

Product: WHEEL LOADER

Model: 988B WHEEL LOADER 50W

Configuration: 988B Wheel Loader 50W06041-UP (MACHINE) POWERED BY 3408 Engine

Disassembly and Assembly 3408E and 3412E Engines for Caterpillar Built Machines

Media Number -SEN1013-11

Publication Date -01/07/2015

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i01615902

Crankshaft - Remove

SMCS - 1202-011

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	171-4660	Bracket	2
	4C-9832	Engine Rollover Stand	1
B	138-7573	Link Bracket	2
C	1H-3110	Bearing Puller	1
	8B-7560	Step Plate	1
	9U-6600	Hydraulic Pump	1
	1H-3108	Push-Puller Leg	2
	1H-3107	Bearing Puller	1
	3H-0468	Puller Plate	5
	3H-0465	Push-Puller Plate	2
	1P-0820	Hydraulic Puller	1
	5B-0637	Nut	1
	8S-6586	Screw	1
D	5P-0944	Dowel Puller Group	1
	5P-0939	Dowel Extractor	1

Start By:

- a. Remove the front housing. Refer to Disassembly and Assembly, "Housing (Front) - Remove".
- b. Remove the rear gear group. Refer to Disassembly and Assembly, "Gear Group (Rear) - Remove".
- c. Remove the crankshaft main bearings. Refer to Disassembly and Assembly, "Crankshaft Main Bearings - Remove".
- d. Remove the connecting rod bearings. Refer to Disassembly and Assembly, "Connecting Rod Bearings - Remove".

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

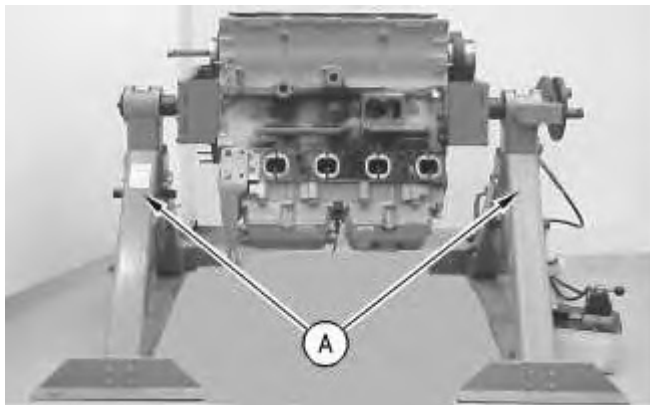


Illustration 1
Typical example

g00720077

1. The engine should be in position on Tool (A).
 2. Push the piston assemblies toward the cylinder heads.
-



Illustration 2
Typical example

g00584893

3. Be sure that the "V" timing marks are aligned on idler gear (2) and crankshaft gear (1).

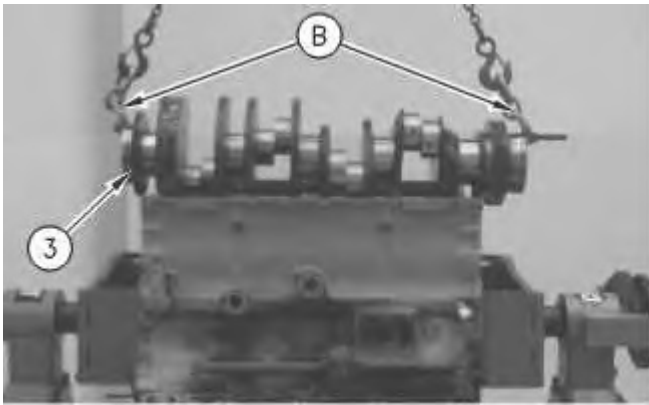


Illustration 3
Typical example

g00720087

4. Install Tools (B) on each end of the crankshaft with a front pulley bolt.
5. Fasten a hoist to crankshaft (3). Remove the crankshaft from the cylinder block.

The 3408E crankshaft weighs 150 kg (325 lb).

The 3412E crankshaft weighs 215 kg (474 lb).

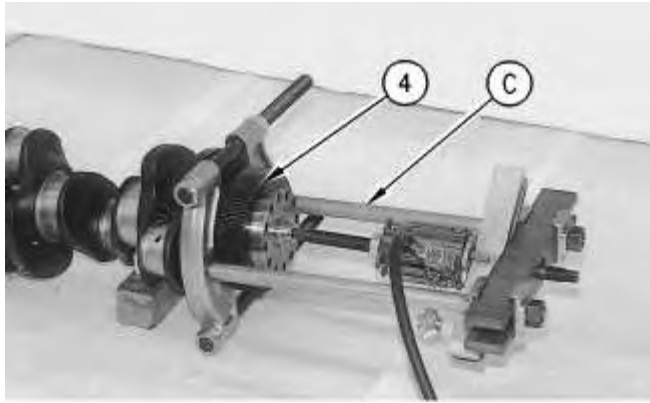


Illustration 4

g00584906

Typical example

6. Use Tool (C) to remove crankshaft gear (4). Use Tool (D) to remove the dowel that is under gear (4) if a replacement is necessary.



Illustration 5

g00584908

Typical example

7. Remove pin (5) from the crankshaft with Tool (D) if the pin is worn or damaged.

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i07509804

Crankshaft - Install

SMCS - 1202-012

Installation Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	138-7573	Link Bracket	2

NOTICE

Keep all parts clean from contaminants.

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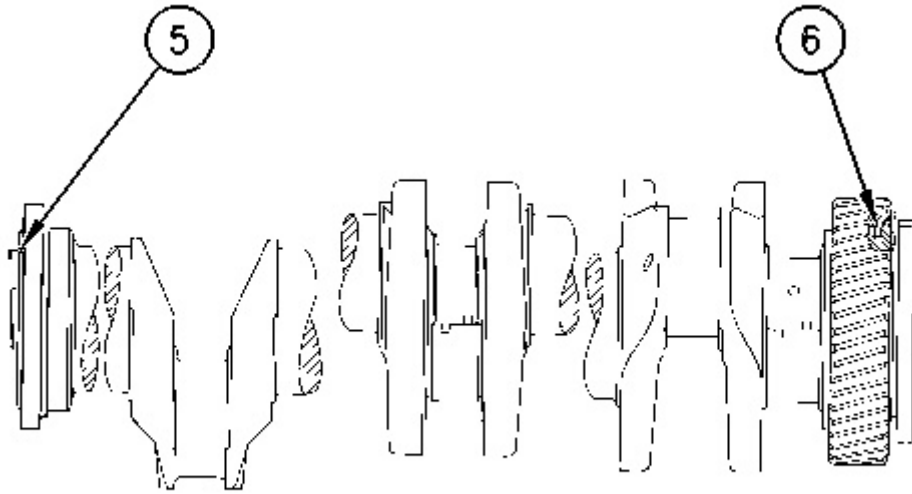


Illustration 1

g00585091

Typical example

1. Install pin (5) in the crankshaft.

Maximum protrusion of pin (5) from the crankshaft face ... 8.4 mm (0.33 inch)

2. Install dowel (6) in the crankshaft.

Protrusion of dowel (6) from the crankshaft face ... 4.1 ± 0.5 mm (0.16 ± 0.02 inch)



Illustration 2

g00585099

Typical example

3. Heat crankshaft gear (4) to a maximum temperature of 205 °C (400 °F). Install gear (4) on the crankshaft with the keyway in alignment with dowel (2). The timing mark "V" should face away from the crankshaft.

Note: Press crankshaft gear (4) until the gear is seated against the lip.

4. Clean the cylinder block and the main bearing caps thoroughly.

Note: Install the main bearings dry when clearance checks are made. Put clean engine oil on the main bearings for final assembly.

5. Install the upper halves of the main bearings in the cylinder block.

Note: Ensure that the main bearings are installed so that the bearing tabs fit into the notch in the cylinder block. The upper halves of the main bearings have the oil groove and the oil hole.

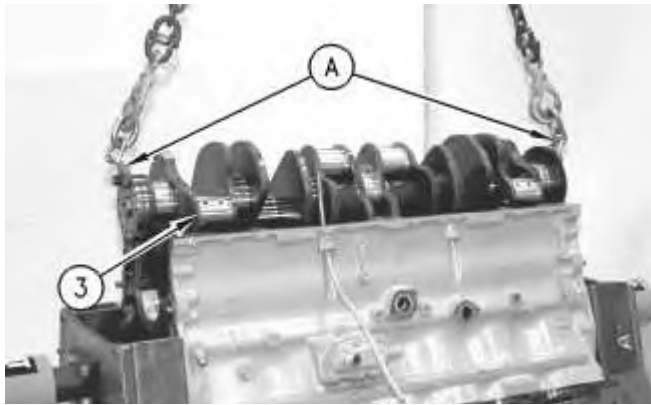


Illustration 3

g00585103

Typical example

6. Install Tools (A) on each end of the crankshaft with a front pulley bolt. Fasten a hoist to crankshaft (3).



Illustration 4

g00584893

Typical example

7. Install crankshaft (3) with the "V" mark on crankshaft gear (1) in alignment with the "V" mark on idler gear (2).

End By:

- a. Install the connecting rod bearings. Refer to Disassembly and Assembly, "Connecting Rod Bearings - Install".

- b. Install the crankshaft main bearings. Refer to Disassembly and Assembly, "Crankshaft Main Bearings - Install".
 - c. Install the rear gear group. Refer to Disassembly and Assembly, "Gear Group (Rear) - Install".
 - d. Install the front housing. Refer to Disassembly and Assembly, "Housing (Front) - Install".
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i05977048

Bearing Clearance - Check

SMCS - 1203-535; 1219-535

Measurement Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	198-9142	Plastic Gauge (Green) 0.025 to 0.076 mm (0.001 to 0.003 inch)	1
	198-9143	Plastic Gauge (Red) 0.051 to 0.152 mm (0.002 to 0.006 inch)	1
	198-9144	Plastic Gauge (Blue) 0.102 to 0.229 mm (0.004 to 0.009 inch)	1
	198-9145	Plastic Gauge (Yellow) 0.230 to 0.510 mm (0.009 to 0.020 inch)	1

Note: Plastic gauge may not be necessary when the engine is in the chassis.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: Cat does not recommend the checking of the actual bearing clearances particularly on small engines. This is because of the possibility of obtaining inaccurate results and the possibility of damaging the bearing or the journal surfaces. Each Cat engine bearing is quality checked for specific wall thickness.

Note: The measurements should be within specifications and the correct bearings should be used. If the crankshaft journals and the bores for the block and the rods were measured during disassembly, no further checks are necessary. However, if the technician still wants to measure the bearing clearances, Tooling (A) is an acceptable method. Tooling (A) is less accurate on journals with small diameters if clearances are less than 0.10 mm (0.004 inch).

NOTICE

Lead wire, shim stock or a dial bore gauge can damage the bearing surfaces.

The technician must be very careful to use Tooling (A) correctly. The following points must be remembered:

- Ensure that the backs of the bearings and the bores are clean and dry.
- Ensure that the bearing locking tabs are properly seated in the tab grooves.
- The crankshaft must be free of oil at the contact points of Tooling (A).

1. Put a piece of Tooling (A) on the crown of the bearing that is in the cap.

Note: Do not allow Tooling (A) to extend over the edge of the bearing.

2. Use the correct torque-turn specifications in order to install the bearing cap. Do not use an impact wrench. Be careful not to dislodge the bearing when the cap is installed.

Note: Do not turn the crankshaft when Tooling (A) is installed.

3. Carefully remove the cap, but do not remove Tooling (A). Measure the width of Tooling (A) while Tooling (A) is in the bearing cap or on the crankshaft journal. Refer to Illustration 1.

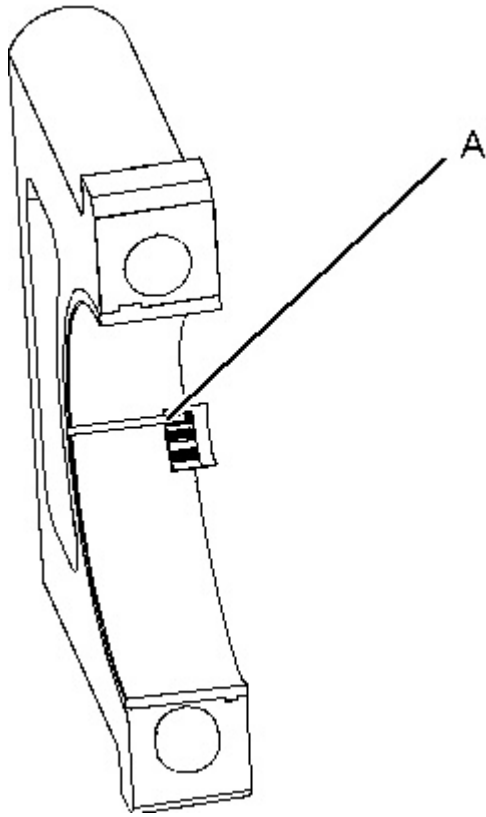


Illustration 1
Typical Example

g01152855

4. Remove all of Tooling (A) before you install the bearing cap.

Note: When Tooling (A) is used, the readings can sometimes be unclear. For example, all parts of Tooling (A) are not the same width. Measure the major width in order to ensure that the parts are within the specification range. Refer to Specifications Manual, "Connecting Rod Bearing Journal" and Specifications Manual, "Main Bearing Journal" for the correct clearances.

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i01055901

Atmospheric Pressure Sensor - Remove and Install

SMCS - 1923-010

Removal Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

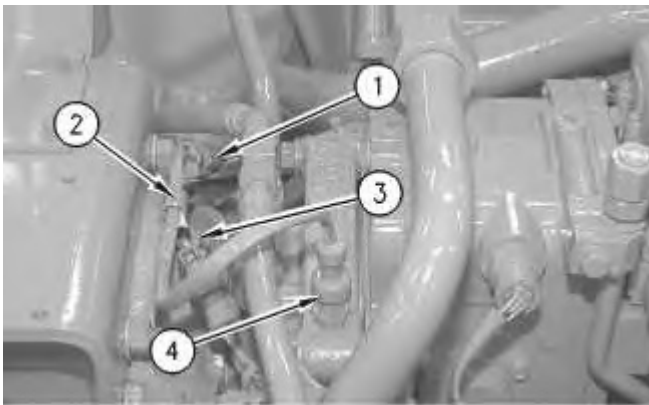


Illustration 1

g00548090

1. Disconnect atmospheric pressure sensor connector (1).
2. Remove nut (3) and the washer.
3. Remove clamp (2).

4. Remove atmospheric pressure sensor (4).

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

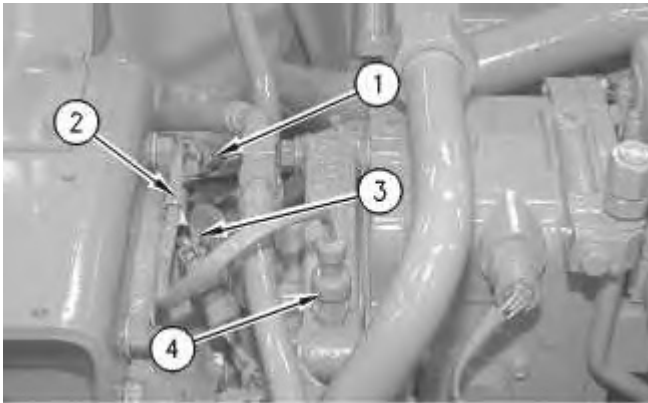


Illustration 2

g00548090

1. Install atmospheric pressure sensor (4).
 2. Install clamp (2).
 3. Install the washer and nut (3).
 4. Connect atmospheric pressure sensor connector (1) to the engine wiring harness.
-

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i01054519

Coolant Temperature Sensor - Remove and Install

SMCS - 1906-010

Removal Procedure

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, "Caterpillar Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

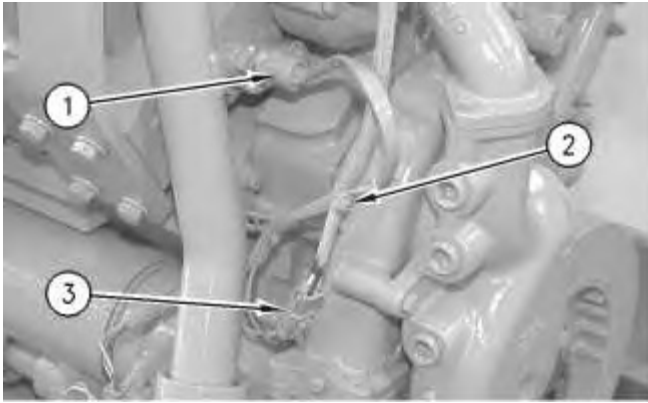


Illustration 1

g00547145

1. Remove wire tie (2).
2. Disconnect coolant temperature sensor connector (3) from the engine wiring harness.
3. Remove coolant temperature sensor (1) from the engine.

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

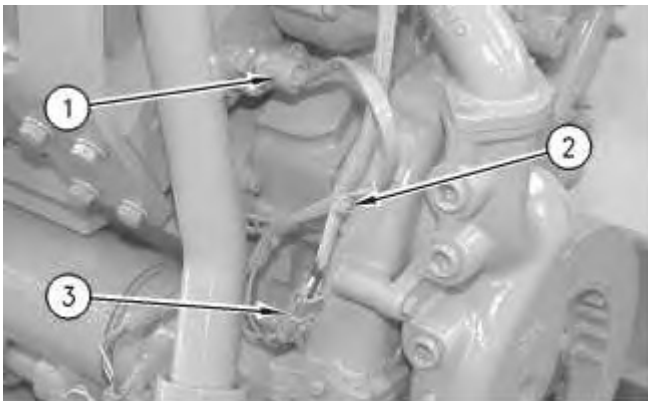


Illustration 2

g00547145

1. Install coolant temperature sensor (1) in the engine.
2. Tighten the coolant temperature sensor to a torque of 20 ± 3 N·m (15 ± 2 lb ft).
3. Connect coolant temperature sensor connector (3) to the engine wiring harness.

4. Use a wire tie (2) to secure the wiring from the coolant temperature sensor.

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i01054575

Engine Oil Pressure Sensor - Remove and Install

SMCS - 1924-010

Removal Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

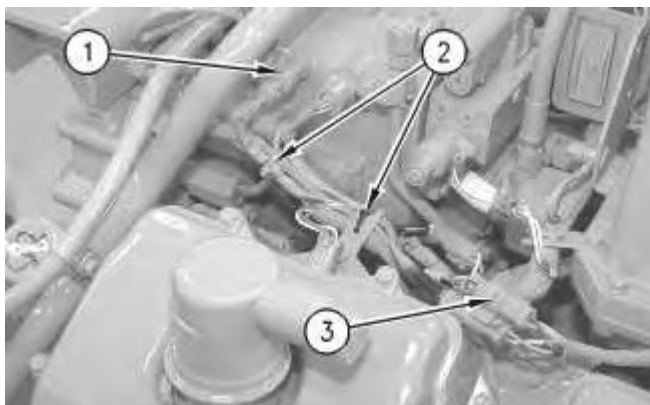


Illustration 1

g00547194

1. Disconnect engine oil pressure sensor connector (3) from the engine wiring harness.
2. Remove two wire ties (2).
3. Remove engine oil pressure sensor (1) from the unit injector hydraulic pump.

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

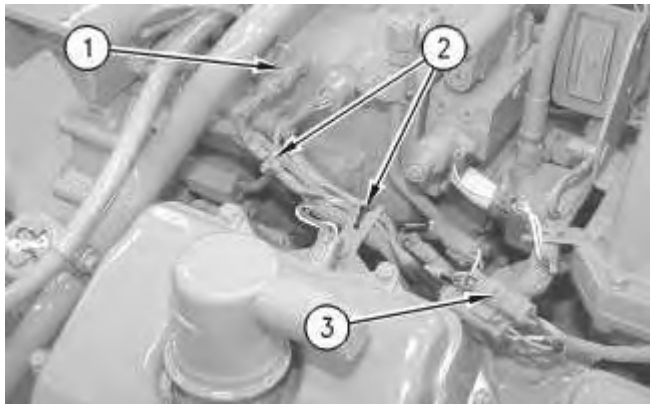


Illustration 2

g00547194

1. Lightly lubricate the seal for engine oil pressure sensor (1) with clean engine oil. Install the engine oil pressure sensor in the unit injector hydraulic pump.
 2. Tighten the engine oil pressure sensor to a torque of 10 ± 2 N·m (90 ± 18 lb in).
 3. Connect engine oil pressure sensor connector (3) to the engine wiring harness.
 4. Install two wire ties (2) in order to secure the wiring.
-

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i01055863

Engine Oil Temperature Sensor - Remove and Install

SMCS - 1929-010

Removal Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

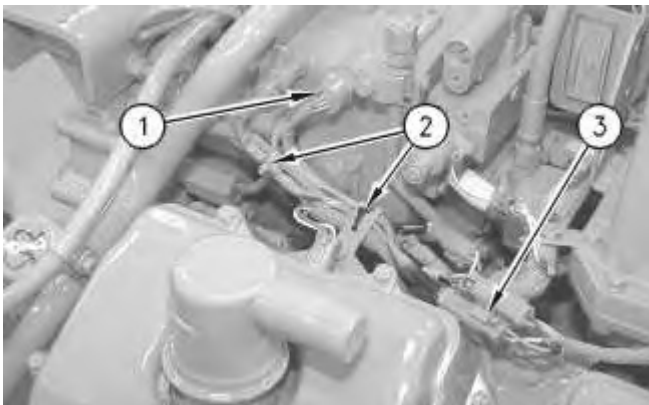


Illustration 1

g00548023

1. Disconnect engine oil temperature sensor connector (3) from the engine wiring harness.
2. Remove two wire ties (2).
3. Remove engine oil temperature sensor (1).

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

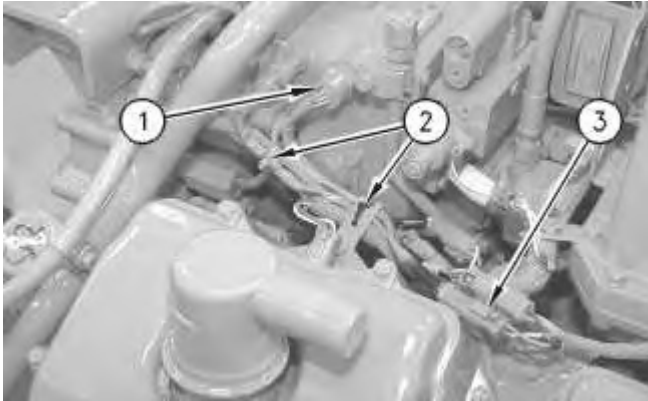


Illustration 2

g00548023

1. Install engine oil temperature sensor (1) in the unit injector hydraulic pump.
 2. Tighten the engine oil temperature sensor to a torque of 20 ± 3 N·m (15 ± 2 lb ft).
 3. Connect engine oil temperature sensor connector (3) to the engine wiring harness.
 4. Install two wire ties (2) in order to secure the wiring.
-

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i01055542

Fuel Temperature Sensor - Remove and Install

SMCS - 1922-010

Removal Procedure

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, "Caterpillar Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

NOTICE

Do not allow dirt to enter the fuel system. Thoroughly clean the area around a fuel system component that will be disconnected. Fit a suitable cover over disconnected fuel system component.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

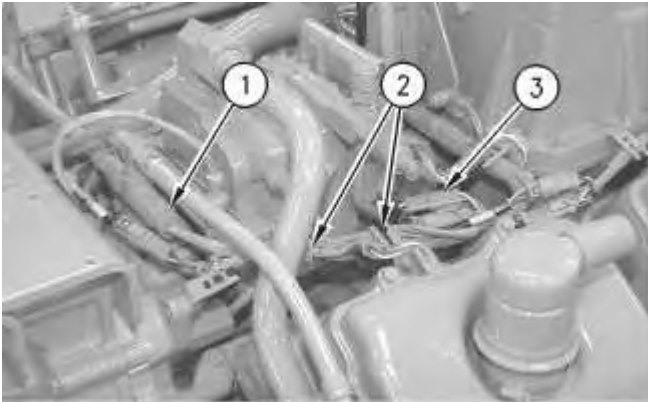


Illustration 1

g00547935

1. Disconnect fuel temperature sensor connector (3) from the engine wiring harness.
2. Remove two wire ties (2).
3. Remove fuel temperature sensor (1).

Installation Procedure

NOTICE

Do not allow dirt to enter the fuel system. Thoroughly clean the area around a fuel system component that will be disconnected. Fit a suitable cover over disconnected fuel system component.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

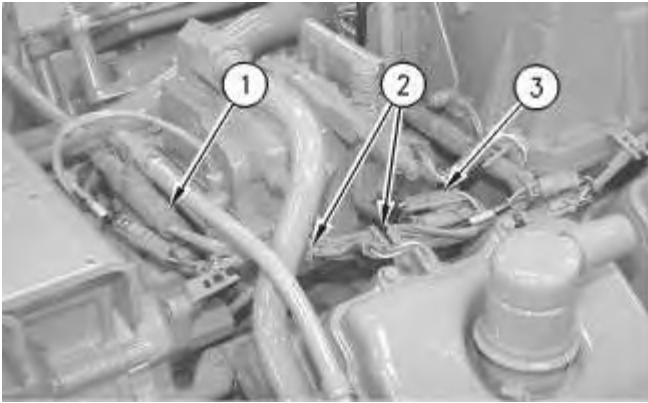


Illustration 2

g00547935

1. Install fuel temperature sensor (1).
 2. Tighten the fuel temperature sensor to a torque of 20 ± 3 N·m (15 ± 2 lb ft).
 3. Connect the fuel temperature sensor connector (3) to the engine wiring harness.
 4. Install two wire ties (2) in order to secure the wiring.
-

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i01044641

Injection Actuation Pressure Sensor - Remove and Install

SMCS - 1925-010

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.

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Dispose of all fluids according to local regulations and mandates.

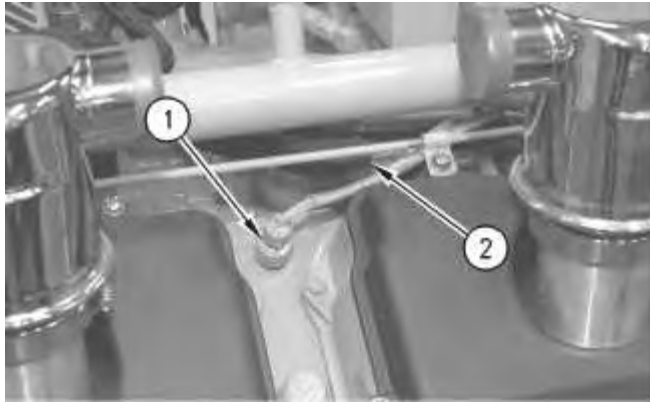


Illustration 1

g00555809

1. Disconnect wiring harness connector (2).
2. Remove injection actuation pressure sensor (1).

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

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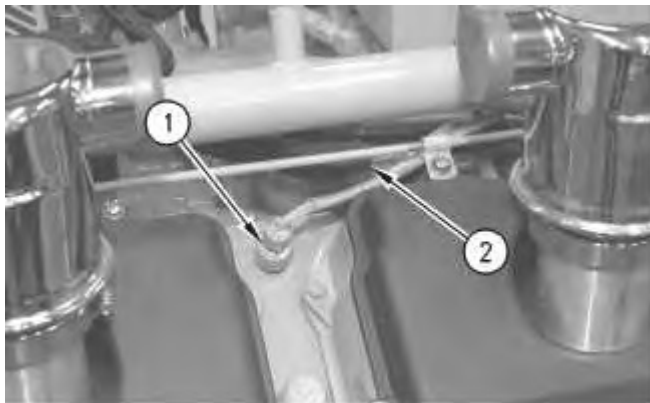


Illustration 2

g00555809

1. Install injection actuation pressure sensor (1).
 2. Connect wiring harness connector (2).
-

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