



Service Repair Manual

Model

428D BACKHOE LOADER

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Product: BACKHOE LOADER

Model: 428D BACKHOE LOADER DSX

Configuration: 428D Backhoe Loader DSX00001-UP (MACHINE) POWERED BY 3054C Engine

Disassembly and Assembly 3054C Engines for Caterpillar Built Machines

Media Number -SEN5069-18

Publication Date -01/05/2015

Date Updated -19/09/2018

i02293101

Engine Oil Pump - Remove - Engines Without a Balancer

SMCS - 1304-011

Removal Procedure

Start By:

- a. Remove the oil pan. Refer to Disassembly and Assembly, "Engine Oil Pan - Remove and Install".

Note: This procedure is for the removal of the engine oil pump on engines that are not equipped with a balancer. Refer to this Disassembly and Assembly Manual, "Balancer Group - Remove" for information on the removal of the engine oil pump on engines that are equipped with a balancer.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

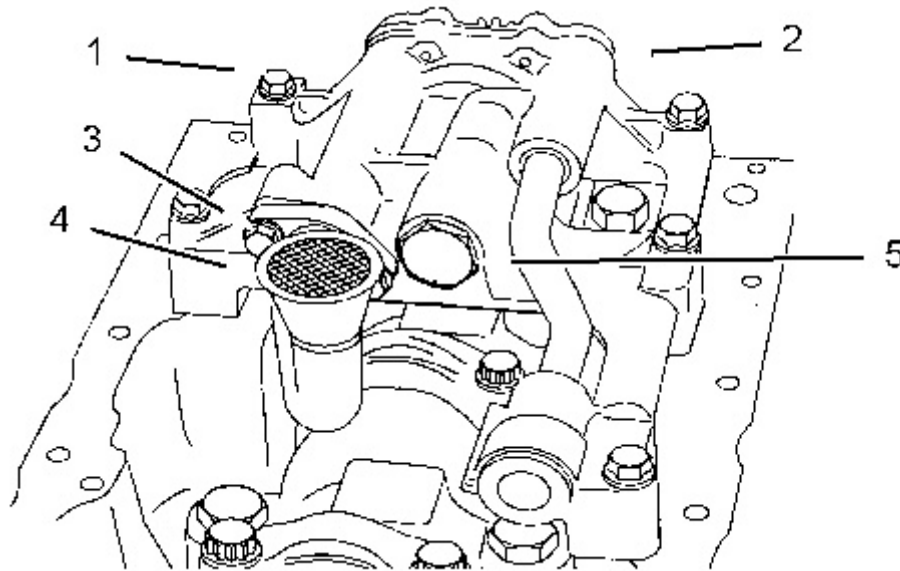


Illustration 1

g01147907

1. Remove the setscrews (3) and the suction pipe (4).
2. Remove the setscrews (1). Remove the assembly of the engine oil pump (2) from the cylinder block.

! WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

3. If necessary, remove the pressure relief valve (5) from the assembly of the engine oil pump (4). Refer to this Disassembly and Assembly Manual, "Engine Oil Relief Valve - Remove and Install".
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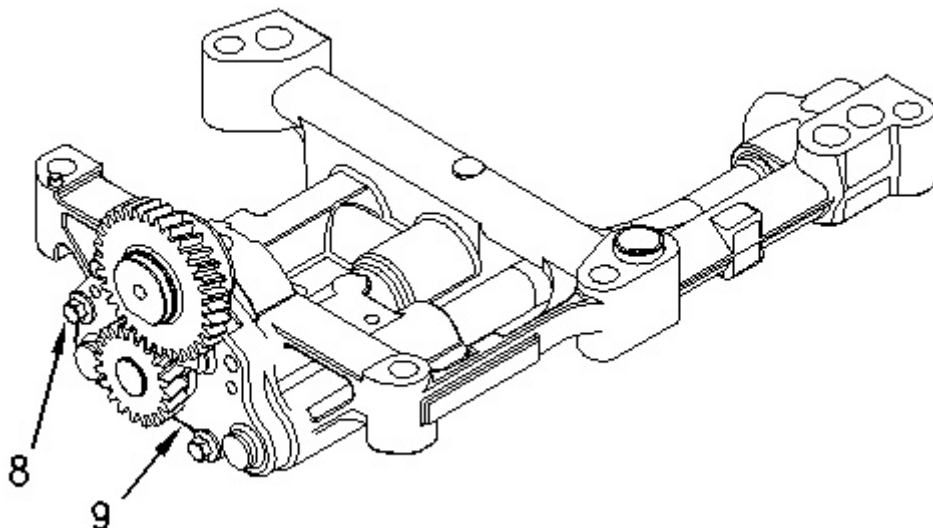


Illustration 2

g00956631

4. Remove the setscrews (8). Remove engine oil pump (9).
5. If necessary, remove the setscrews and remove the front cover assembly from the engine oil pump (7) in order to inspect the components within the engine oil pump.

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Media Number -SEN5069-18

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i02293102

Engine Oil Pump - Install - Engines Without a Balancer

SMCS - 1304-012

Installation Procedure

Note: This procedure is for the installation of the engine oil pump on engines that are not equipped with a balancer. Refer to this Disassembly and Assembly Manual, "Balancer Group - Install" for information on the installation of the engine oil pump on engines that are equipped with a balancer.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE

If any of the parts on the engine oil pump are worn or damaged, the entire pump must be replaced.

1. Clean all of the internal components of the oil pump if the front cover of the oil pump was previously removed in order to inspect the internal components. Check the internal components for wear and for other damage. Check the clearance between the outer rotor of the oil pump and the oil pump body. Check the clearance between the outer rotor and the inner rotor. Check the end play movement of the rotor. Refer to the Systems Operation/Testing and Adjusting Manual, "Engine Oil Pump - Inspect". Replace the engine oil pump if any of the components are worn or damaged.

2. Lubricate the inner rotor and the outer rotor of the engine oil pump with clean engine lubricating oil. Install the front cover of the engine oil pump onto the body of the oil pump. Install the setscrews and tighten the setscrews in order to secure the front cover to the body.

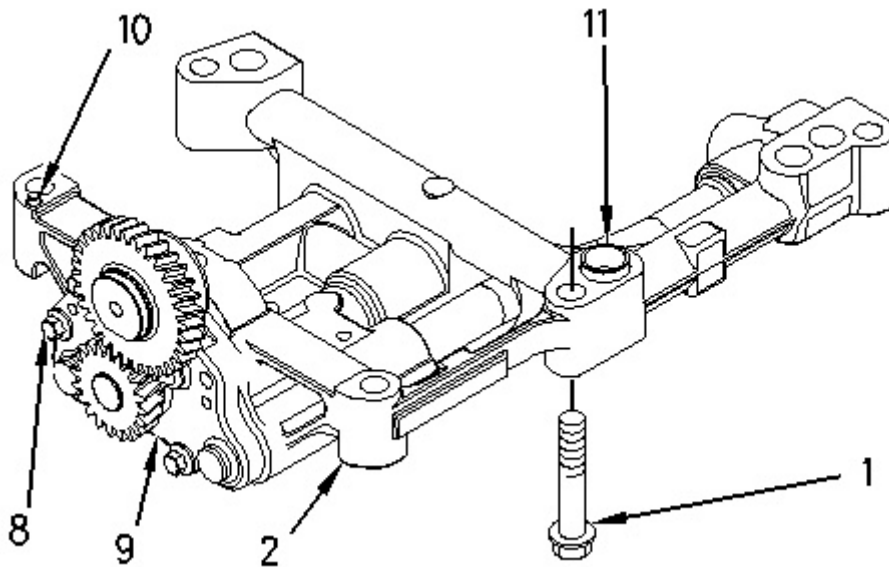


Illustration 1

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3. Install the engine oil pump (9) into the assembly of the engine oil pump (2). Install the setscrews (8). Tighten the setscrews to a torque of 9 N·m (80 lb in).
4. Fill engine oil pump (9) with clean engine oil.
5. Position the assembly of the engine oil pump (2) against the cylinder block. Ensure that dowel pin (10) and hollow dowel (11) are correctly located in the cylinder block.
6. Install the setscrews (1). Tighten the setscrews to a torque of 44 N·m (32 lb ft).
7. Check the backlash between the idler gear of the oil pump and the crankshaft gear. Refer to the Specifications Manual, "Gear Group - Front" for further information.

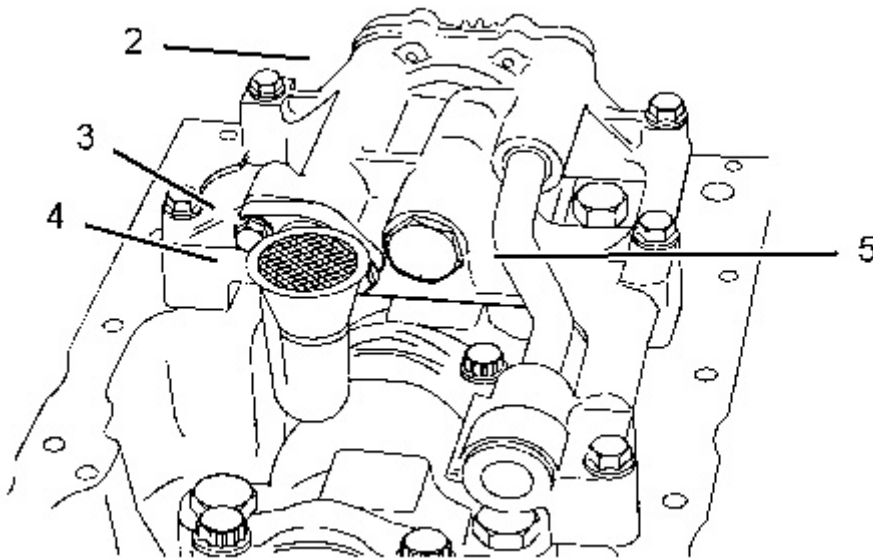


Illustration 2

g01147909

⚠ WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

8. If the pressure relief valve (5) was removed, install the pressure relief valve. Refer to this Disassembly and Assembly Manual, "Engine Oil Relief Valve - Remove and Install" for further information.
9. Position the suction pipe (4) and install the setscrews (3).

End By:

- a. Install the oil pan. Refer to Disassembly and Assembly, "Engine Oil Pan - Remove and Install".


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Disassembly and Assembly 3054C Engines for Caterpillar Built Machines

Media Number -SEN5069-18

Publication Date -01/05/2015

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i02293115

Water Pump - Remove and Install

SMCS - 1361-011; 1361-012

Removal Procedure

Start By:

- a. Remove the fan. Refer to Disassembly and Assembly, "Fan - Remove and Install".

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

1. Drain the coolant from the cooling system into a suitable container for storage or disposal.

Note: Refer to Operation and Maintenance Manual, "Refill Capacities" for the coolant capacity of the engine.

2. Loosen the clamps and remove the hose from the water pump inlet.

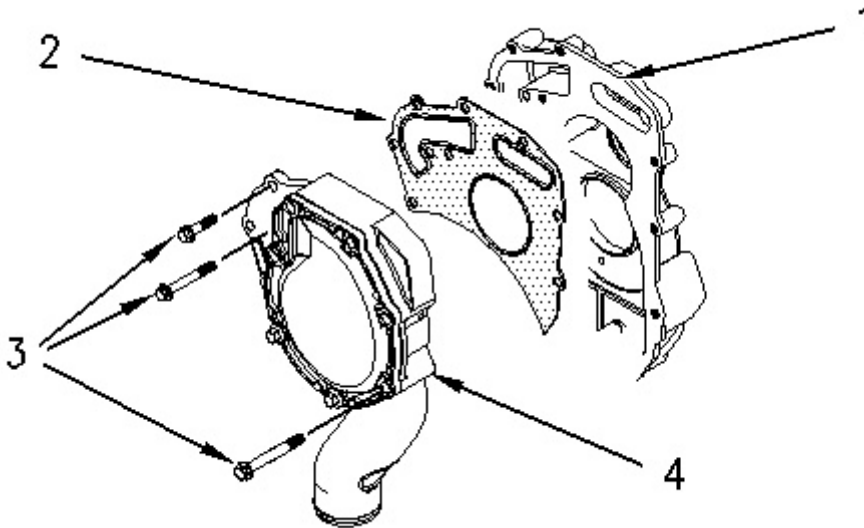


Illustration 1

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3. Remove the setscrews (3) that fasten the water pump (4) to the front housing (1).
4. If necessary, tap the water pump with a soft hammer in order to loosen the water pump.
5. Remove water pump (4). Remove the gasket (2) from the front housing and the water pump. Discard the gasket (2).

Installation Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	9S-3263	Thread Lock	-
B	-	Guide Bolt (M8 X 1.25 by 70 mm)	2

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Inspect the drive gear for the water pump for wear or other damage. If necessary, replace the drive gear.
2. Clean the joint faces of the water pump and the front housing.

Note: Do not use sealant on the gasket for the water pump.

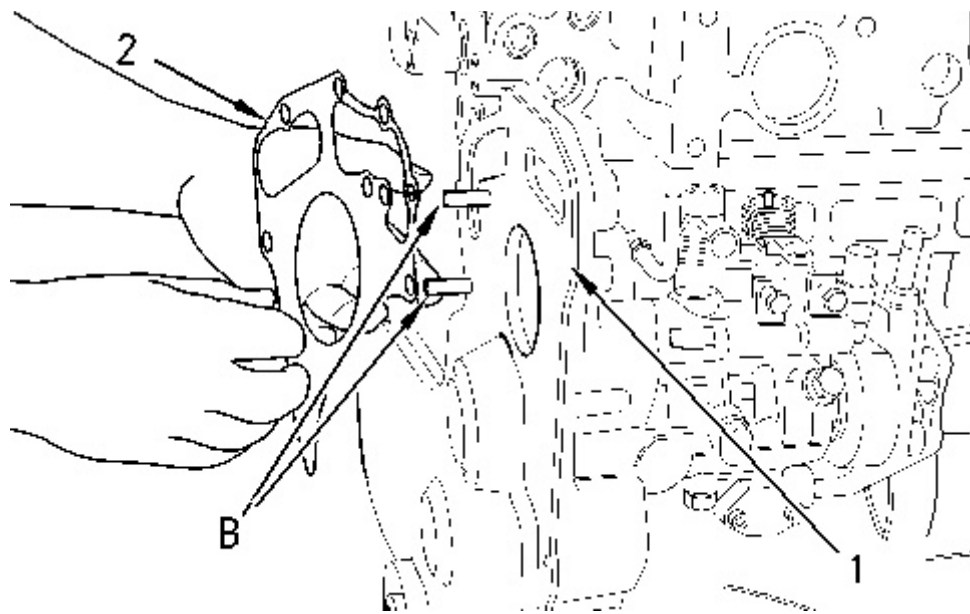


Illustration 2

g00952716

3. Install Tooling (B) in the front housing (1).
4. Install a new gasket (2) on the front housing.

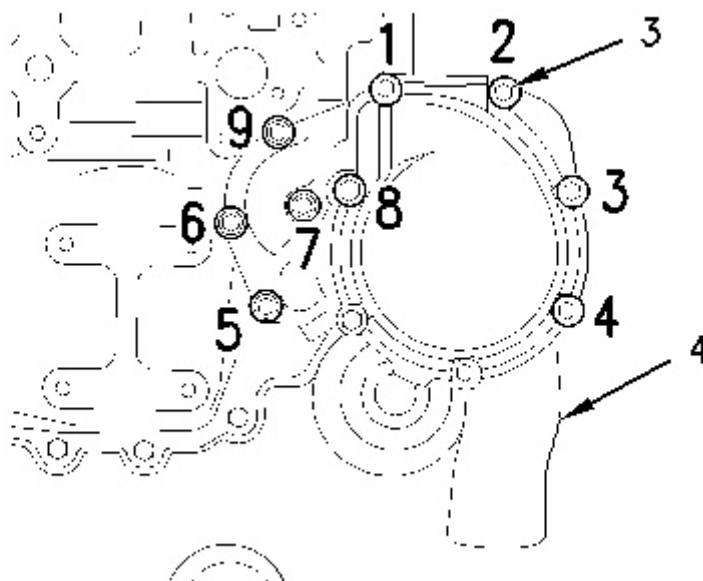


Illustration 3

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5. Install the water pump (4) on the front housing.

Note: New setscrews have sealant on the first 13 mm (0.5 inch) of the threads. In order to reuse the old setscrews, clean the old sealant from the setscrews and apply Tooling (A) to the setscrews.

6. Install the setscrews (3) that fasten the water pump to the front housing. Do not tighten the setscrews at this time.
7. Remove Tooling (B) and install the remaining setscrews in order to secure the water pump to the front housing.

Note: Tighten the setscrews evenly in order to pull the water pump into the front housing.

8. Tighten the setscrews (3) to a torque of 22 N·m (16 lb ft). Tighten the setscrews in the sequence that is shown in Illustration 3.
9. Install the hose to the water pump inlet. Tighten the hose clamps.
10. Fill the cooling system with coolant. Refer to Operation and Maintenance, "Refill Capacities" for the cooling system capacity.

End By:

- a. Install the fan. Refer to Disassembly and Assembly, "Fan - Remove and Install".

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Configuration: 428D Backhoe Loader DSX00001-UP (MACHINE) POWERED BY 3054C Engine

Disassembly and Assembly 3054C Engines for Caterpillar Built Machines

Media Number -SEN5069-18

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i02293128

Water Temperature Regulator - Remove and Install

SMCS - 1355-010

Removal Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

1. Drain the coolant from the cooling system to a level below the water temperature regulator into a suitable container for storage or disposal.

2. Loosen the hose clamp from the upper radiator hose and remove the upper radiator hose from the water temperature regulator housing.

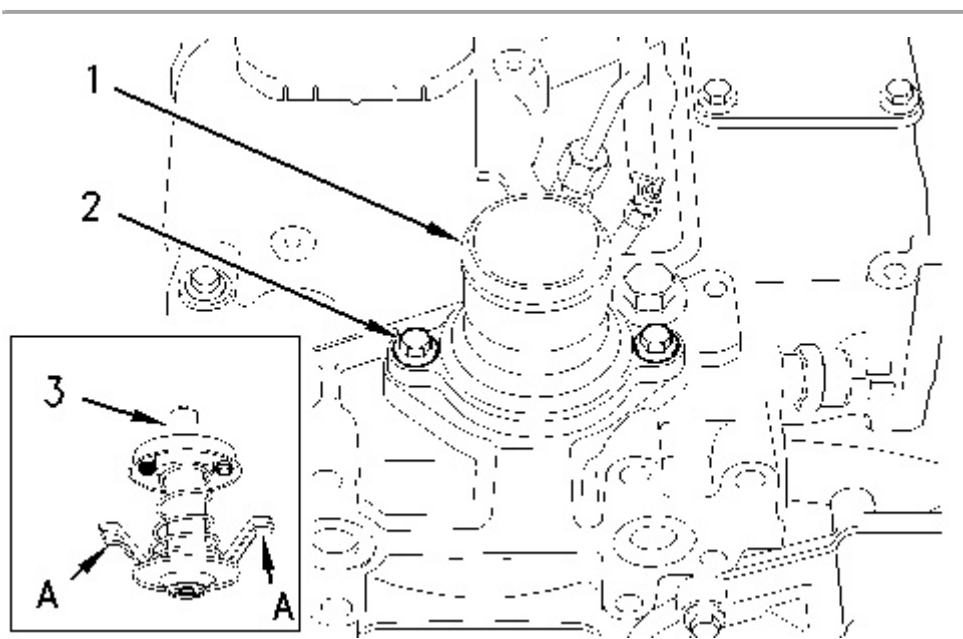


Illustration 1

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3. Remove the setscrews (2) that hold the water temperature regulator housing (1) in position on the cylinder head. Remove the water temperature regulator housing. Remove the O-ring seal from the water temperature regulator housing. Discard the O-ring.
4. Squeeze the retainers (A) and rotate the water temperature regulator in order to release the water temperature regulator from the tabs of the water temperature regulator housing.
5. Refer to Systems Operation, Testing and Adjusting, "Water Temperature Regulator - Test" for the correct procedure on testing the water temperature regulator.

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Clean the water temperature regulator housing.
-

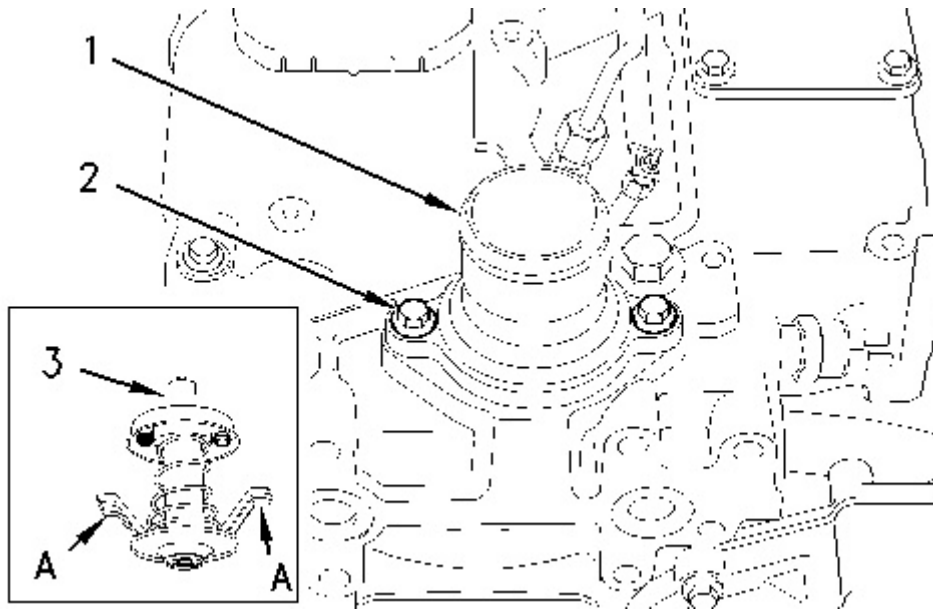


Illustration 2

g00953937

2. Position the water temperature regulator (3) in the water temperature regulator housing. Squeeze the retainers (A) and rotate the water temperature regulator in order to secure the water temperature regulator to the water temperature regulator housing.

Note: The retainers (A) must be inserted behind the tabs of the water temperature regulator housing in order to secure the water temperature regulator during engine operation.

3. Install a new O-ring seal on the water temperature regulator housing (1). Lubricate the O-ring seal with red rubber grease. Position the water temperature regulator housing on the cylinder head.
4. Install the setscrews (2) that fasten water temperature regulator housing (1) to the cylinder head.
5. Install the upper radiator hose and tighten the hose clamps. Refer to the Torque Specifications Manual for the correct torque.
6. Fill the cooling system to the proper level. Refer to the Operation and Maintenance Manual, "Refill Capacities" for further information.



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Disassembly and Assembly 3054C Engines for Caterpillar Built Machines

Media Number -SEN5069-18

Publication Date -01/05/2015

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i02293555

Flywheel - Remove

SMCS - 1156-011

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	-	Guide Bolt (1/2 inch - 20 NF by 4 inch)	2
B	138-7575	Link Bracket	1

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

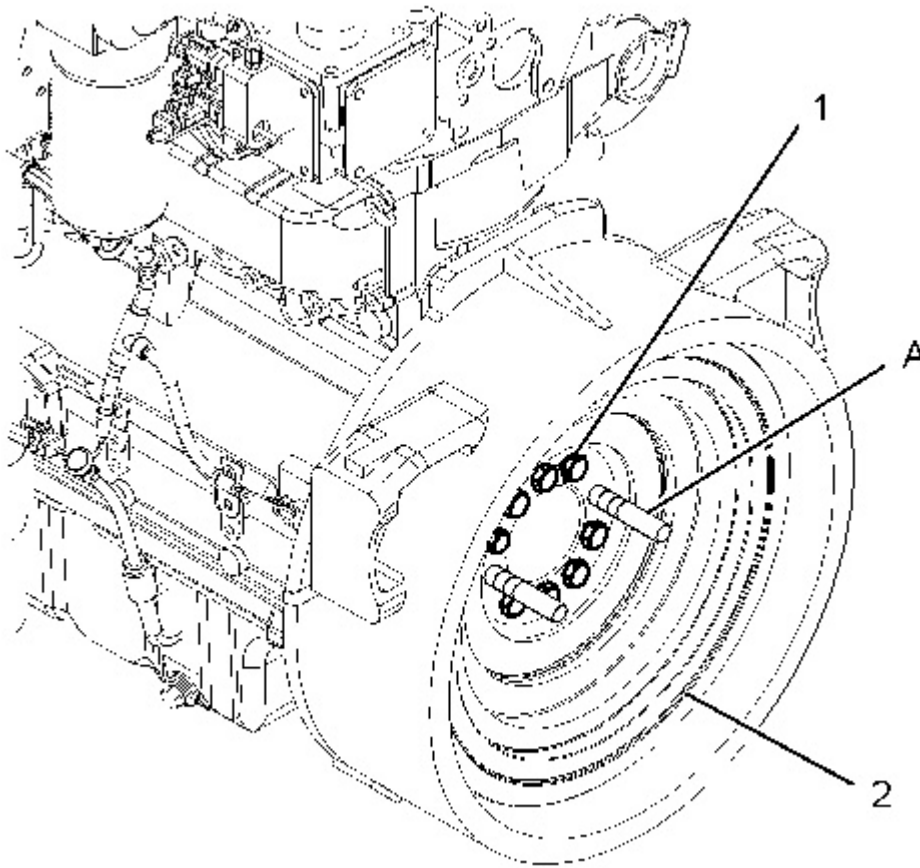


Illustration 1
Typical example

g01148312

1. Remove the two setscrews and install the Tooling (A) as guides.

Note: The weight of the flywheel (2) is approximately 54 kg (119 lb). Install the Tooling (B) in order to support the flywheel (2) before the remainder of the setscrews (1) are removed.

2. Remove the remaining setscrews (1) that secure flywheel (2) to the crankshaft.
 3. Remove the flywheel (2) from the engine.
-

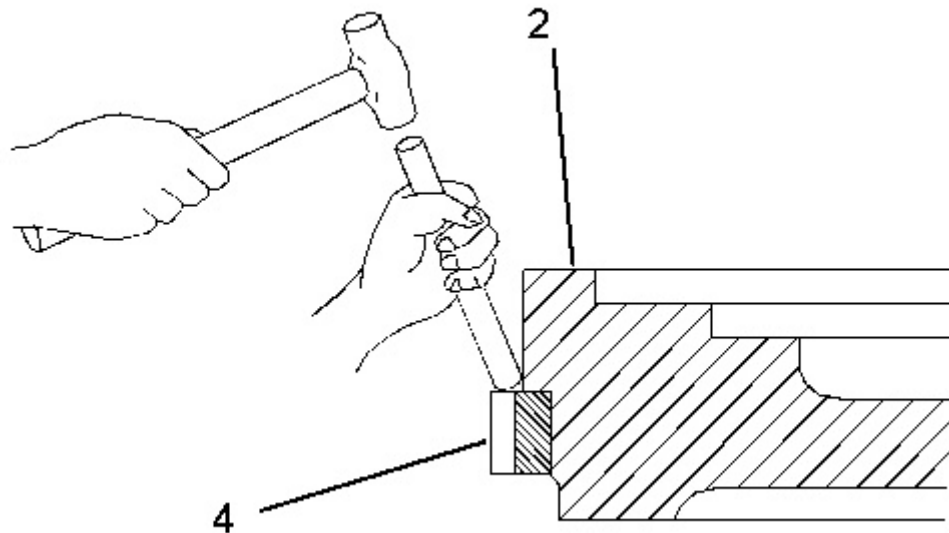


Illustration 2

g01148313

4. Check the condition of the ring gear (4). Remove the ring gear (4) if the ring gear is worn or damaged.

Note: Identify the orientation of the ring gear (4) on the flywheel (2) and the position of the chamfer on the teeth for the correct positioning when the new ring gear is installed.

5. Place the flywheel (2) and the ring gear (4) on a suitable support. Use a hammer and a chisel in order to remove the ring gear (4) from the flywheel (2).


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Date Updated -19/09/2018

i07030444

Flywheel - Install

SMCS - 1156-012

Installation Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	-	Guide Bolt (1/2 inch - 20 NF by 4 inch)	2
B	138-7575	Link Bracket	1

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Thoroughly clean the flywheel housing. Inspect the crankshaft rear seal for leaks. If there are any oil leaks, refer to this Disassembly and Assembly Manual, "Crankshaft Rear Seal - Remove" for the correct procedure.
-

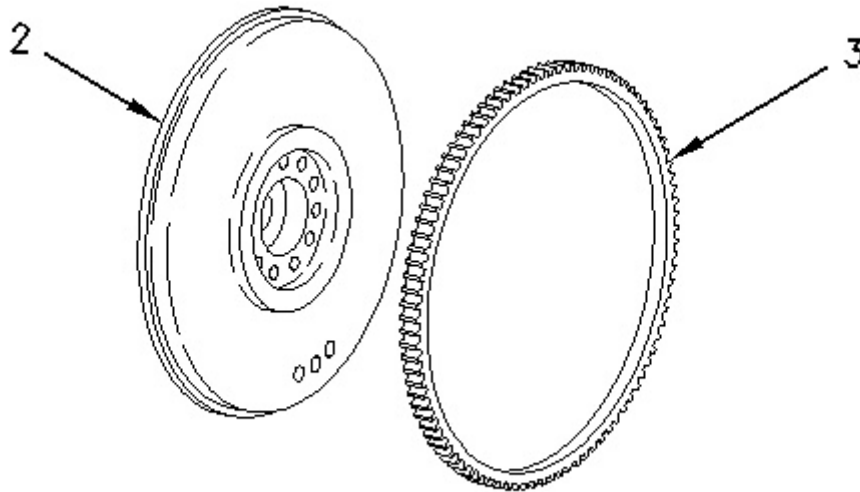


Illustration 1

g00909349

 **WARNING**

Always wear protective gloves when handling parts that have been heated.

Note: If ring gear (3) has been removed from flywheel (2). Identify the orientation of ring gear (3) on the flywheel for the correct positioning when the new ring gear is installed.

2. Heat the ring gear to 250 °C (480 °F) in an oven to install the ring gear onto the flywheel. Ensure that the orientation of the ring gear is correct and quickly install the ring gear onto the flywheel.

Note: Do not use a torch to heat the ring gear.

3. Clean flywheel (2) and ring gear (3) when the ring gear has cooled.

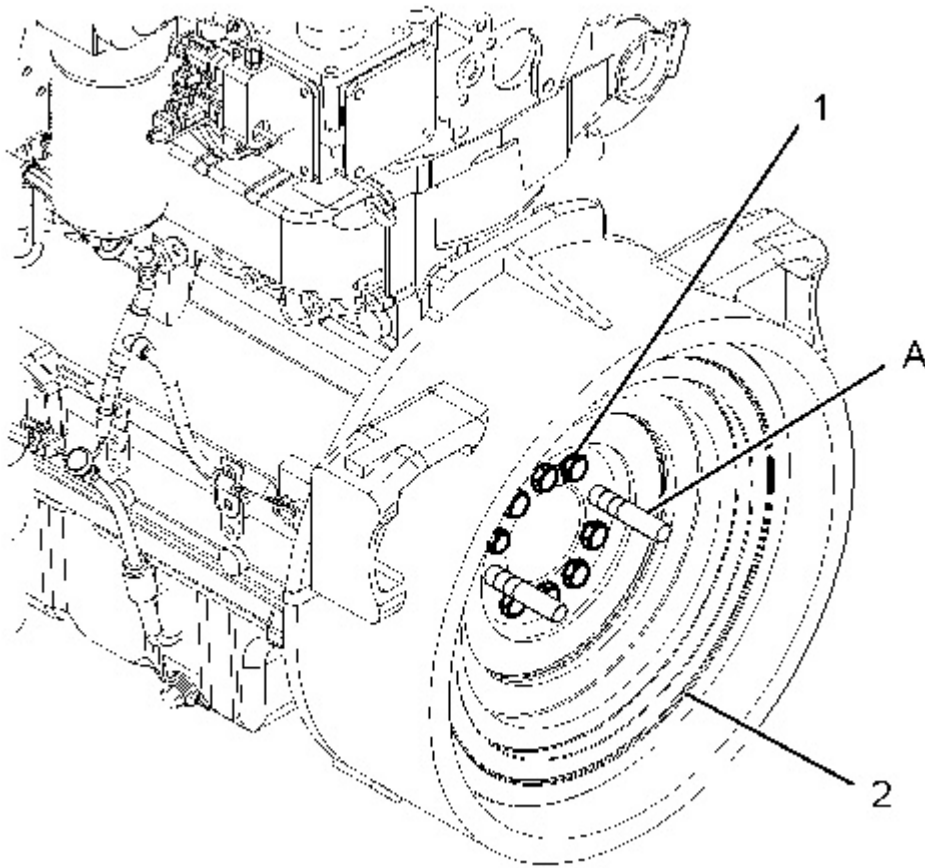


Illustration 2

g01148312

4. Install the Tooling (A) on the crankshaft. Install the Tooling (B) and a suitable lifting device on flywheel (2) and position the flywheel in the flywheel housing. The weight of the flywheel is approximately 54 kg (119 lb).
5. Install bolts (1) to flywheel (2).
6. Remove Tooling (A). Install the remaining bolts (1) that secure flywheel (2) to the crankshaft. Tighten the bolts (1) to a torque of 140 N·m (103 lb ft).
7. Check the alignment of flywheel (2) with the crankshaft. Refer to Testing and Adjusting, "Flywheel - Inspect" for the correct procedure.

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i02293665

Crankshaft Rear Seal - Remove

SMCS - 1161-011

Removal Procedure

Start By:

- Remove the flywheel. Refer to Disassembly and Assembly, "Flywheel - Remove".

NOTICE

Keep all parts clean from contaminants.

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Dispose of all fluids according to local regulations and mandates.



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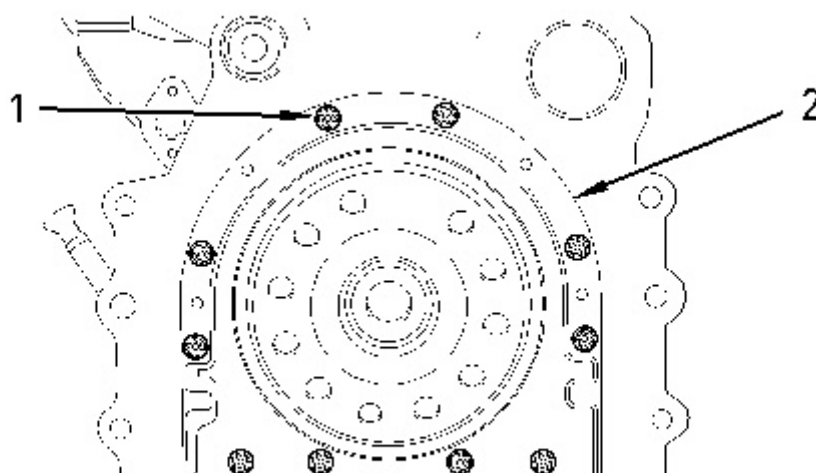


Illustration 1

g00991388

Note: The crankshaft rear seal is nonserviceable. If the crankshaft rear seal is removed, the complete housing assembly must be replaced.

1. Remove the setscrews (1) from the housing assembly (2).
2. Remove the housing assembly (2) from the cylinder block. Discard the housing assembly (2).

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