



Service Repair Manual

Models

312E L Excavator

Previous Screen

Product: EXCAVATOR

Model: 312E L EXCAVATOR MJD

Configuration: 312E L Excavator MJD00001-UP (MACHINE) POWERED BY C4.4 Engine

Disassembly and Assembly
C4.4 Engines for Caterpillar Built Machines

Media Number -UENR0602-11

Publication Date -01/08/2013

Date Updated -25/10/2017

i05000621

Engine Oil Pan - Remove and Install - Cast Iron Oil Pan

SMCS - 1302-010

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	-	Strap Wrench	1

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.

Dispose of all fluids according to local regulations and mandates.

1. In order to remove a cast iron oil pan, the engine must be removed from the machine. The engine should be mounted in a suitable stand and placed in the inverted position.
-

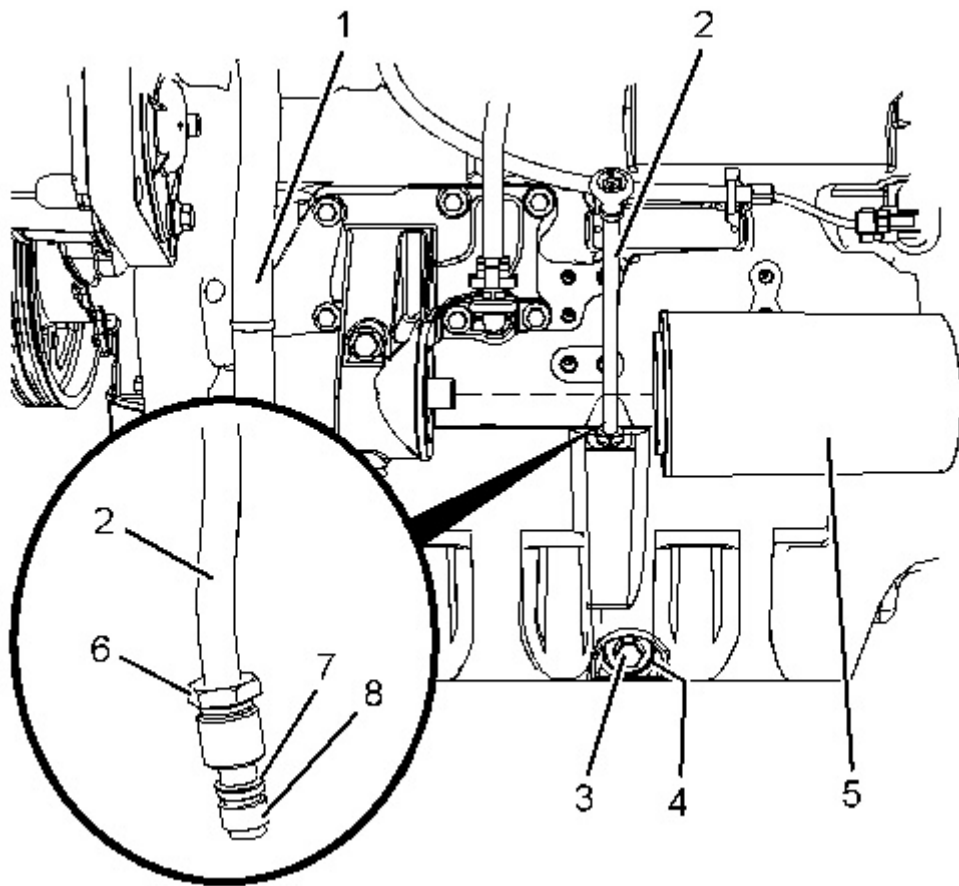


Illustration 1

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2. Use Tooling (A) in order to remove engine oil filter (5). Remove plug (3) and drain the engine lubricating oil. Remove O-ring seal (4) (not shown) from plug (3). Refer to Operation and Maintenance Manual, "Engine Oil and Filter - Change" for correct procedure.
 3. Remove breather hose (1) from the clip. Position the breather hose away from the engine oil pan.
 4. Loosen nut (6) and remove tube assembly (2). Remove O-ring seal (7) and seal (8) from the tube assembly.
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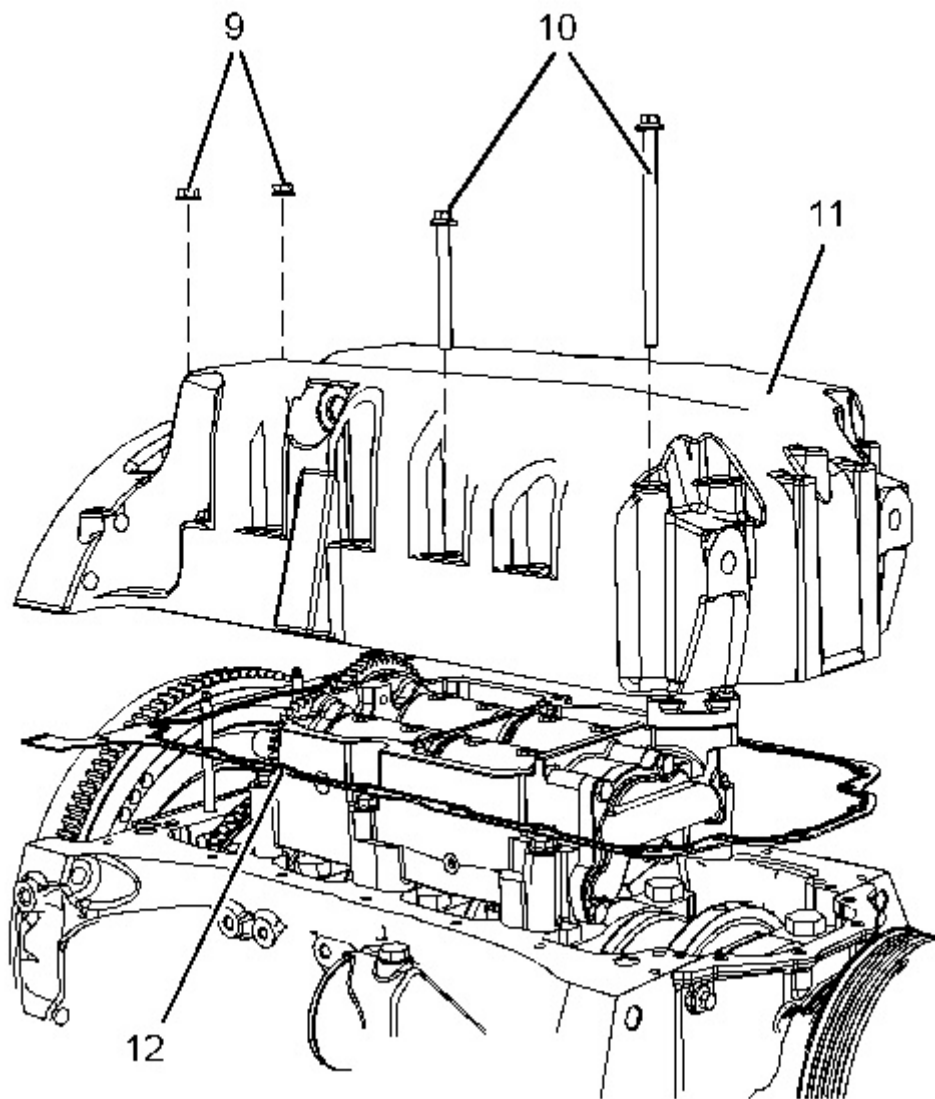


Illustration 2

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5. Remove nuts (9) and bolts (10) from engine oil pan (11).

Note: The bolts are different lengths. Note the position of the different bolts.

6. Attach a suitable lifting device to engine oil pan (11). Support the weight of the engine oil pan. The engine oil pan weighs approximately 41 kg (90 lb).
7. Use the lifting device to remove engine oil pan (11) from the cylinder block.
8. Remove gasket (12) from the cylinder block.

Installation Procedure

Table 2

Required Tools	

Tool	Part Number	Part Description	Qty
A	-	Loctite 5900	-
B	-	Loctite 243	-
C	-	Straight Edge	1

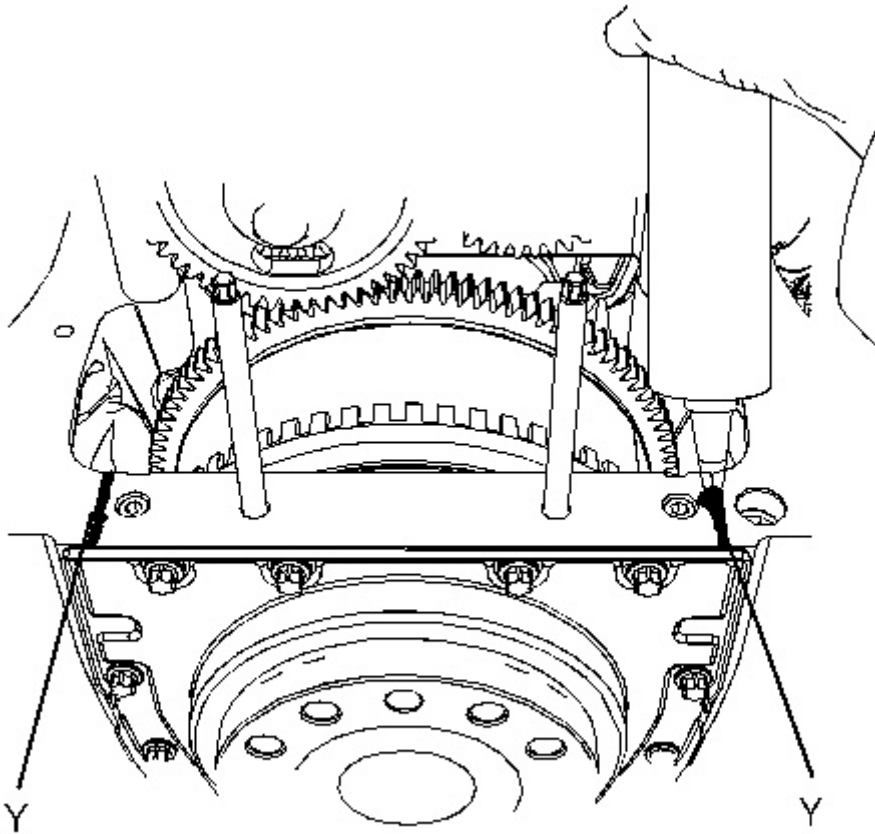
Note: In order to install a cast iron oil pan, the engine must be removed from the machine.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Ensure that the face of the cylinder block is clean and free from damage. Inspect the studs in the cylinder block for damage. If necessary, replace the studs.
2. Ensure that the engine oil pan is clean and free from damage.



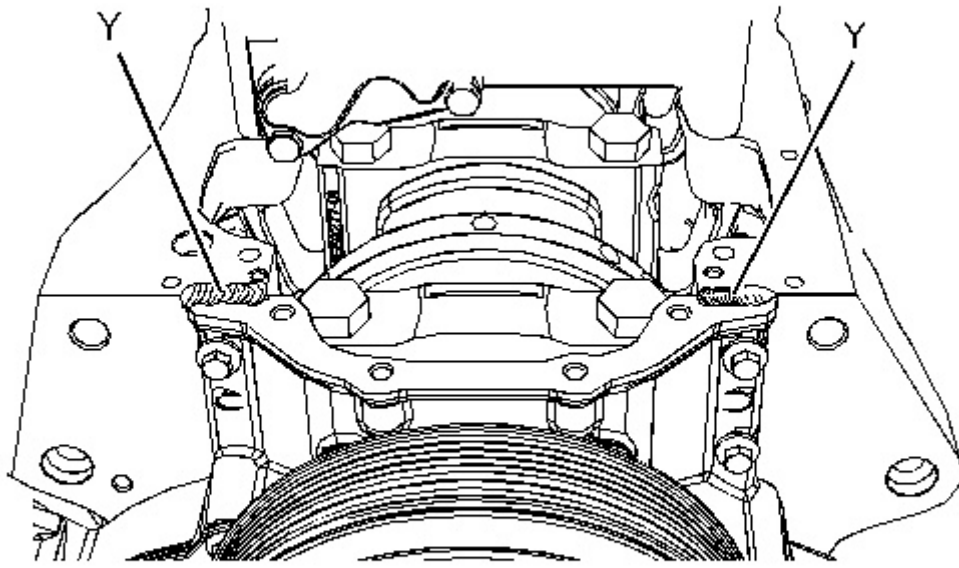


Illustration 4

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3. Apply a bead of Tooling (A) to Positions (Y) on the cylinder block.

Note: If the bridge piece for the cylinder block has just been installed, the engine oil pan must be installed before Tooling (A) has cured.

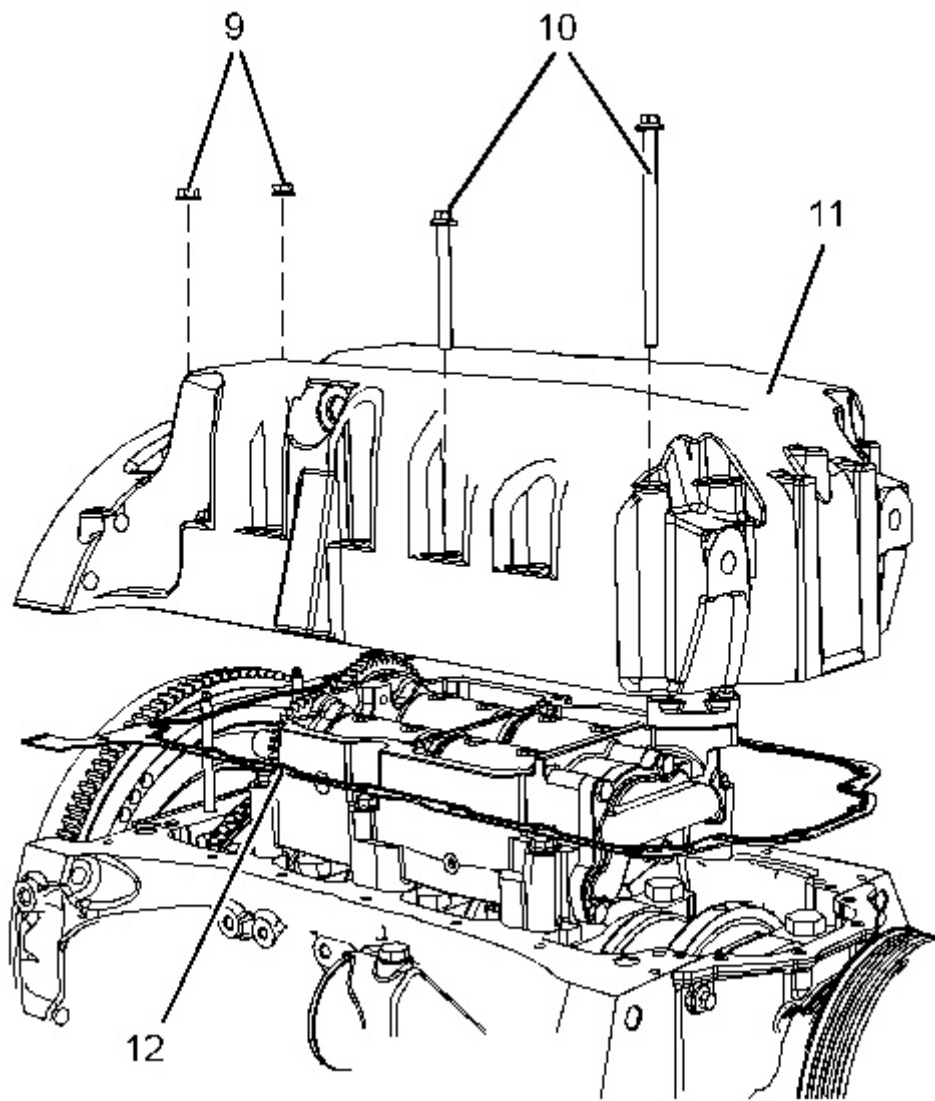


Illustration 5

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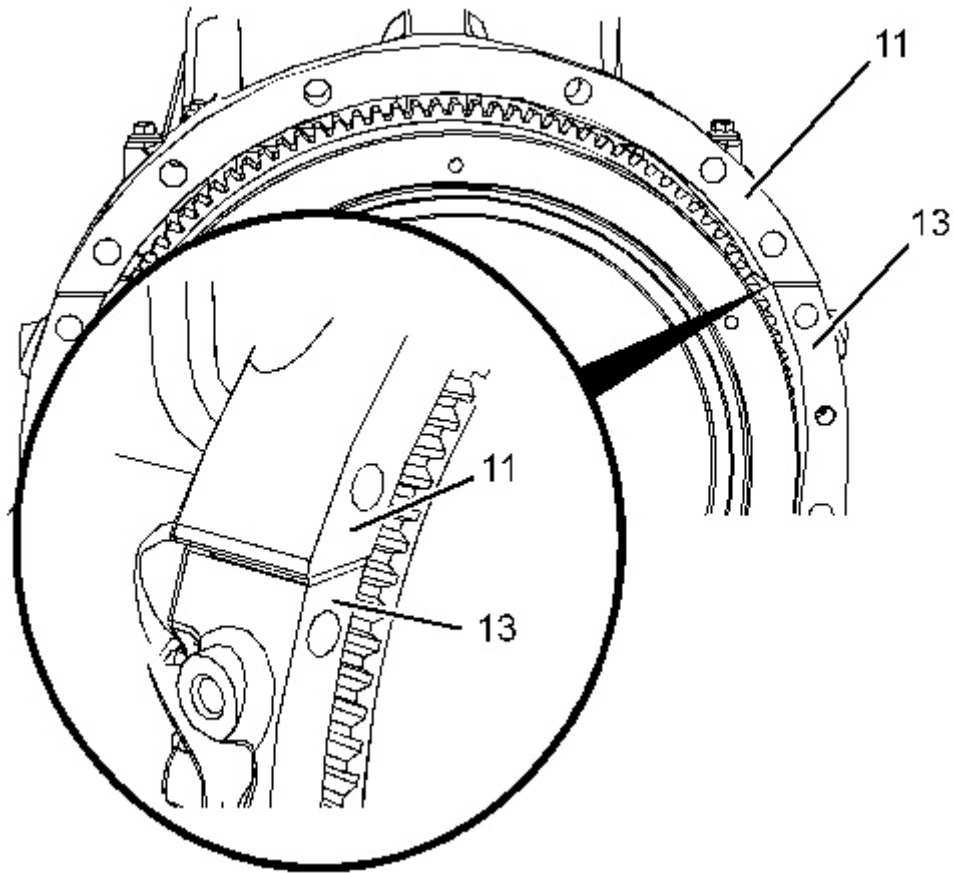


Illustration 6

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4. Align a new gasket (12) with the studs in the cylinder block. Install the gasket to the cylinder block.
 5. Attach a suitable lifting device to engine oil pan (11). The engine oil pan weighs approximately 41 kg (90 lb).
 6. Use the lifting device to align engine oil pan (11) with the studs in the cylinder block. Install the engine oil pan to the cylinder block. Remove the lifting device from the engine oil pan.
 7. Install nuts (9) and bolts (10) finger tight.
 8. Align the rear face of engine oil pan (11) to the rear face of cylinder block (13) on both sides. Use Tooling (C) and a feeler gauge in order to check the alignment between the engine oil pan and the cylinder block. The maximum step that is allowed between the cylinder block and the sump is 0.1 mm (0.004 inch).
 9. Tighten bolts (9) and nuts (10) to a torque of 22 N·m (16 lb ft). Refer to Specifications, "Engine Oil Pan" for the correct tightening sequence.
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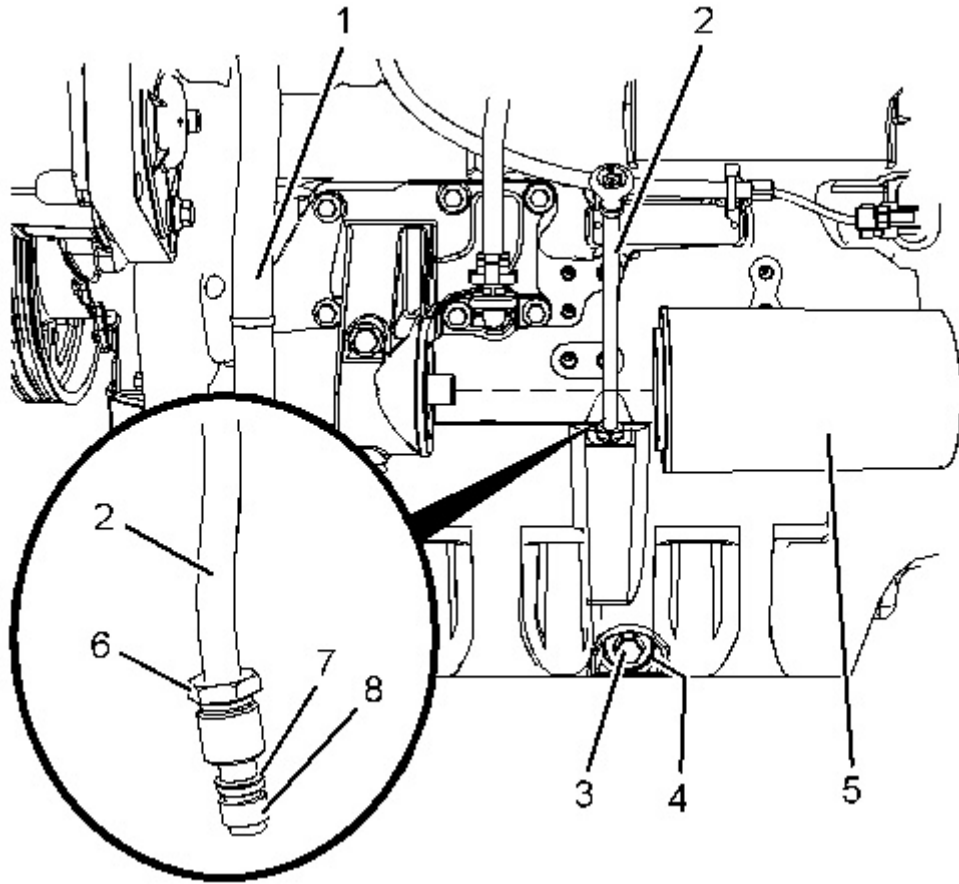


Illustration 7

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10. If necessary, install a new O-ring seal (4) (not shown) to drain plug (5). Install drain plug (3) to the engine oil pan. Tighten the drain plug to a torque of 34 N·m (25 lb ft).
11. Follow Step 11.a through Step 11.c in order to install the assembly of the dipstick tube.
 - a. Install a new O-ring seal (7) and a new seal (8) to tube assembly (2).
 - b. Apply Tooling (B) to the nut of dipstick tube (2). Install the tube assembly to the engine oil pan.

Note: Ensure the correct orientation of the tube assembly.

 - c. Tighten the nut to a torque of 18 N·m (13 lb ft). Install the dipstick .
12. Install breather hose (1) to the clip.
13. Install a new oil filter (5). After the engine has been installed, ensure that the engine oil pan is filled with lubricating oil to the correct level. Refer to Operation and Maintenance Manual, "Engine Oil and Filter - Change" for correct procedure.

[Previous Screen](#)

Product: EXCAVATOR

Model: 312E L EXCAVATOR MJD

Configuration: 312E L Excavator MJD00001-UP (MACHINE) POWERED BY C4.4 Engine

Disassembly and Assembly

C4.4 Engines for Caterpillar Built Machines

Media Number -UENR0602-11

Publication Date -01/08/2013

Date Updated -25/10/2017

i04165879

Balancer - Remove

SMCS - 1220-011

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A ⁽¹⁾	9U-6198	Crankshaft Turning Tool	1
A ⁽²⁾	5P-7306	Shaft Housing	1
	5P-7305	Engine Turning Tool	1
B	136-4632	Timing Pin (Crankshaft)	1
	268-1966	Adapter	1
C	231-8849	Timing Pin (Balancer)	1

⁽¹⁾ The Crankshaft Turning Tool is used on the front pulley.

⁽²⁾ This Tool is used in the aperture for the electric starting motor.

Start By:

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

Note: Either Tooling (A) can be used. Use the Tooling that is most suitable.

Note: In order to remove the balancer, the engine must be removed from the machine. The engine should be mounted in a suitable stand and placed in the inverted position.

NOTICE

Keep all parts clean from contaminants.

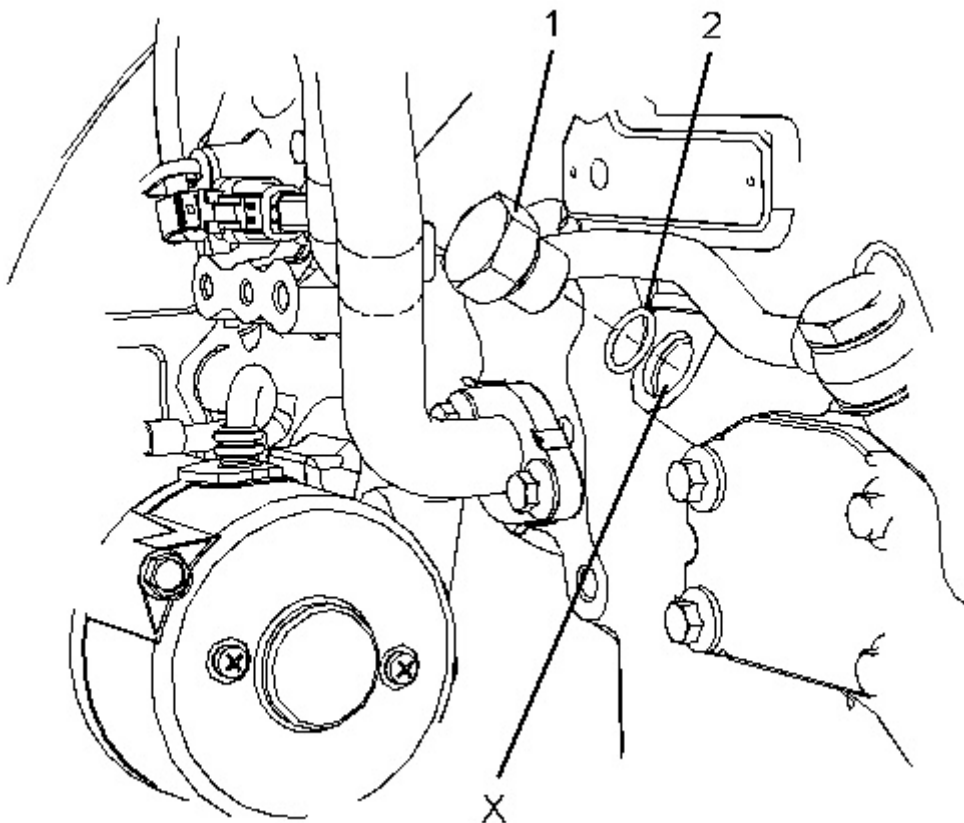
Contaminants may cause rapid wear and shortened component life.

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.

Dispose of all fluids according to local regulations and mandates.

1. Use Tooling (A) in order to rotate the crankshaft so that number one piston is at the top center position on the compression stroke. Refer to Systems Operation, Testing and Adjusting, "Fuel Injection Timing - Check".
-



2. Remove plug (1) from the cylinder block. Remove O-ring seal (2) from the plug.
 3. Install Tooling (B) through Hole (X) in the cylinder block. Use Tooling (B) in order to lock the crankshaft in the correct position.
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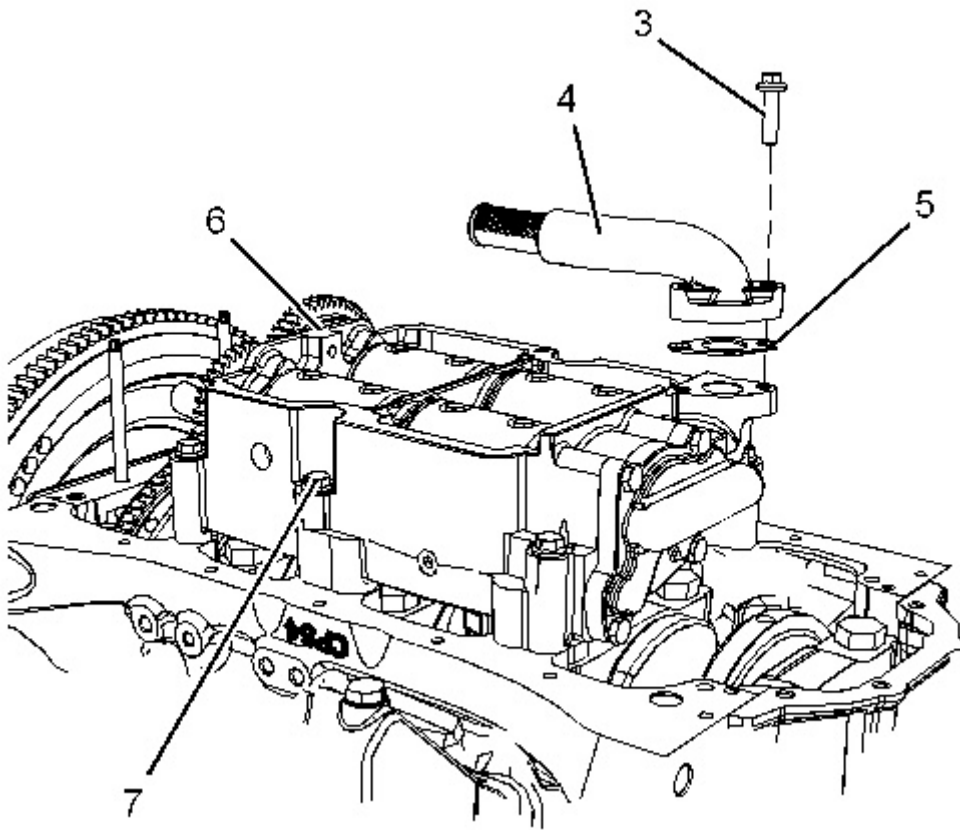


Illustration 2

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4. Remove bolts (3) from suction pipe (4).
 5. Remove suction pipe (4) from balancer (6).
 6. Remove gasket (5).
 7. Remove bolts (7) from balancer (6).
-

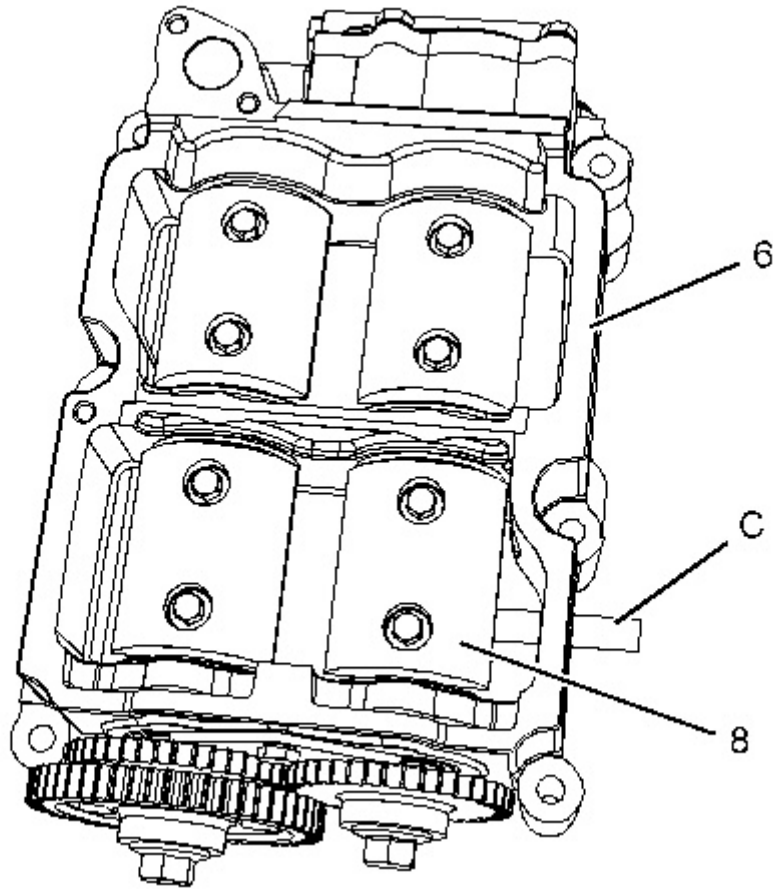


Illustration 3

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8. Install Tooling (C) into balancer (6). Ensure that Tooling (C) is engaged into the hole in drive shaft (8).
 9. Attach a suitable lifting device to balancer (6). Support the weight of the balancer. The balancer weighs approximately 23 kg (51 lb).
 10. Use the lifting device to remove balancer (6) from the cylinder block.
-

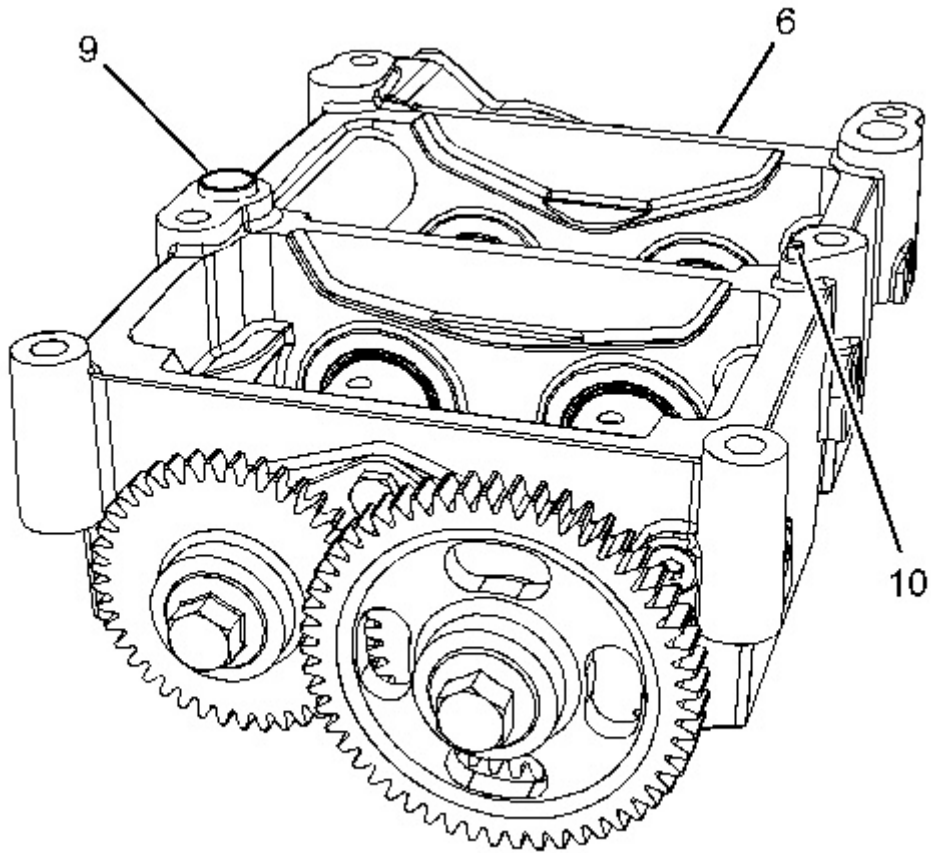


Illustration 4

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11. Do not remove dowel (9) and dowel (10) from the balancer (6) unless the dowels are damaged.

Note: The balancer unit is not a serviceable item. The engine oil pump and the engine oil relief valve are the only serviceable parts of the balancer.

[Previous Screen](#)

Product: EXCAVATOR

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Configuration: 312E L Excavator MJD00001-UP (MACHINE) POWERED BY C4.4 Engine

Disassembly and Assembly

C4.4 Engines for Caterpillar Built Machines

Media Number -UENR0602-11

Publication Date -01/08/2013

Date Updated -25/10/2017

i04165880

Balancer - Install

SMCS - 1220-012

Installation Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
B	230-6284	Timing Pin (Crankshaft)	1
	268-1966	Adapter	1
C	231-8849	Timing Pin (Balancer)	1
F	9U-7324	Indicator Bracket	1
	7H-1942	Dial Indicator	1
	3S-3268	Indicator Contact Point	1
	7H-1940	Universal Attachment	1
G	-	Guide Studs M10 by 75mm	2

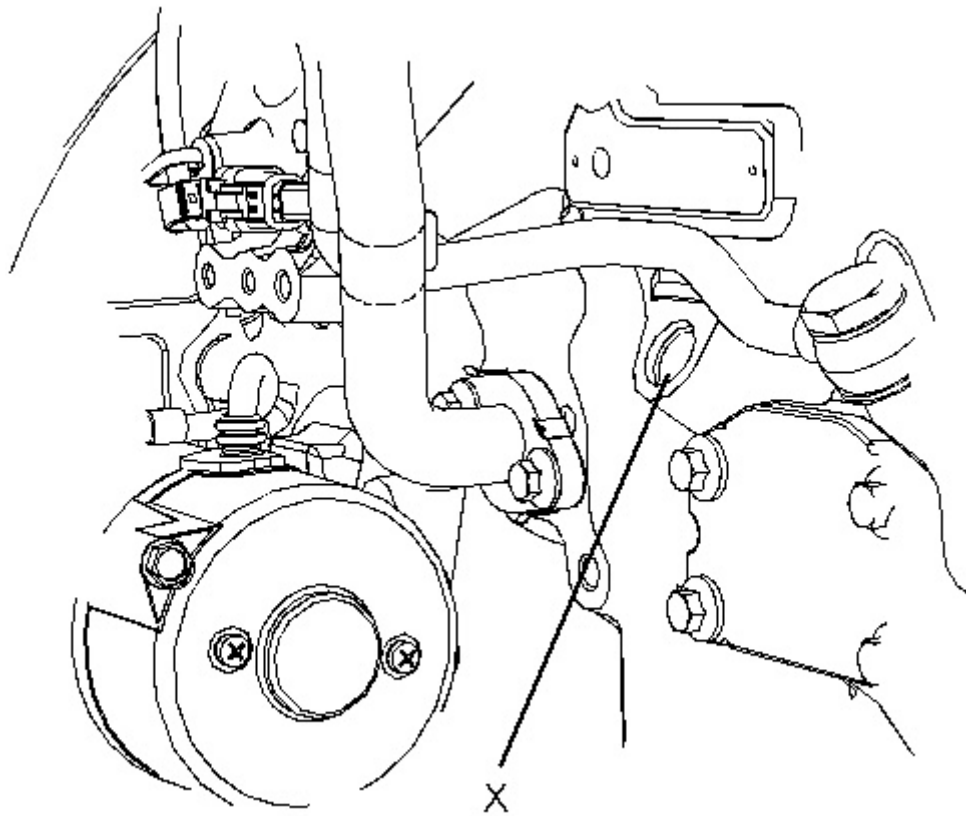


Illustration 1

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1. Ensure that Tooling (B) is installed in Hole (X) in the cylinder block. Use Tooling (B) in order to lock the crankshaft in the correct position.

Note: Do not use excessive force to install Tooling (B). Do not use Tooling (B) to hold the crankshaft during repairs.

2. Ensure that the surfaces of the cylinder block are clean and free from damage.
-

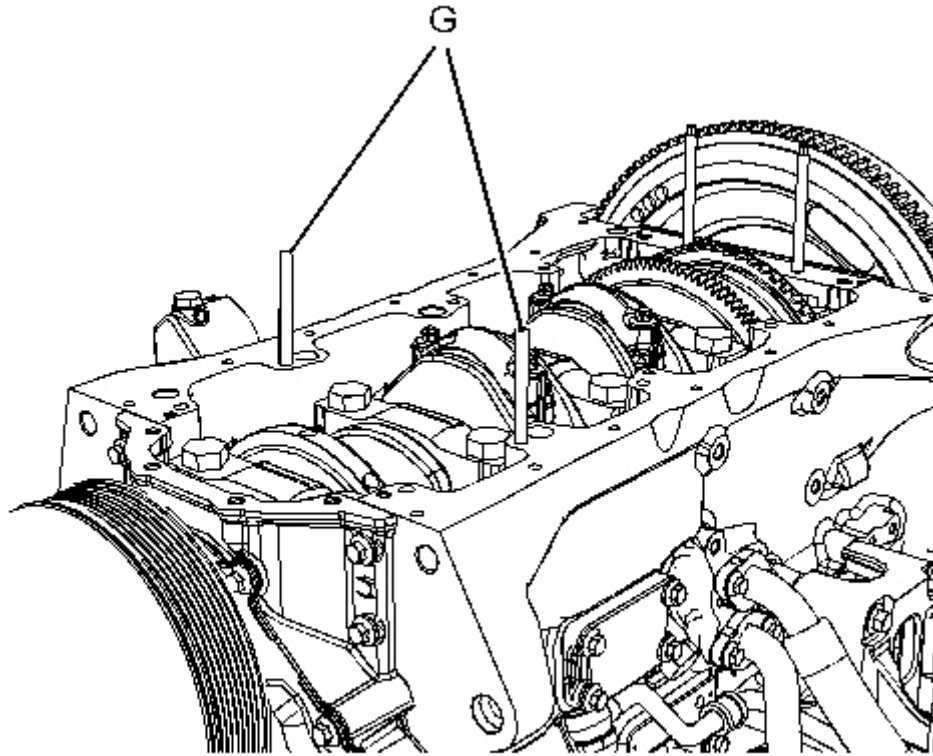


Illustration 2

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3. Install Tooling (G) to the cylinder block.
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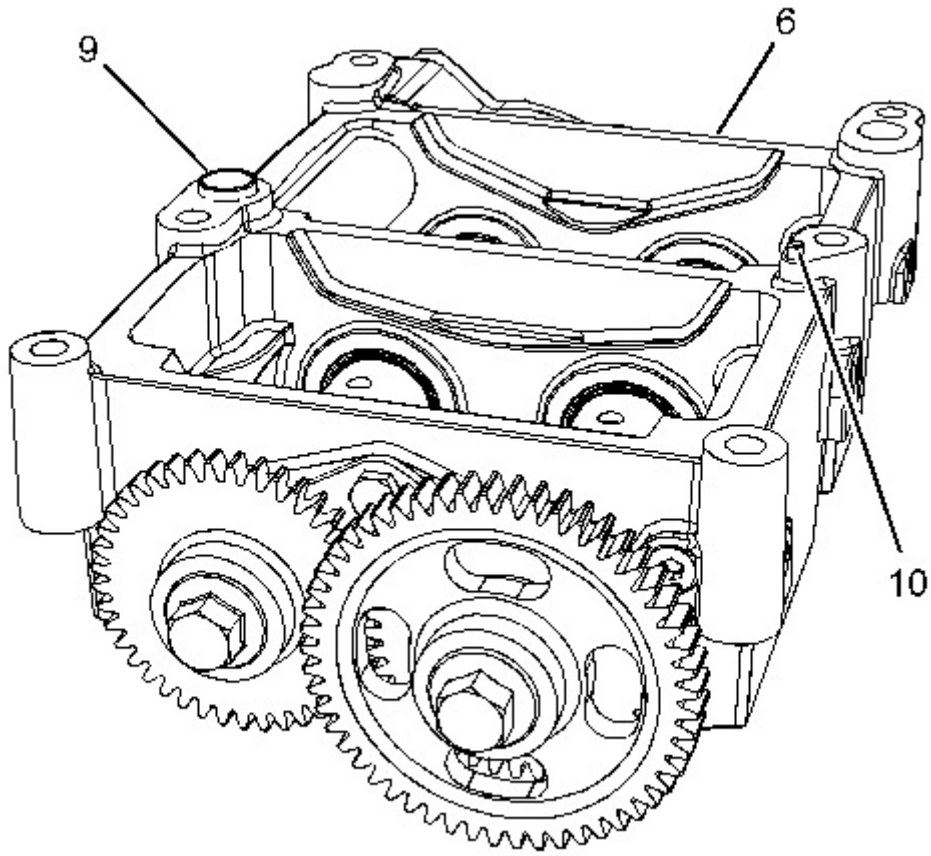


Illustration 3

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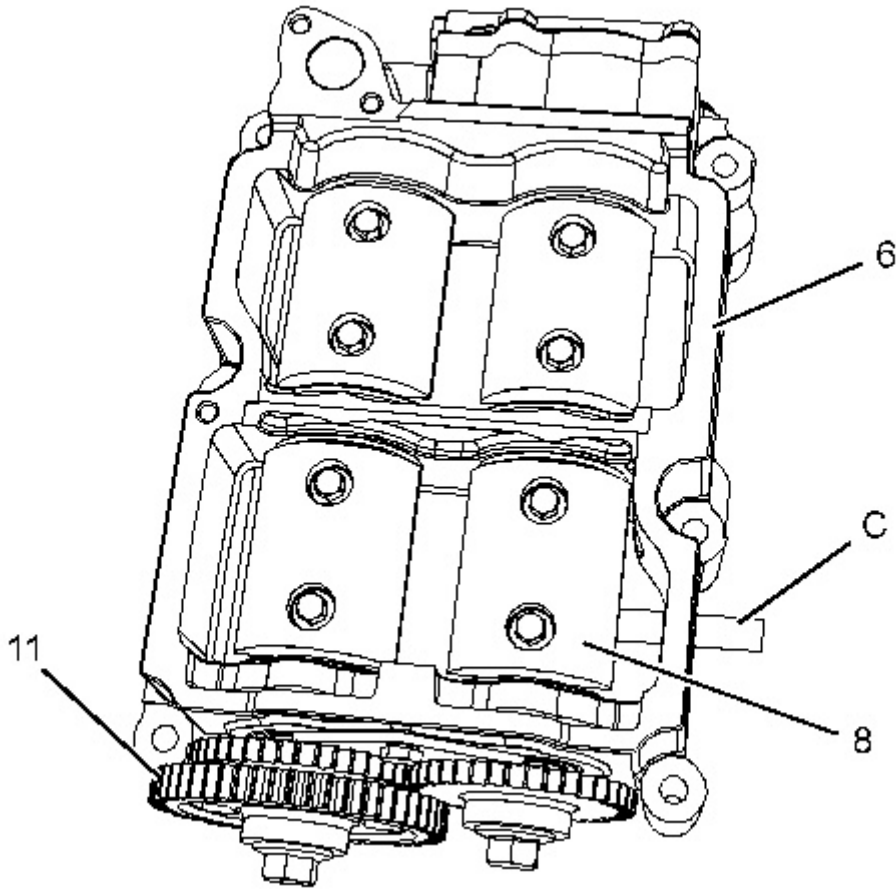


Illustration 4

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4. Ensure that dowel (9) and dowel (10) are seated in the housing of balancer (6).
 5. Install Tooling (C) to balancer (6). Ensure that Tooling (C) is correctly engaged into shaft (8).
 6. Attach a suitable lifting device to the balancer. The balancer weighs approximately 23 kg (51 lb).
 7. Use the lifting device to align balancer (6) with Tooling (G). Install the balancer to the cylinder block. Ensure that dowel (9) and dowel (10) are aligned with the holes in the cylinder block. Ensure that gear (11) and the crankshaft gear mesh. Remove the lifting device.
-

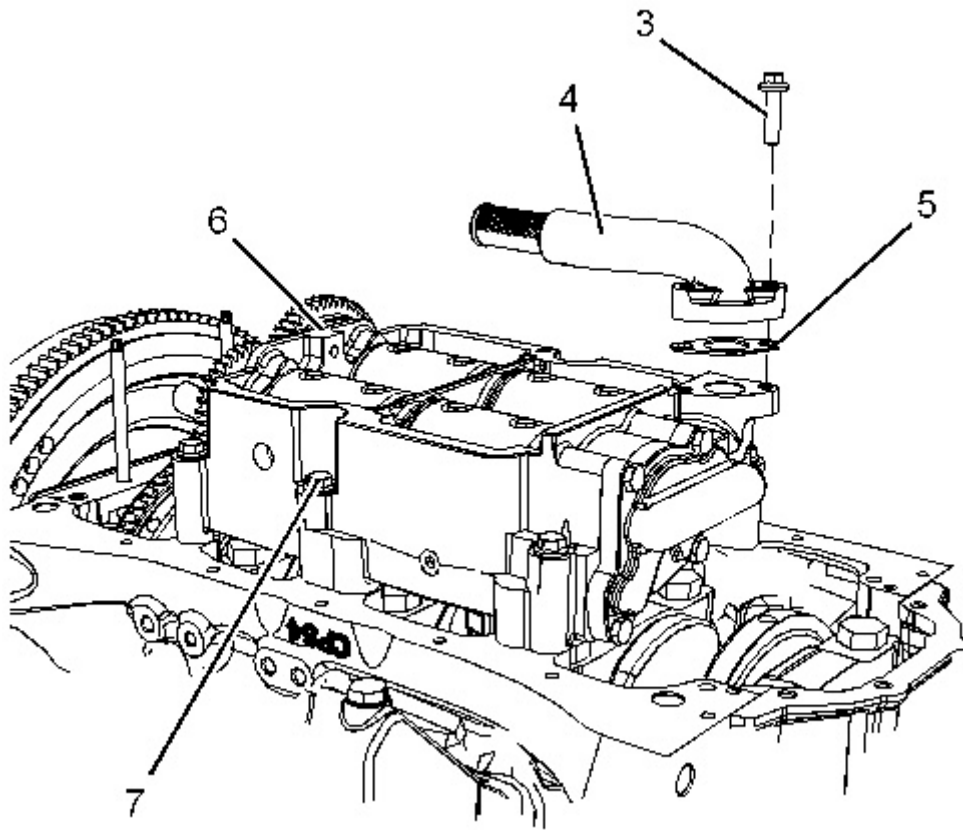


Illustration 5

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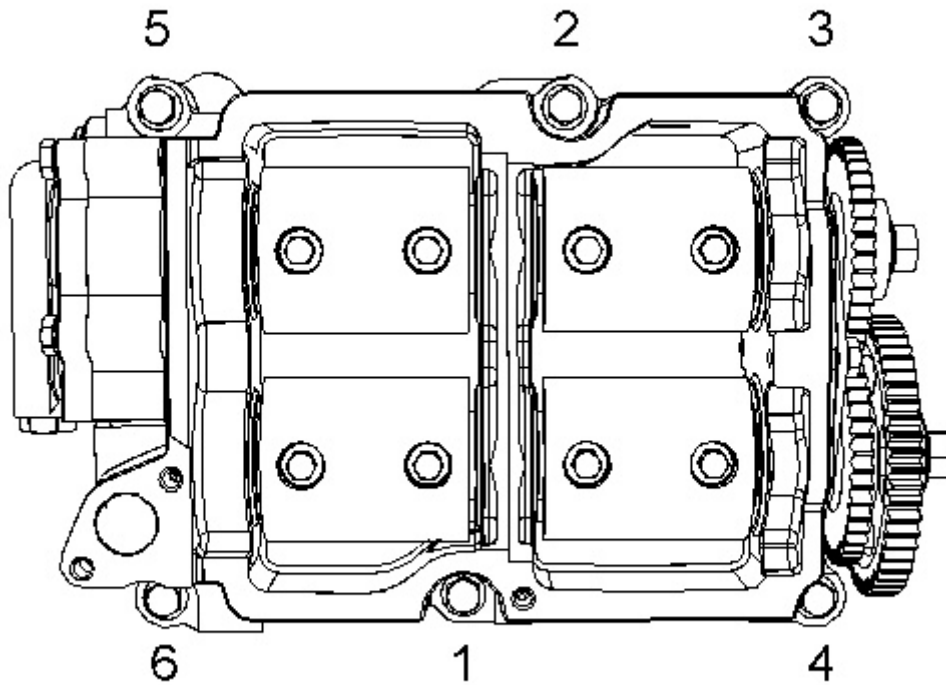


Illustration 6

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8. Install bolts (7) to balancer (6) and hand tighten the bolts.
 9. Remove Tooling (G). Install remaining bolts (7) and hand tighten the bolts.
 10. Tighten the bolts to a torque of 54 N·m (40 lb ft). Tighten the bolts in the sequence that is shown in Illustration 6.
 11. Position a new gasket (5) onto balancer (6).
 12. Position suction pipe (2) onto balancer (6).
Note: Ensure that the suction pipe is correctly orientated.
 13. Install bolts (3) finger tight.
 14. Tighten bolts (3) to a torque to 22 N·m (16 lb ft).
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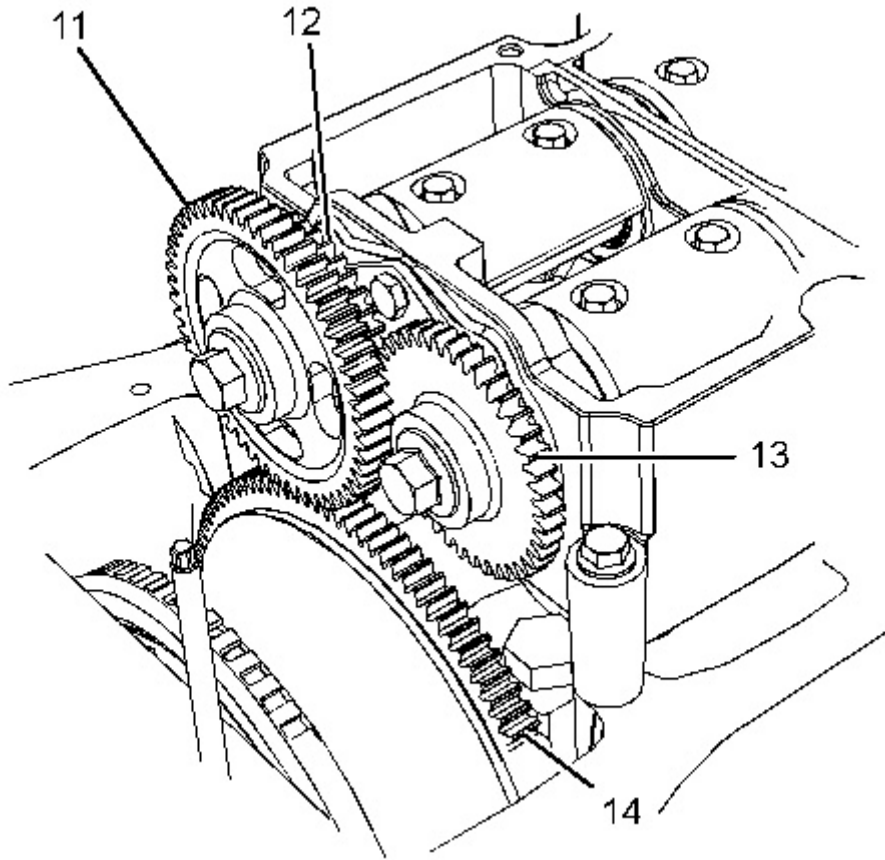


Illustration 7

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15. Use Tooling (F) in order to check the backlash between gear (11) and gear (14). Refer to Specifications, "Balancer Group" for correct information.
 16. Use Tooling (F) in order to check the backlash between gear (12) and gear (13). Refer to Specifications, "Balancer Group" for correct information.
-

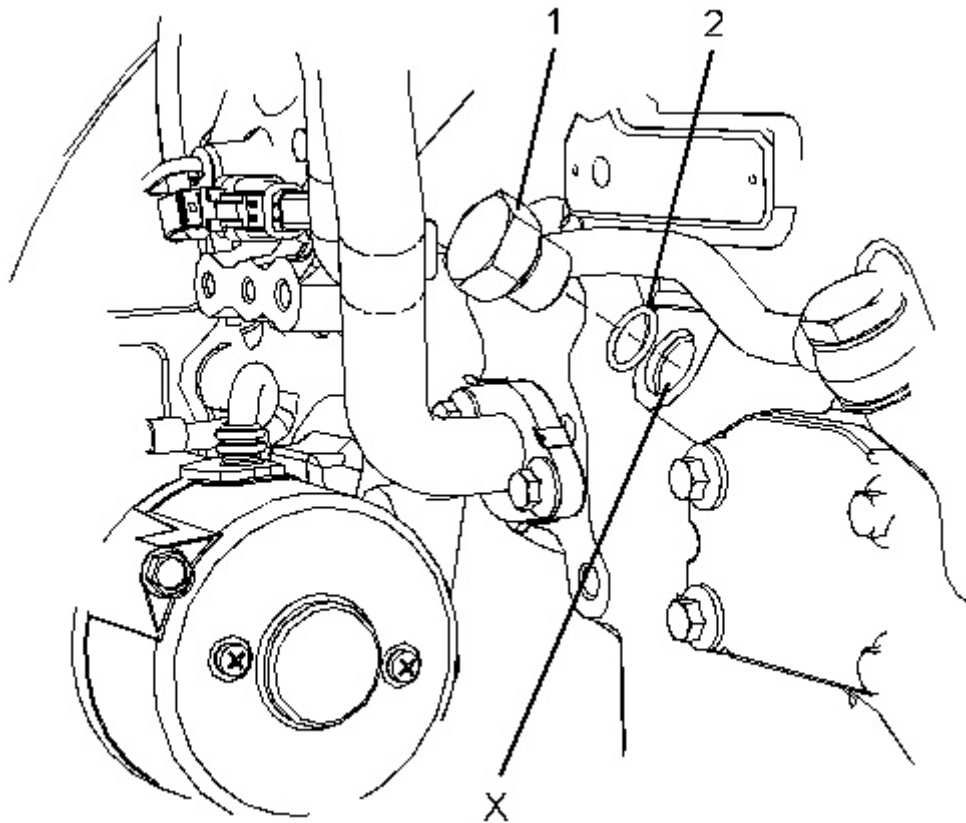


Illustration 8

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17. Remove Tooling (B) from Hole (X) in the cylinder block.
18. Install a new O-ring seal (1) to plug (2). Install the plug to the cylinder block. Tighten the plug to a torque of 21 N·m (186 lb in).

End By:

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

[Previous Screen](#)

Product: EXCAVATOR

Model: 312E L EXCAVATOR MJD

Configuration: 312E L Excavator MJD00001-UP (MACHINE) POWERED BY C4.4 Engine

Disassembly and Assembly C4.4 Engines for Caterpillar Built Machines

Media Number -UENR0602-11

Publication Date -01/08/2013

Date Updated -25/10/2017

i04048718

Piston Cooling Jets - Remove and Install

SMCS - 1331-010

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A ⁽¹⁾	9U-6198	Crankshaft Turning Tool	1
A ⁽²⁾	5p-7306	Housing	1
	5P-7305	Engine Turning Tool	1

⁽¹⁾ The Crankshaft Turning Tool is used on the front pulley.

⁽²⁾ This Tool is used in the aperture for the electric starting motor.

Start By:

- a. If the engine is equipped with a balancer, remove the balancer. Refer to Disassembly and Assembly, "Balancer - Remove" for the correct procedure.
- b. If the engine is not equipped with a balancer, remove the engine oil pump. Refer to Disassembly and Assembly, "Engine Oil Pump - Remove" for the correct procedure.

Note: Either Tooling (A) can be used. Use the Tooling that is most suitable.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.



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1. If the crankshaft is installed, use Tooling (A) to rotate the crankshaft in order to gain access to the piston cooling jet.

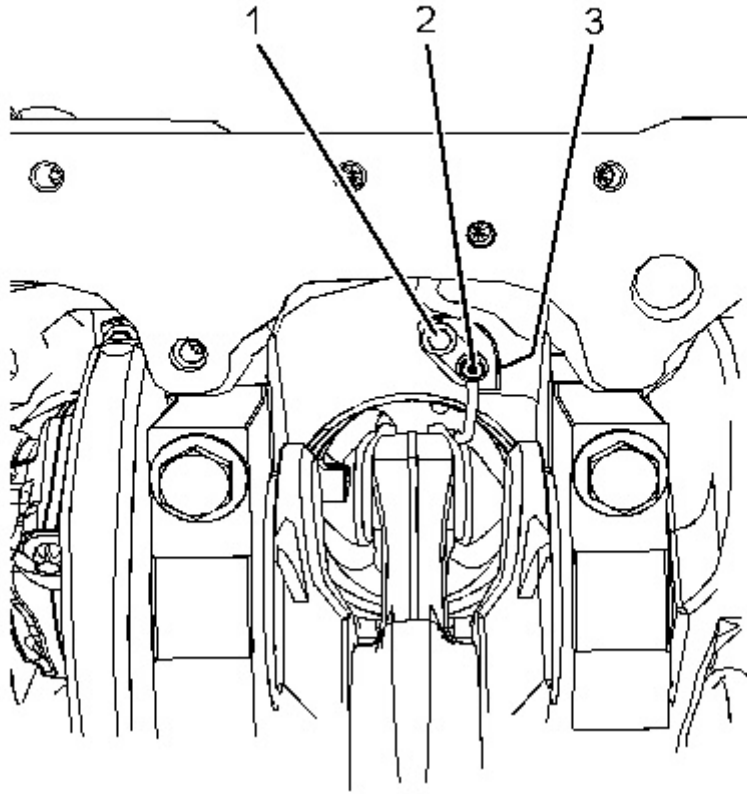


Illustration 1

g02011713

2. Remove bolt (2) and piston cooling jet (1) from the cylinder block. Remove O-ring seal (3).
3. Repeat Step 1 through Step 2 for the remaining piston cooling jets.

Installation Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
A ⁽¹⁾	9U-6198	Crankshaft Turning Tool	1
A ⁽²⁾	5p-7306	Housing	1
	5P-7305	Engine Turning Tool	1

⁽¹⁾ The Crankshaft Turning Tool is used on the front pulley.

⁽²⁾ This Tool is used in the aperture for the electric starting motor.

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