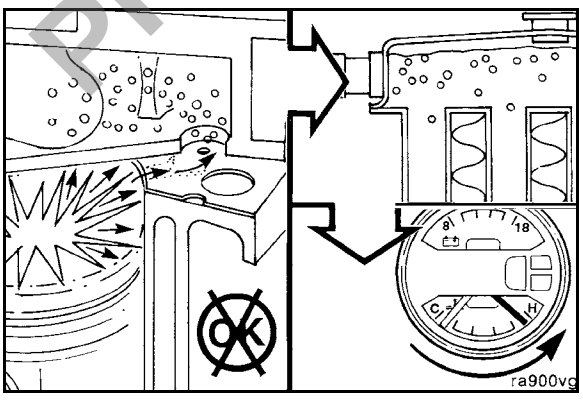
	System	Cap
A (Normal Duty)	104 °C [220 °F]	103 KPa [15 psi]
B (Light Duty)	99 °C [210 °F]	48 KPa [7 psi]

An incorrect or malfunctioning cap can result in the loss of coolant and the engine running hot.



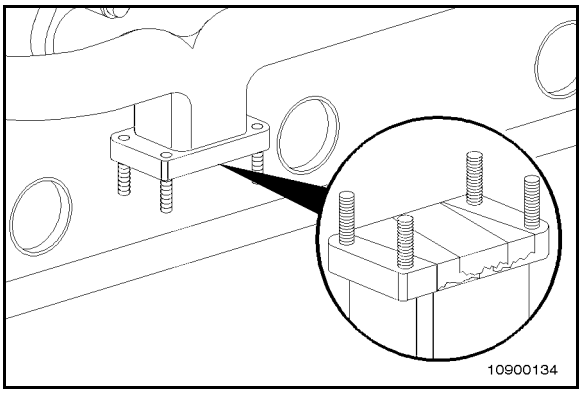
Air in the coolant can result in loss of coolant from the overflow when the aerated coolant is hot. The heated air expands, increasing the pressure in the system, causing the cap to open.

Similarly, coolant can be displaced through the overflow if the head gasket leaks compression gas into the coolant system.



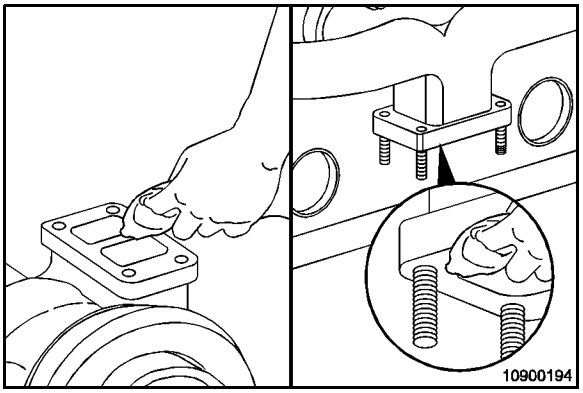
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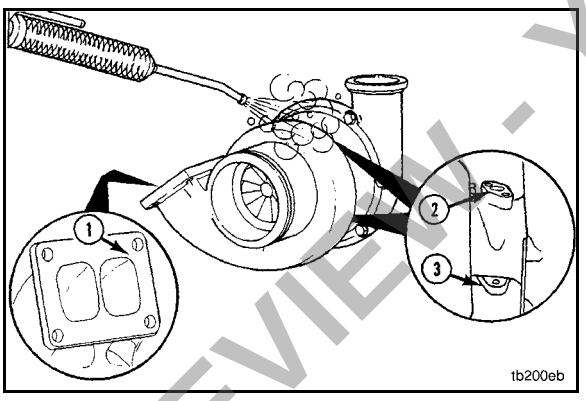


NOTE: If the turbocharger is **not** to be replaced immediately, cover the openings on the manifold and turbocharger to prevent any material from falling into them.

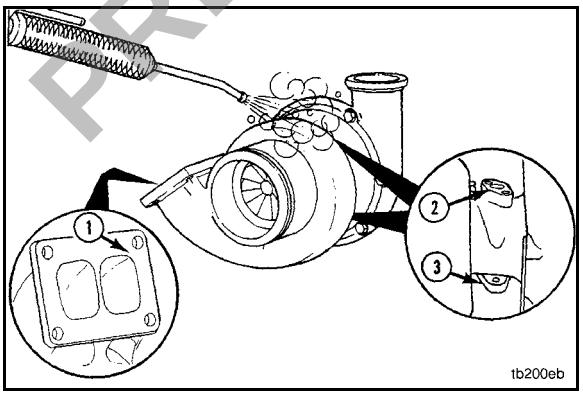
Clean (010-033-006)



Using a clean cloth, clean the turbocharger and exhaust manifold gasket surfaces.



Remove all carbon deposits and gasket material from surfaces (1, 2, and 3).



Δ **WARNING** Δ

When using solvents, acids, or alkaline materials for cleaning, follow the manufacturer's recommendations for use. Wear goggles and protective clothing to avoid personal injury.

Δ **WARNING** Δ

When using a steam cleaner, wear protective clothing and safety glasses or a face shield. Hot steam can cause serious personal injury.

Use solvent or steam to clean the exterior of the turbocharger.

Dry with compressed air.

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Straight Thread O-Ring Plugs				
Thread Size Inches	Torque - lbf			
	N•m	In-lb	N•m	ft-lb
1/4	4	35		
3/8	6	50		
1/2	8	70		
9/16	12	105		
5/8	16	145		
3/4			20	15
7/8			35	20
1			40	30
1-1/16			45	35
1-3/16			55	40

oi203vg

Tighten the straight-thread plugs. Refer to the adjoining chart for the appropriate torque values.

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