

CX37C
Mini Excavator

SERVICE MANUAL

Part number 48127449

English
May 2017





SERVICE MANUAL

CX37C Cab - Tier IV final engine
CX37C Canopy - Tier IV final engine

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INTRODUCTION

Foreword - Important notice regarding equipment servicing

All repair and maintenance work listed in this manual must be carried out only by qualified dealership personnel, strictly complying with the instructions given, and using, whenever possible, the special tools.

Anyone who performs repair and maintenance operations without complying with the procedures provided herein shall be responsible for any subsequent damages.

The manufacturer and all the organizations of its distribution chain, including - without limitation - national, regional, or local dealers, reject any responsibility for damages caused by parts and/or components not approved by the manufacturer, including those used for the servicing or repair of the product manufactured or marketed by the manufacturer. In any case, no warranty is given or attributed on the product manufactured or marketed by the manufacturer in case of damages caused by parts and/or components not approved by the manufacturer.

The manufacturer reserves the right to make improvements in design and changes in specifications at any time without notice and without incurring any obligation to install them on units previously sold. Specifications, descriptions, and illustrative material herein are as accurate as known at time of publication but are subject to change without notice.

In case of questions, refer to your CASE CONSTRUCTION Sales and Service Networks.

Safety rules

Personal safety



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.

Throughout this manual you will find the signal words DANGER, WARNING, and CAUTION followed by special instructions. These precautions are intended for the personal safety of you and those working with you.

Read and understand all the safety messages in this manual before you operate or service the machine.

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

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

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

FAILURE TO FOLLOW DANGER, WARNING, AND CAUTION MESSAGES COULD RESULT IN DEATH OR SERIOUS INJURY.

Machine safety

NOTICE: Notice indicates a situation that, if not avoided, could result in machine or property damage.

Throughout this manual you will find the signal word Notice followed by special instructions to prevent machine or property damage. The word Notice is used to address practices not related to personal safety.

Information

NOTE: Note indicates additional information that clarifies steps, procedures, or other information in this manual.

Throughout this manual you will find the word Note followed by additional information about a step, procedure, or other information in the manual. The word Note is not intended to address personal safety or property damage.

Safety rules - General information

Cleaning

Clean the metal parts with cleaning solution that meets the standard and steam cleaning. (except for bearings)

After cleaning, dry well, and inject oil in all parts.

Also inject oil into the bearings after drying.

Inspection

When disassembling parts, check all the parts.

If there are any worn or damaged parts, replace them.

Inspect carefully to prevent initial breakdowns.

Bearing

Replace any loose bearings.

Air dry bearings before installing them.

Needle bearing

When inserting needle bearings, be very careful not to damage them.

Apply grease to the section where the needle bearing will be inserted.

Gear

Check that there is no wear and no damage.

Oil seal, O-ring, gasket

Always install new oil seals, O-rings, and gaskets.

Apply grease to sections where oil seals and O-rings will be inserted.

Shaft

Check that there is no wear and no damage.

Check the bearings and check for damaged oil seals on the shaft.

Service parts

Install CASE CONSTRUCTION genuine service parts.

When placing an order, check the parts catalog. It contains the CASE CONSTRUCTION genuine part numbers.

Any breakdowns arising from the installation of non-genuine parts are not covered by the warranty.

Lubricants (fuel, hydraulic oil)

Use the oil from the specified company or specified in the operator's manual or service Manual.

Any breakdowns arising from any fuel or hydraulic oil other than those specified are not covered by the warranty.

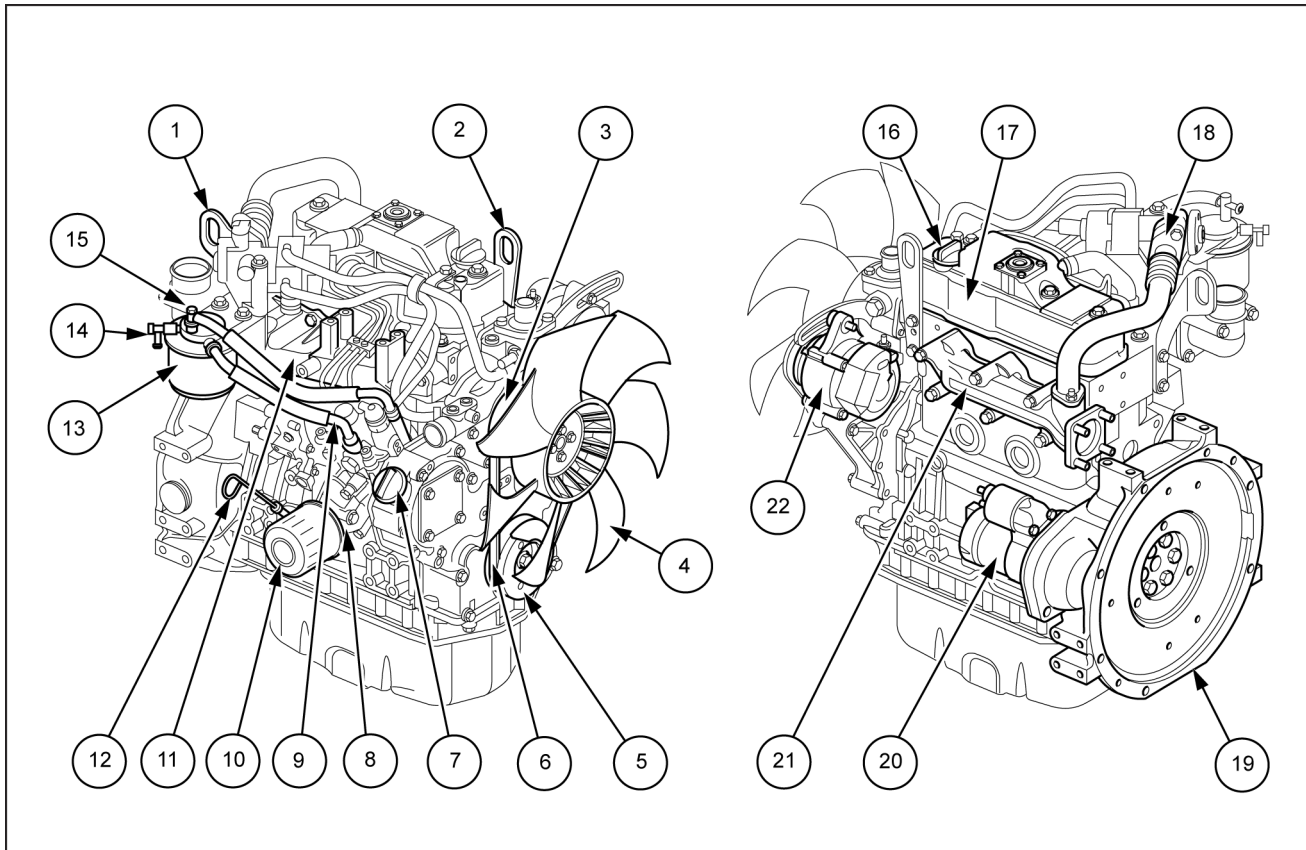


SERVICE MANUAL

Engine

CX37C Cab - Tier IV final engine
CX37C Canopy - Tier IV final engine

Engine - Component identification



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- | | |
|---|----------------------------------|
| 1. Lifting eye (flywheel end) | 12. Dipstick (engine oil) |
| 2. Lifting eye (engine cooling fan end) | 13. Fuel filter |
| 3. Engine coolant pump | 14. Fuel return to fuel tank |
| 4. Engine cooling fan | 15. Fuel inlet |
| 5. Crankshaft V-pulley | 16. Top filler port (engine oil) |
| 6. V-belt | 17. Rocker arm cover |
| 7. Side filler port (engine oil) | 18. EGR valve |
| 8. Engine oil cooler | 19. Flywheel |
| 9. Fuel injection pump | 20. Starter motor |
| 10. Engine oil filter | 21. Exhaust manifold |
| 11. Intake manifold | 22. Alternator |

NOTE: engine oil drain plug location may vary depending on oil pan options.

- | | |
|-------------------------|----------------------------------|
| 15. Idler gear | 35. Piston |
| 16. Oil pickup gasket | 36. Oil ring |
| 17. Oil pickup | 37. Second compression ring |
| 18. Crankshaft | 38. Top compression ring |
| 19. Crankshaft gear key | 39. Crankshaft rear seal housing |
| 20. Crankshaft gear | 40. Crankshaft rear seal |

Engine - Dynamic description

Function of major engine components

Components	Functions
Air cleaner	The air cleaner prevents airborne contaminants from entering the engine. Since the air cleaner is application specific, it must be carefully selected by an application engineer.
Alternator	The alternator is driven by a V-belt which is powered by the crankshaft Vpulley. The alternator supplies electricity to the engine systems and charges the battery while the engine is running.
Dipstick (engine oil)	The engine oil dipstick is used to determine the amount of engine oil in the crankcase.
Electric fuel pump	The electric fuel pump makes sure there is a constant supply of diesel fuel to the fuel injection pump. The electric fuel pump is electro-magnetic and runs on 12 V DC. It must be installed on every application. This is standard equipment with every engine.
Engine oil filter	The engine oil filter removes contaminants and sediments from the engine oil.
Engine oil cooler	The engine oil cooler helps to keep the engine oil cool. Engine coolant from the cooling system is circulated through an adapter at the base of the engine oil filter assembly and then returned to the coolant pump inlet.
Fuel filter	The fuel filter removes contaminants and sediments from the diesel fuel.
Water separator	The water separator removes contaminants, sediment and water from diesel fuel going to the fuel filter. This is a required component of the fuel system and is standard equipment with every engine. The water separator is installed between the fuel tank and the fuel feed pump. Periodically drain the water from the water separator.
Fuel tank	The fuel tank is a reservoir that holds diesel fuel. When the fuel leaves the fuel tank it goes to the fuel filter/water separator. Next the fuel is pumped to the fuel filter by the electric fuel pump. Then the fuel goes to the fuel injection pump. Since the fuel is used to keep the fuel injection pump cool and lubricated, more fuel than necessary enters the injection pump. When the injection pump pressure reaches a preset value, a relief valve allows the excess fuel to be returned back to the fuel tank. The fuel tank is a required engine component.
Side and top filler port (engine oil)	You can fill the crankcase with engine oil from either the side or the top filler port depending upon which one is most convenient.
Starter motor	The starter motor is powered by the battery. When you turn the key switch in the operator's console to the START position, the starter motor engages with the ring gear installed on the flywheel and starts the flywheel in motion.

Main electronic control components and features

Components / feature		Description
Engine Control Unit (ECU)		The ECU adjusts the rack position of the fuel injection pump depending on the speed command signal from the accelerator sensor, thus regulating the engine speed and power. The ECU also regulates the opening of the EGR valve depending on the engine speed and power. It serves as the master station for the following components/features.
Electronic governor (eco-governor)		The electronic governor consists of the engine speed sensor, the rack actuator, etc., and is directly connected to the fuel injection pump in order to regulate the rack position of the fuel injection pump depending on the signals communicated with the ECU.
Fuel injection pump (for eco-governor)		The fuel injection pump is of single plunger type and it is equipped with a Cold System Device (CSD) solenoid valve that allows the fuel injection timing to advance and the injection quantity to increase, thereby improving the cold start performance of the engine.
EGR valve		Controls the exhaust gas recirculation flow rate depending on the engine speed/load signals from the ECU. It is installed on the top of the exhaust manifold.
Accelerator sensor		Unlike mechanical governors, the Eco-governor has no governor lever. The accelerator sensor serves as the governor lever to provide the speed command signal (voltage signal) to the ECU for engine speed control. It is installed in the operator cabin of the driven machine. Constant speed engines for e.g. generator use do not require accelerator sensors because the engine speed can be shifted via a switch on the operator's console.
	Optional	CAN communication capability is available as an option.
Fault indicator		Is installed on the operator's console. If a fault occurs in the ECU or Eco-governor, the fault indicator flashes alerting the operator to a fault. The number of flashes and/or the flashing pattern vary depending on the type or source of the fault, Optional enabling quick-fix.
	Optional	
Engine diagnosis tool		Allows the operator to troubleshoot the cause of a problem based on detailed information regarding the problem occurring in the ECU or eco-governor. This tool can also be used for data maintenance tasks including programming and mapping.
	Option for service	
Engine coolant temperature sensor		Allows the CSD to be controlled in engine cold start conditions.
Glow plugs	Optional	When the key switch is turned to the ON position, the glow plugs/air heater are/is energized for up to 15 seconds (glow plugs). The duration of energization depends on the engine coolant temperature. The HEAT indicator is on during energization. When the indicator goes out, turn the key switch to the START position to start the engine.
Droop control	Standard with VM series	Reduces the engine speed by a certain percentage from no load to full (rated) load in steady state operation. The same percentage droop is maintained even when the load increases at any no-load speed.
Isochronous control	Standard with CL series Optional with VM series	Offers a constant engine speed from no load to full load. The engine speed does not decrease even when the load increases at any no-load speed.
Low-idling speed up		When the engine is cold, increases the low-idling speed to up to 1000 RPM depending on the engine coolant temperature. When the coolant temperature reaches a predetermined value, this feature returns the engine speed to the normal low idle setting, thus reducing the warm-up time.

Components / feature		Description
High-idling speed down	Optional	Decreases the high-idling speed depending on the engine coolant temperature. When the coolant temperature falls to a predetermined value, this feature returns the engine speed to the normal high idle setting, thus minimizing the emission of white smoke at low temperatures.
Auto deceleration	Optional	Brings the running engine in low idle mode automatically when the accelerator pedal is not operated for a predetermined period of time. When the pedal is operated, for example, the accelerator sensor is activated, the low idle mode is cancelled.

Engine - Compression test

Compression pressure drop is one of the major causes of increasing blow-by gas (engine oil contamination or increased engine oil consumption as a resultant phenomenon) or starting failure. The compression pressure is affected by the following factors:

1. degree of clearance between the piston and the cylinder;
2. degree of clearance at the intake/exhaust valve seat;
3. gas leak from the nozzle gasket or cylinder head gasket.

The pressure will drop due to increased parts wear. Pressure drop reduces the durability of the engine.

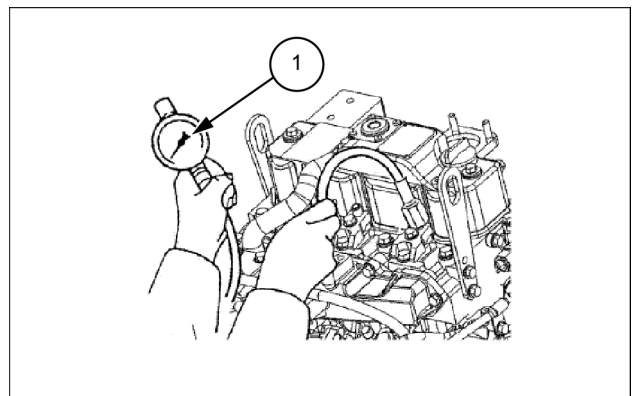
A pressure drop may also be caused by a scratched cylinder or piston, dust entrance from the dirty air cleaner element or a worn broken piston ring. Measure the compression pressure to determine the condition of the engine.

Compression pressure measurement method

1. Warm up the engine.
2. Stop the engine. Remove the high-pressure fuel injection lines as an assembly from the engine.
3. Remove the fuel injector from the cylinder to be measured (refer to **Fuel injectors - Remove (10.218)**).

NOTICE: remove or install the high-pressure fuel injection lines as an assembly whenever possible. Disassembling the high-pressure fuel injection lines from the retainers or bending any of the fuel lines will make difficult to reinstall the fuel lines.

4. Turn off the fuel supply valve in the fuel supply line. Disconnect the fuel injection pump stop solenoid at the connector. This prevents the fuel injection pump from injecting fuel during the compression testing.
5. Before install the compression gauge **(1)** adapter (refer to **Engine - Special tools (10.001)**), crank the engine with the stop solenoid disconnected for a few seconds to clear the cylinder of any residual fuel.
6. Install a nozzle seat at the tip end of the compression gauge adapter. Install the compression gauge **(1)** and the compression gauge adapter at the cylinder to be measured.
7. Crank the engine until the compression gauge reading is stabilized.
8. After performing the compression check, remove the compression gauge **(1)** and the compression gauge adapter from the cylinder.
9. Reinstall the fuel injector, the high-pressure fuel injection lines, and reconnect the stop solenoid (refer to **Fuel injectors - Install (10.218)**).



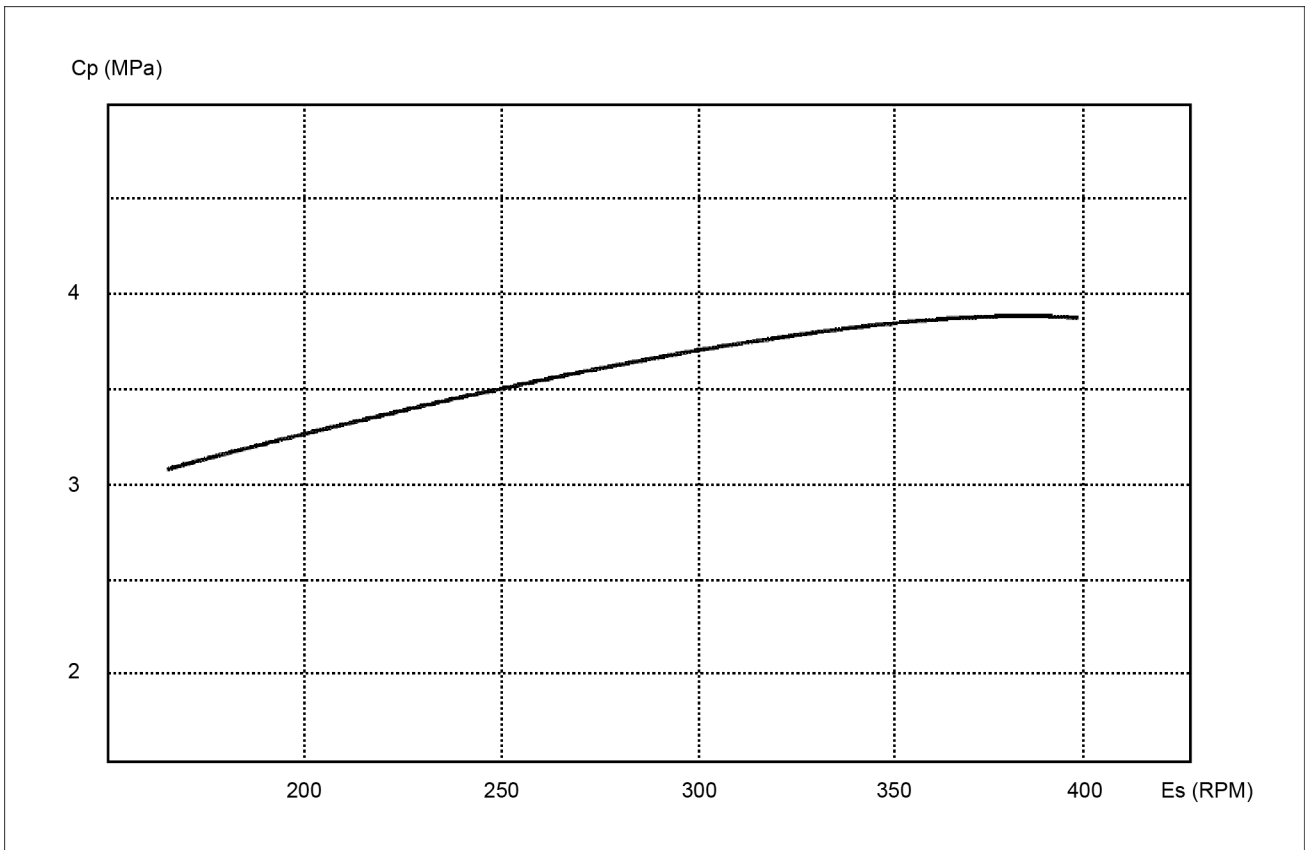
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10. Turn on the fuel supply valve and reconnect the injection pump stop solenoid.
11. Prime the fuel system (refer to **Fuel-water separator filter - Replace (10.206)**). Check for leaks. Test the engine.

Standard compression pressure (reference value)

Compression pressure at 250 RPM		Deviation between cylinders
Standard	Limit	
3.33 – 3.53 MPa (483.02 – 512.03 psi)	2.65 – 2.85 MPa (384.38 – 413.39 psi)	0.2 – 0.3 MPa (29.01 – 43.52 psi)

Engine speed and compression pressure (use for reference)



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Cp. Compression pressure
Es. Engine speed

Measured value and troubleshooting

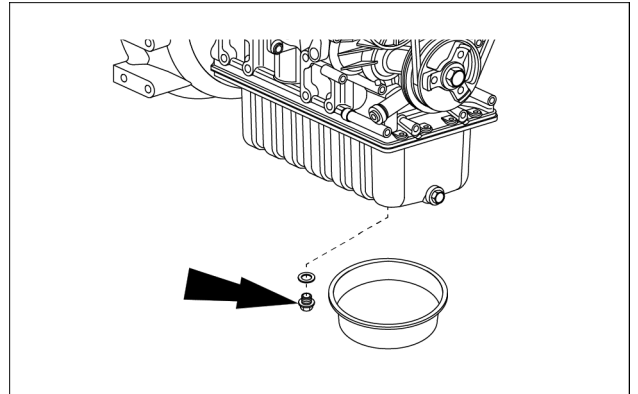
When the measured compression pressure is below the limit value, inspect each part by referring to the table below.

No.	Item	Cause	Corrective action
1	Air cleaner element	Clogged element	Clean the element
		Broken element	Replace the element
		Defect at element seal portion	
2	Valve clearance	Excessive or no clearance	Adjust the valve clearance
3	Valve timing	Incorrect valve clearance	Adjust the valve clearance
4	Cylinder head gasket	Gas leak from gasket	Replace the gasket
			Retighten the cylinder head bolts to the specified torque
5	Intake/exhaust valve	Sticking valve	Replace the intake/exhaust valve
	Valve seat	Gas leak due to worn valve seat or foreign matter trapped in valve	Lap the valve seat.
6	Piston	Gas leak due to scratching or wear	Perform honing and use an oversized part.
	Piston ring		
	Cylinder		

Engine - Change fluid - Engine oil and oil filter

NOTE: replace the oil while the engine is warm, but not hot. Doing so helps the oil in flowing.

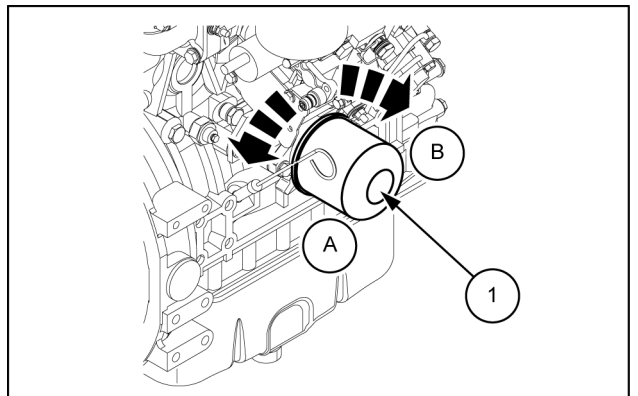
1. Park the machine on a flat and level place. Stop the engine, remove the starter key.
2. Remove the cover of drain plug.
3. Place a container with a capacity of **10 L (2.6 US gal)** under the drain plug.
4. Remove the drain plug and drain the oil.
5. Open the engine hood and remove the fill cap.



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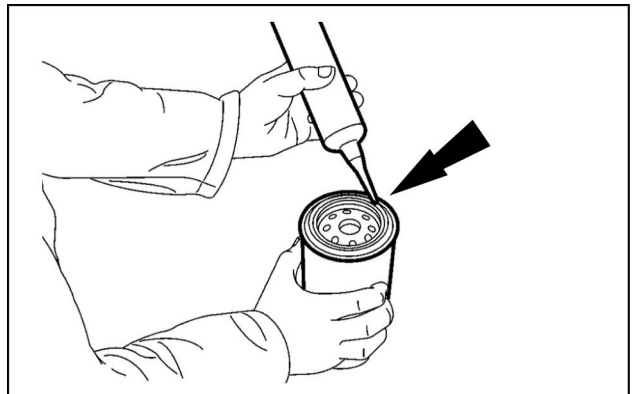
6. Clean around the filter head, remove the filter (1) with a filter wrench and clean the gasket surface.

- A. Open
- B. Close



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7. Apply an oil film finely to the seal of a new filter.



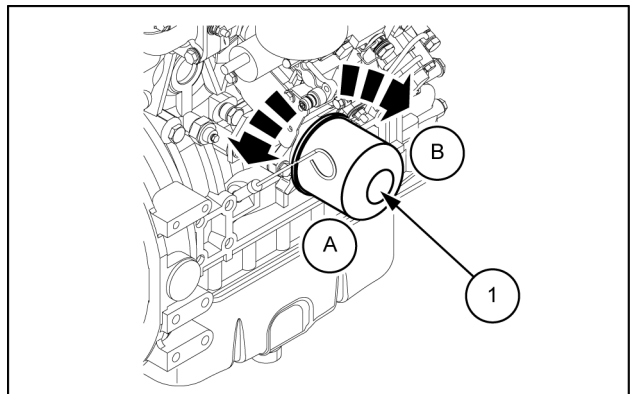
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8. Install a new filter. Turn the filter until the seal touches the filter head, and then tighten it further a half turn by hand.

NOTE: do not use a filter wrench for tightening the filter. Overtightening can damage the filter and its seal.

- A. Open
- B. Close

9. Install the drain plug.



SMIL16MEX1443AB 4

10. Add new engine oil to the engine (quantity: **6.7 L (1.8 US gal)**). Install the fill cap.
11. Run the engine for several minutes to check that there are no leaks at the filter and at the drain plug.
12. Stop the engine and check the oil level with the dipstick. Add oil if necessary.

NOTE: *always wait **15 min** to allow the oil to return to the sump before checking the oil level.*

13. Install the cover of the drain plug.

Engine - Disassemble

Prepare a clean, flat working surface on a workbench large enough to accommodate the engine components. Discard all used gaskets, O-rings and seals. Use new gaskets, O-rings and seals on reassembly of engine.

NOTICE: *identify all parts and their location using an appropriate method. It is important that all parts are returned to the same position during the reassembly process.*

If the engine will be completely disassembled, the following preliminary steps should be performed.

1. Disconnect the battery cables at the battery. Always disconnect the negative (-) cable first.
2. Remove the throttle cable, electrical connections, intake and exhaust system connections, and fuel supply lines from the engine.
3. Remove the alternator (refer to **Alternator - Remove (55.301)**).
4. Drain the engine coolant from the radiator and cylinder block (refer to **Engine cooling system - Change fluid - Radiator coolant (10.400)**).
Remove the cooling system components from the engine.
5. Remove the engine from the machine. Mount the engine to a suitable engine repair stand having adequate weight capacity.

NOTICE: *be sure to secure the engine solidly to prevent injury or damage to parts due to the engine falling during work on the engine.*

6. Clean the engine by washing with solvent, air or steam cleaning. Carefully operate so as to prevent any foreign matter or fluids from entering the engine or any fuel system or electrical components remaining on the engine.
7. Drain the engine oil into a suitable container. Remove the oil filter.
8. Remove the cylinder head (refer to **Cylinder heads - Disassemble (10.101)**).
9. Remove fuel injection pump if necessary (refer to **Injection pump - Remove (10.218)**).
10. Remove the starter motor (refer to **Engine starter - Remove (55.201)**).

DISASSEMBLY OF CAMSHAFT AND TIMING COMPONENTS

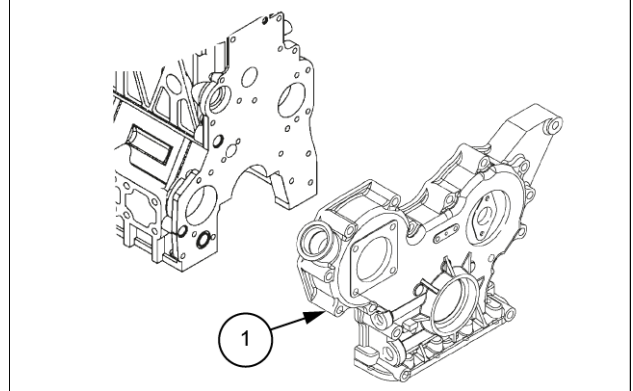
1. Discard all gaskets, O-rings and seals. Use new gaskets, O-rings and seals on reassembly of the camshaft and timing components.

Removal of timing gear case cover

1. Remove the bolt and washer retaining the crankshaft pulley.

NOTICE: use care not to damage the threads in the end of the crankshaft when removing the crankshaft pulley.

2. Remove the crankshaft pulley using a gear puller.
3. Remove the bolts that retain the gear case cover (1) to the cylinder block and oil pan.
4. Remove the gear case cover (1).



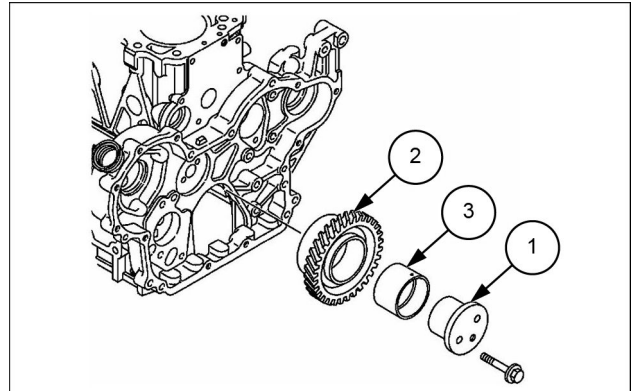
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Gears backlash check

1. Perform the gear backlash check (refer to **Valve drive and gears - Service instruction (10.106)**).

Removal of timing gears

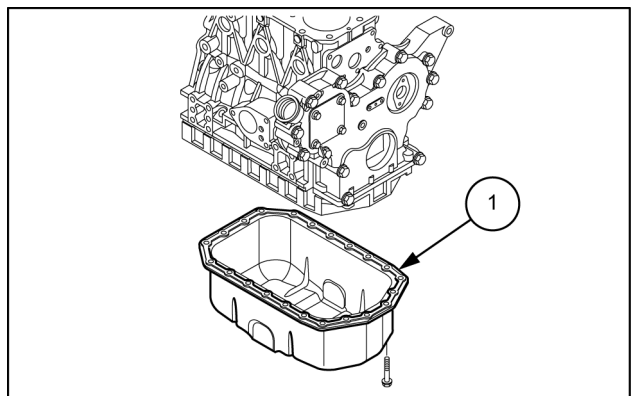
1. Remove the bolts from the idler gear shaft (1). Remove the idler gear shaft (1), the idler gear (2), and the bushing (3).
2. Do not remove the crankshaft gear unless it is damaged and requires replacement. If the gear must be removed, remove it using a gear puller.
3. Removal of the camshaft gear requires the camshaft be removed and placed in a press. Do not remove the camshaft gear unless it or the camshaft is damaged and requires replacement. Refer to the "Removal of the camshaft".



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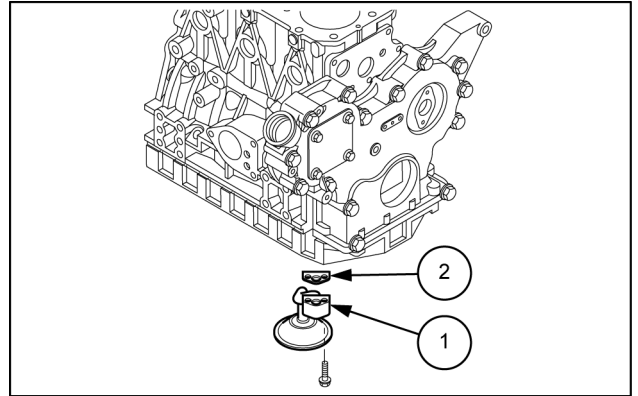
Removal of oil pan

1. Invert the engine (oil pan up) on the engine stand.
2. Remove the oil pan (1).



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3. Remove the oil pickup tube (1) and O-ring (2).

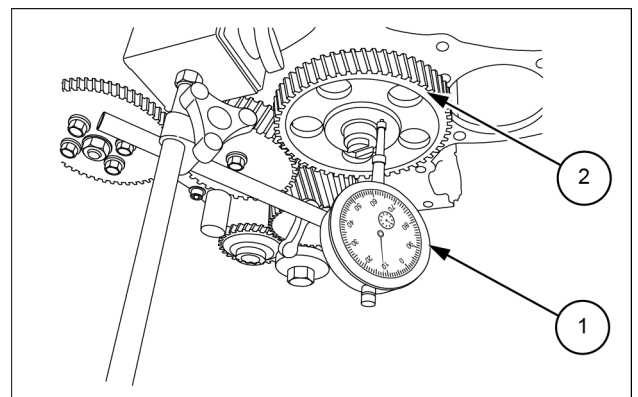


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Removal of camshaft

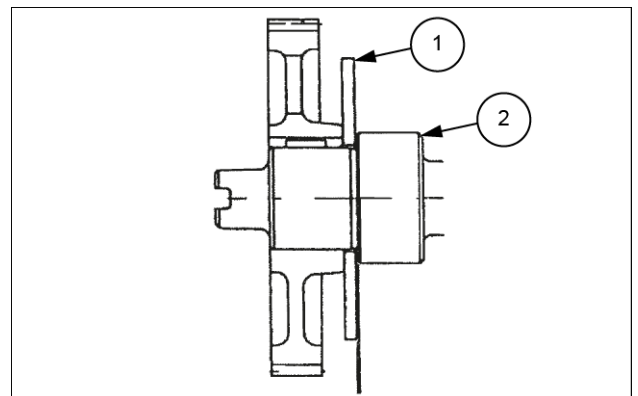
1. Before removing the camshaft, check the camshaft end play.

- Method A: Install a dial indicator (1) on the cylinder block. Move the camshaft (2) back and forth to measure the end play. Record the measurement (refer to **Camshaft - Service limits (10.106)** for the service limit).



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- Method B: Use a feeler gauge to measure the clearance between the thrust plate (1) and front camshaft bearing (2) (refer **Crankshaft - Service limits (10.103)** to for the service limit).



SMIL16MEX3419AB 6

2. Remove the two bolts (3) retaining the camshaft thrust plate (1).
3. Rotate the engine in the engine stand so that gravity causes the tappets (5) to drop away from the camshaft lobes.

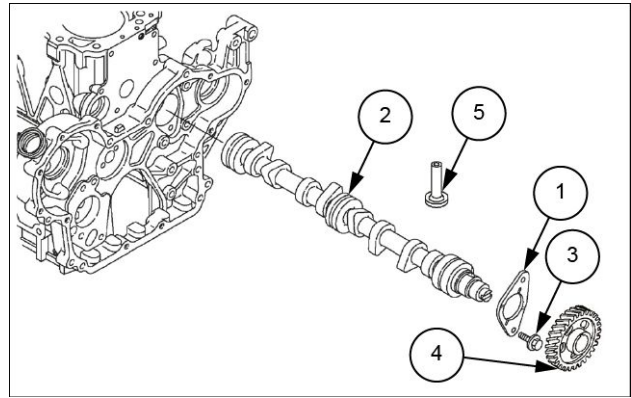
NOTE: rotate the camshaft at least two turns to “bump” any sticking tappets away from the camshaft.

4. Slowly pull the camshaft (2) assembly out of the engine being careful not to damage the front camshaft bushing.

NOTE: if the engine is not installed on an engine repair fixture, stand the engine upright on the flywheel end mounting flange. Rotate the camshaft at least two turns to bump the tappets out of the way to prevent the tappets from interfering with the removal of the camshaft.

The tappets are “mushroom” shaped and must be removed from inside the engine crankcase.

5. Remove the tappets. Mark the tappets so they can be reinstalled in the same location.
6. Remove the camshaft drive gear (4) only if the gear or camshaft require replacement. Use a knife-edge puller and a press to remove the gear. The gear is a shrink-fit and will need to be heated to 180 – 200 °C (356 – 392 °F) to remove.



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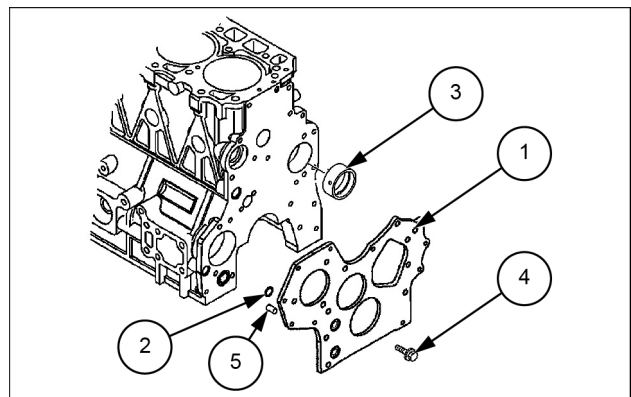
Removal of gear case or front plate

NOTE: the camshaft must be removed before removing the front plate. See “Removal of camshaft”.

1. Remove the oil pump.

NOTE: it is not necessary to remove the fuel supply pump from the gear case to remove the front plate. If the fuel supply pump does not need to be repaired, leaving it mounted to the timing gear case will eliminate the need to re-time it during assembly (refer to **Injection pump - Remove (10.218)**).

2. Remove the bolt (4).
3. Remove the front plate (1) from the cylinder block. Thoroughly clean all old sealant from the mating surfaces.
4. Inspect and measure the camshaft bushing (refer to **Camshaft - Service limits (10.106)** for the service limit). If damaged or worn beyond service limits, remove the camshaft bushing (3).
5. Remove two O-rings.
6. Remove the O-ring (2) and the dowels (5).



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DISASSEMBLY OF CRANKSHAFT AND PISTON COMPONENTS

Removal of pistons

NOTICE: keep the piston pin parts, the piston assemblies, and the connecting rod assemblies together to be returned to the same position during the reassembly process. Label the parts using an appropriate method.

NOTICE: engines with high operating hours may have a ridge near the top of the cylinders that will catch the piston rings and make it impossible to remove the pistons. Use a suitable ridge reamer to remove ridges and carbon prior to removing the pistons.

NOTE: pistons can fall from cylinder block if the engine is inverted. Rotate the engine so the connecting rods are horizontal before removing the connecting rod caps.

1. Using a feeler gauge, measure the connecting rod side clearance as shown (refer to **Connecting rod and piston - Service limits (10.105)** for the standard limit). If the measurement is out of specification, replace the crankshaft, connecting rod, or both.
2. Measure bearing oil clearance prior to removing the pistons and connecting rods to determine extent of wear. Record the measurements.

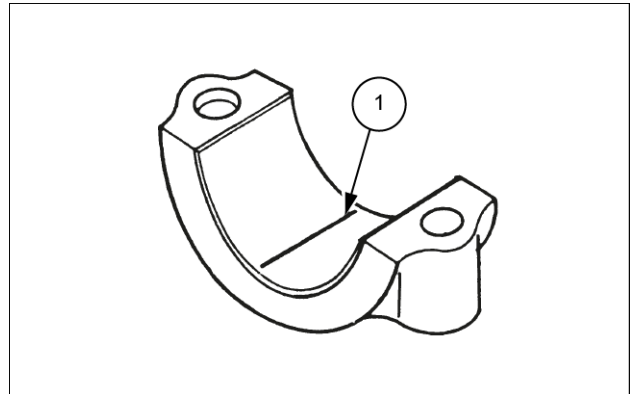
NOTICE: mark the connecting rod caps and connecting rods so the caps and connecting rods stay together.



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1. Remove the bearing cap. Do not remove the bearing inserts at this time.
2. Wipe oil from the bearing insert and crankshaft journal surfaces.
3. Place a piece of PLASTIGAGE® (1) along the full width of the bearing insert.

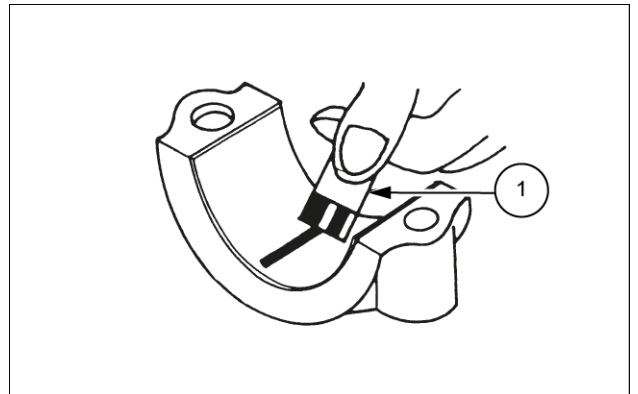
NOTICE: do not rotate the crankshaft when using PLASTIGAGE®. A false reading may result.



SMIL16MEX3424AB 10

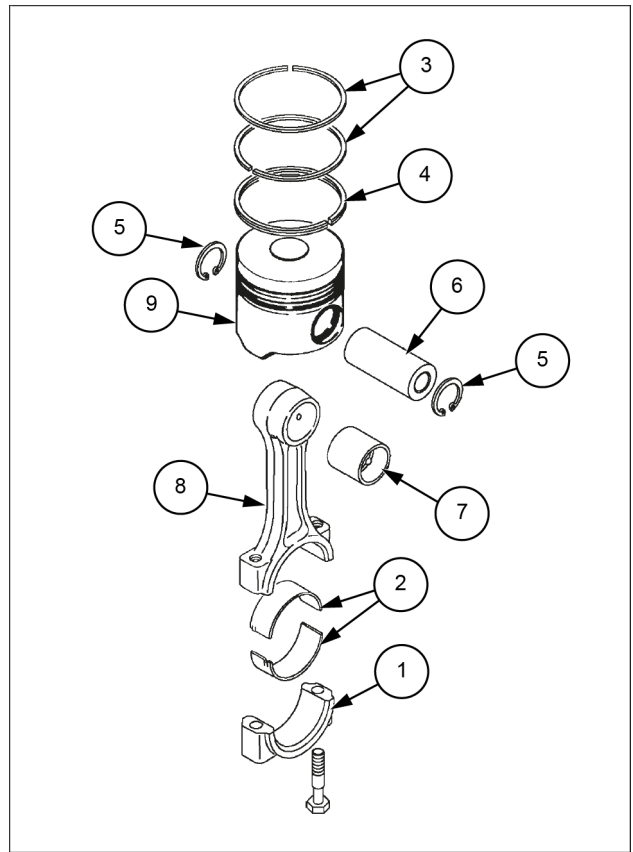
4. Reinstall the bearing cap and tighten to specification (refer to **Engine - Torque for special use (10.001)**).
5. Remove the bearing cap.
6. Compare the width of the flattened PLASTIGAGE® to the graduation marks on the package (1). The mark that most closely matches the width of the flattened PLASTIGAGE® will indicate the bearing oil clearance.
7. Repeat with remaining connecting rods.

NOTICE: do not allow the connecting rod to contact the crankshaft journal during piston removal. Damage to the bearing journal may result.



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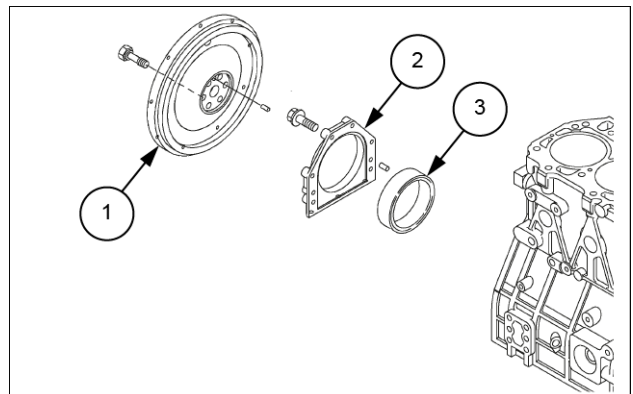
3. Use a wooden dowel against the connecting rod and tap the piston/connecting rod assembly out of the cylinder.
4. Mark the cylinder number on the piston and connecting rod.
5. Remove the bearing inserts (2).
6. Remove the compression rings (3) from the piston using a piston ring expander.
7. Remove the oil ring (4) from the piston using a piston ring expander.
8. Remove the circlips (5) from the wrist pin.
9. Remove the wrist pin (6) and connecting rod (8) from the piston (9).
10. Repeat the steps until all pistons are removed and disassembled.



SMIL16MEX3426BB 12

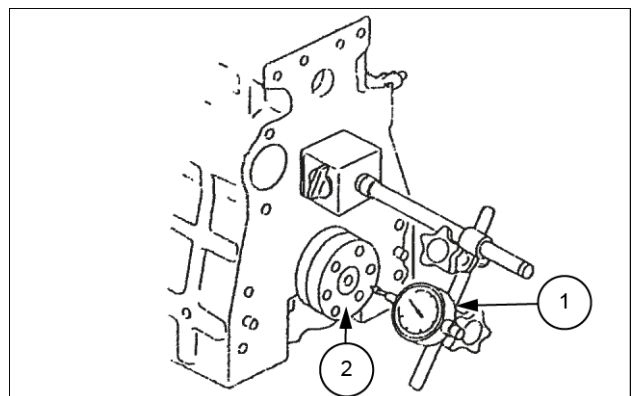
Removal of crankshaft

1. Remove the flywheel (1) from the crankshaft.
2. Remove the bolts from the rear oil seal assembly (2) (3). Remove the assembly from the engine.



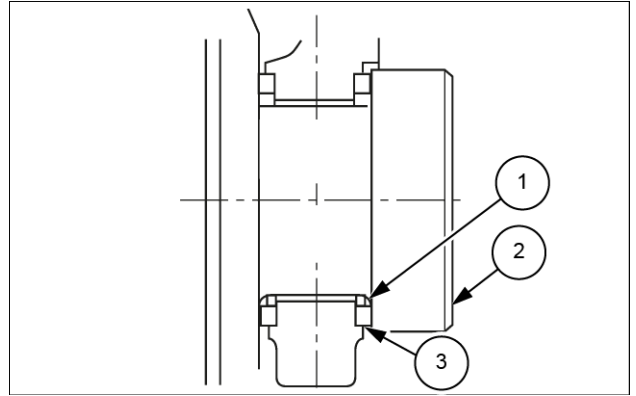
SMIL16MEX3427AB 13

3. Before removing the main bearing caps, measure the crankshaft end play. Use either of the following two methods.
 - Method A: Install a dial gauge (1) on the cylinder block. Move the crankshaft (2) in and out to measure the end play. Record the measurement.



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- Method B: Use a feeler gauge to measure the clearance (3) between the thrust bearing (1) and crankshaft (2). Record the measurement (refer to **Crankshaft - Service limits (10.103)**).

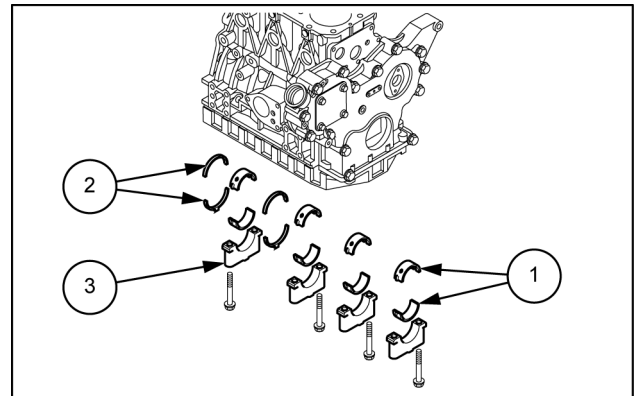


SMIL16MEX3429AB 15

4. Remove the main bearing caps (3). Be sure to note the markings on the main bearing caps, or mark them yourself, so they can be reinstalled in the same order as they were removed. Do not remove the bearing inserts (1) at this time.

NOTE: the “arrows” on the main bearing caps point to the flywheel end of the engine.

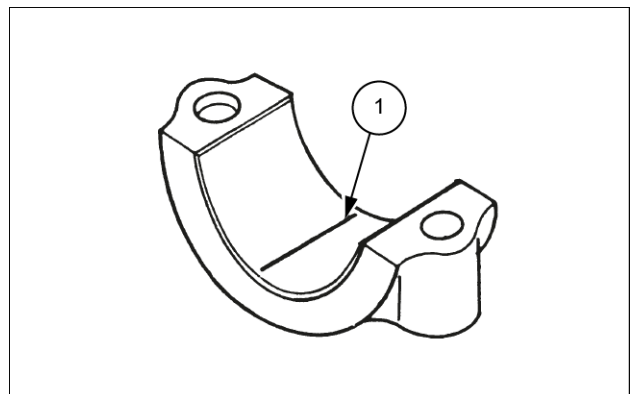
(2) Thrust bearing



SMIL17MEX0152AB 16

5. Measure bearing oil clearance prior to removing the crankshaft to determine extent of wear. Record the measurements.
 1. Wipe oil from the bearing insert and crankshaft journal surfaces.
 2. Place a piece of PLASTIGAGE® (1) along the full width of each bearing insert.

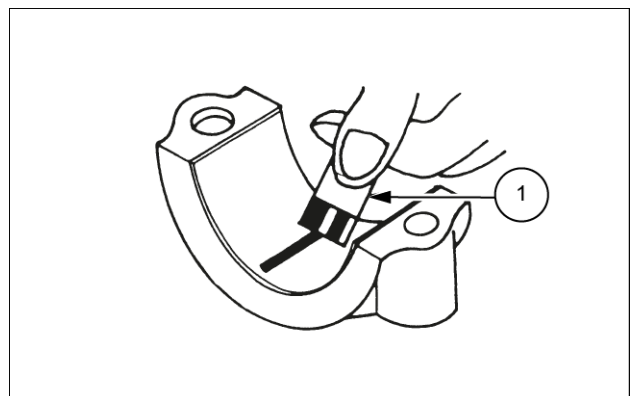
NOTICE: do not rotate the crankshaft when using PLASTIGAGE®. A false reading may result.



SMIL16MEX3424AB 17

3. Reinstall the bearing caps and tighten to specification (refer to **Engine - Torque for special use (10.001)**).
4. Remove the bearing caps.
5. Compare the width of the flattened PLASTIGAGE® to the graduation marks on the package (1). The mark that most closely matches the width of the flattened PLASTIGAGE® will indicate the bearing oil clearance.
6. Remove the crankshaft from the engine.
7. Remove the bearing inserts (1) and thrust bearings (2).

NOTE: do not remove the crankshaft gear unless the gear or crankshaft are damaged and require replacement.



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Suggest:

If the above button click is invalid.

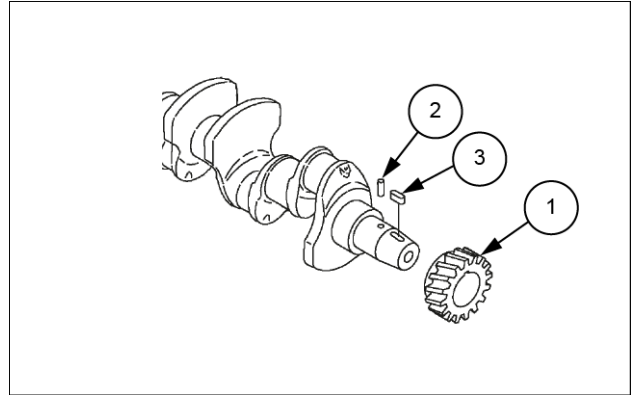
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first, and then click the above link

to download the complete manual.

Thank you so much for reading

8. If necessary, remove the crankshaft gear (1), parallel pin (2) and key (3). If using a gear puller, be careful not to damage the threads in the end of the crankshaft.



SMIL16MEX3431AB 19

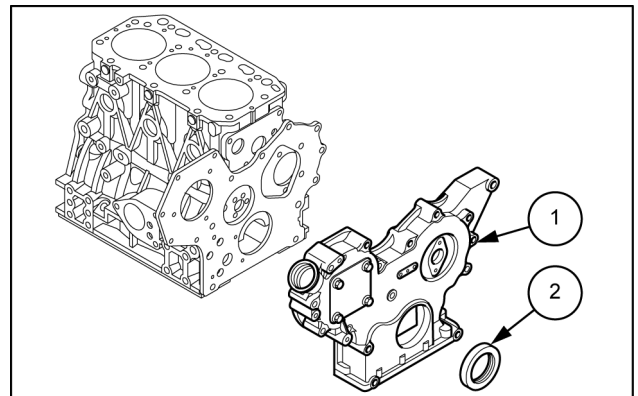
INSPECTION OF CRANKSHAFT AND CAMSHAFT COMPONENTS

NOTICE: always read and follow safety related precautions found on containers of hazardous substances like parts cleaners, primers, sealants and sealant removers.

Thoroughly clean all components using a brush and appropriate solvent. Each part must be free of carbon, gasket material, metal filings and other debris.

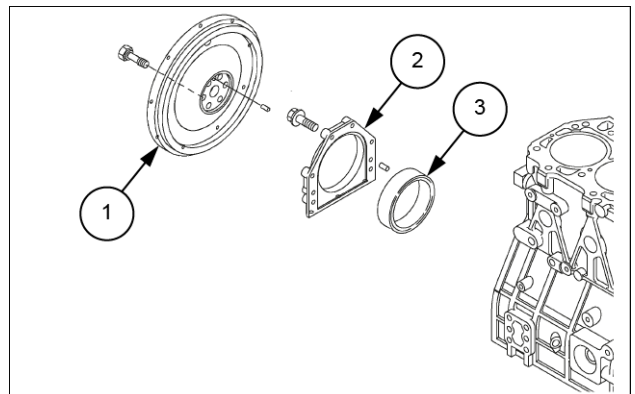
Replacement of crankshaft oil seals

1. Remove the seal (2) from the cover (1).
2. Apply a continuous bead of ThreeBond Liquid Gasket No. 1207F to the outside diameter of a new oil seal (2), and install in the gear case cover. Apply lithium grease to the lip of the seal.



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3. Remove the rear oil seal (3) from the seal housing (2).
4. Apply a continuous bead of ThreeBond Liquid Gasket No. 1207F to the outside diameter of a new oil seal (2), and install in the housing. Apply lithium grease to the lip of the seal.



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