



# Service Repair Manual

## **Models**

314E CR, 314E SR and  
314E LCR Excavator

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[Previous Screen](#)

Product: EXCAVATOR

Model: 314E CR EXCAVATOR ECN

Configuration: 314E CR/SR &amp; 314E LCR Excavators ECN00001-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

i04048572

# Gear Group (Front) - Remove and Install

SMCS - 1206-010

## Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	9U-7336	Housing	1
	5P-7305	Engine Turning Tool	1
B	230-6284	Timing Pin (Camshaft)	1
C	364-9107	Timing Pin (Fuel Injection Pump)	1
D	136-4632	Timing Pin (Crankshaft)	1
	268-1966	Adapter	1
E	298-5564	T40Torx Socket	1

### Start By:

- a. Remove the front cover. Refer to Disassembly and Assembly, "Front Cover - Remove and Install" for the correct procedure.
- b. Remove the valve mechanism cover. Refer to Disassembly and Assembly, "Valve Mechanism Cover - Remove and Install" for the correct procedure.

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**NOTICE**

**Keep all parts clean from contaminants.**

**Contaminants may cause rapid wear and shortened component life.**

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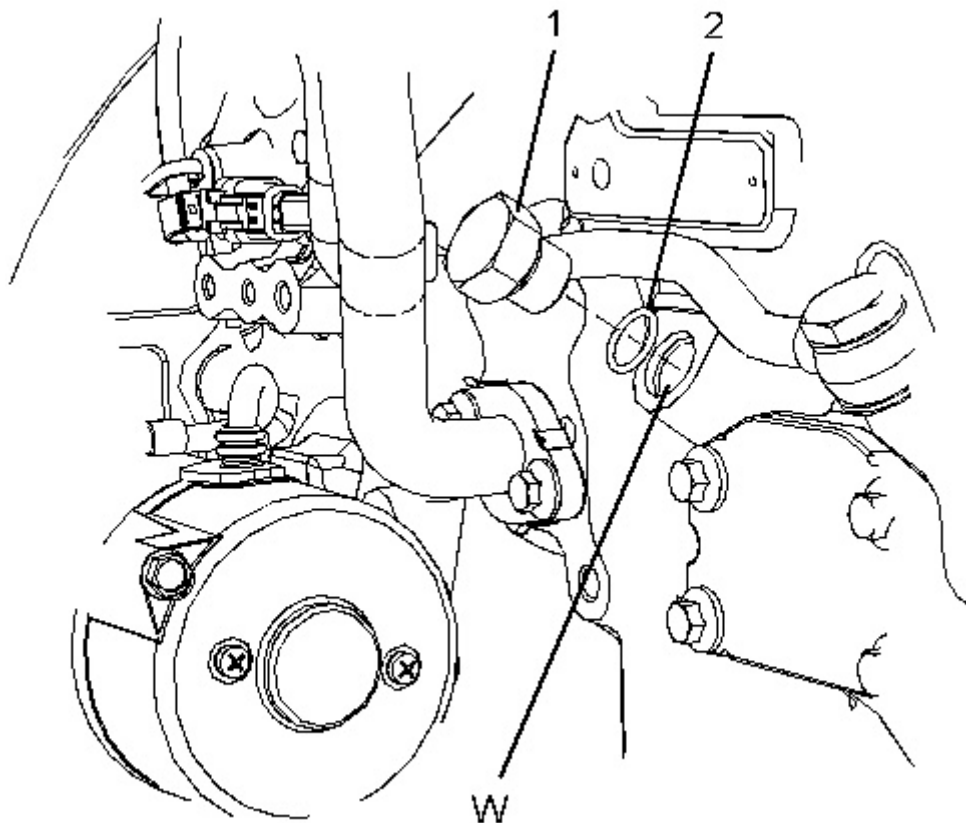
### **NOTICE**

**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.**

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**Note:** Care must be taken in order to ensure that the fuel injection pump timing is not lost during the removal of the front gear group. Carefully follow the procedure in order to remove the gear group.



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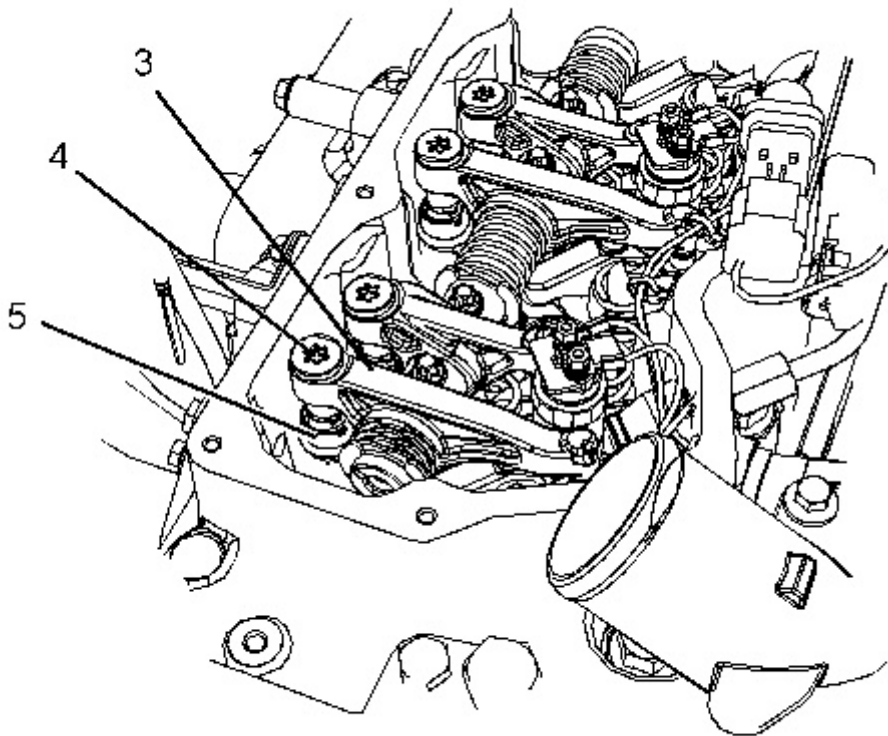
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1. Remove plug (1) from the cylinder block. Remove O-ring seal (2) from the plug.
  2. Use Tooling (A) in order to rotate the crankshaft so that number one piston is at top dead center on the compression stroke. Refer to System Operation, Testing and Adjusting, "Finding Top Center Position for No.1 Piston" for the correct procedure. Install Tooling (D) through Hole (W) in order to lock the crankshaft so that number one piston is at top dead center on the compression stroke.
  3. Remove Tooling (D).
  4. Use Tooling (A) in order to rotate the crankshaft in a clockwise direction and position the crankshaft at the safe position. Refer to System Operation, Testing and Adjusting, "Position the Valve Mechanism Before Maintenance Procedures" for the correct procedure.
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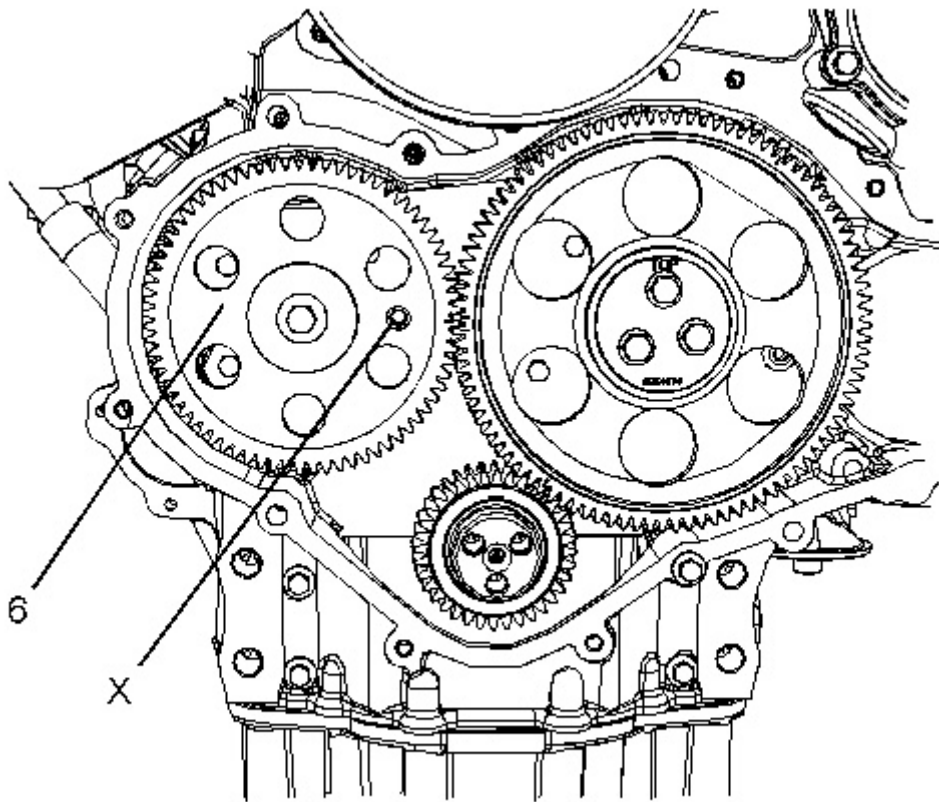
Illustration 2

g01992077

5. Use Tooling (E) in order to loosen threaded inserts (4) on all rocker arms (3). Unscrew threaded inserts (4) on all rocker arms (3) until all valves are fully closed. Ensure that the guides (5) for the pushrods are left in position on the threaded inserts (4).

**Note:** Ensure that ALL threaded inserts are fully unscrewed.

6. Use Tooling (A) in order to rotate the crankshaft so that number one piston is at top dead center on the compression stroke. Refer to System Operation, Testing and Adjusting, "Finding Top Center Position for No.1 Piston" for the correct procedure. Install Tooling (D) through Hole (W) in order to lock the crankshaft so that number one piston is at top dead center on the compression stroke. Refer to Illustration 1.



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Illustration 3

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7. Install Tooling (B) through Hole (X) in camshaft gear (6) into the front housing. Use Tooling (B) in order to lock the camshaft in the correct position. Refer to System Operation, Testing and Adjusting, "Finding Top Center Position for No.1 Piston" for the correct procedure.
8. Install Tooling (D) into Hole (W) in the cylinder block. Use Tooling (D) in order to lock the crankshaft in the correct position. Refer to System Operation, Testing and Adjusting, "Finding Top Center Position for No.1 Piston" for the correct procedure.

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

9. Use Tooling (C) in order to lock the fuel injection pump gear in the correct position. Refer to Disassembly and Assembly, "Fuel Injection Pump - Remove" for the correct procedure.
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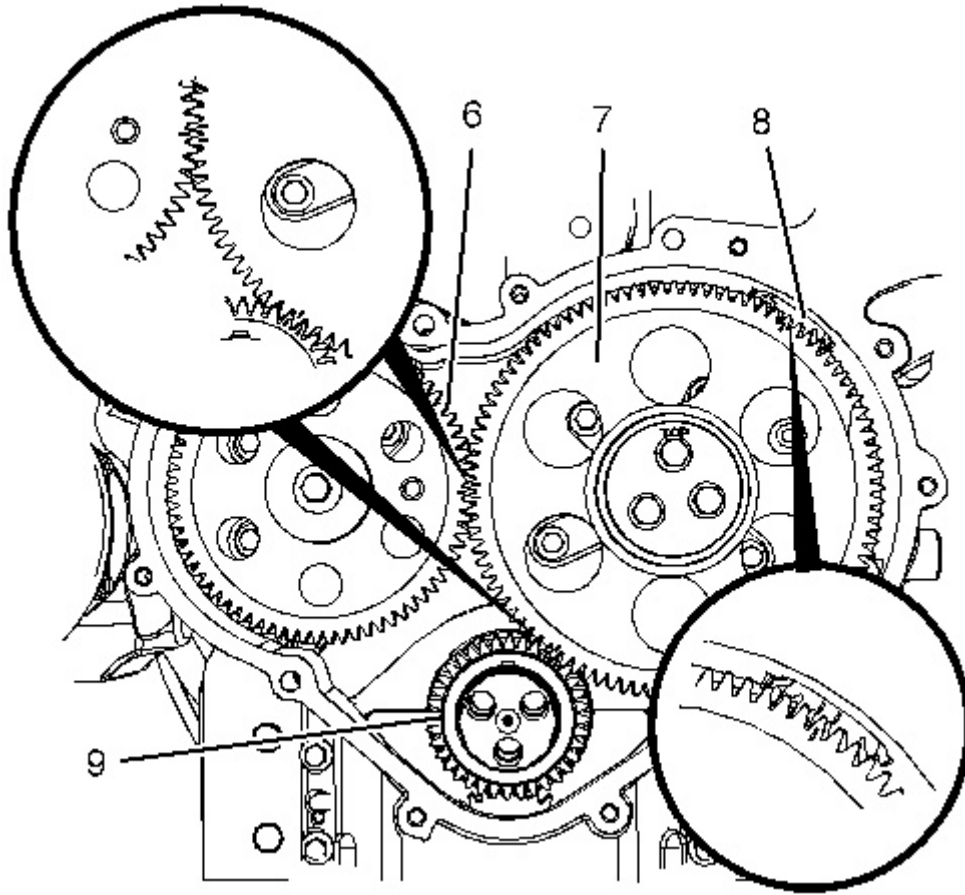


Illustration 4

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10. Mark gear (6), gear (7), gear (8) and gear (9) in order to show alignment. Refer to Illustration 4.

**Note:** Identification will ensure that the gears can be installed in the original alignment.

11. Remove camshaft gear (6). Refer to Disassembly and Assembly, "Camshaft Gear - Remove and Install" for the correct procedure.
12. Remove idler gear (7). Refer to Disassembly and Assembly, "Idler Gear - Remove and Install" for the correct procedure.

## Installation Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
A	9U-7336	Housing	1
	5P-7305	Engine Turning Tool	1
B	230-6284	Timing Pin (Camshaft)	1
C	364-9107		1

		Timing Pin (Fuel Injection Pump)	
D	136-4632	Timing Pin (Crankshaft)	1
	268-1966	Adapter	1
E	298-5564	T40 Torx Socket	1
F	9U-7324	Indicator Bracket	1
	7H-1942	Dial Indicator	1
	3S-3268	Indicator Contact Point	1
	7H-1940	Universal Attachment	1

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### NOTICE

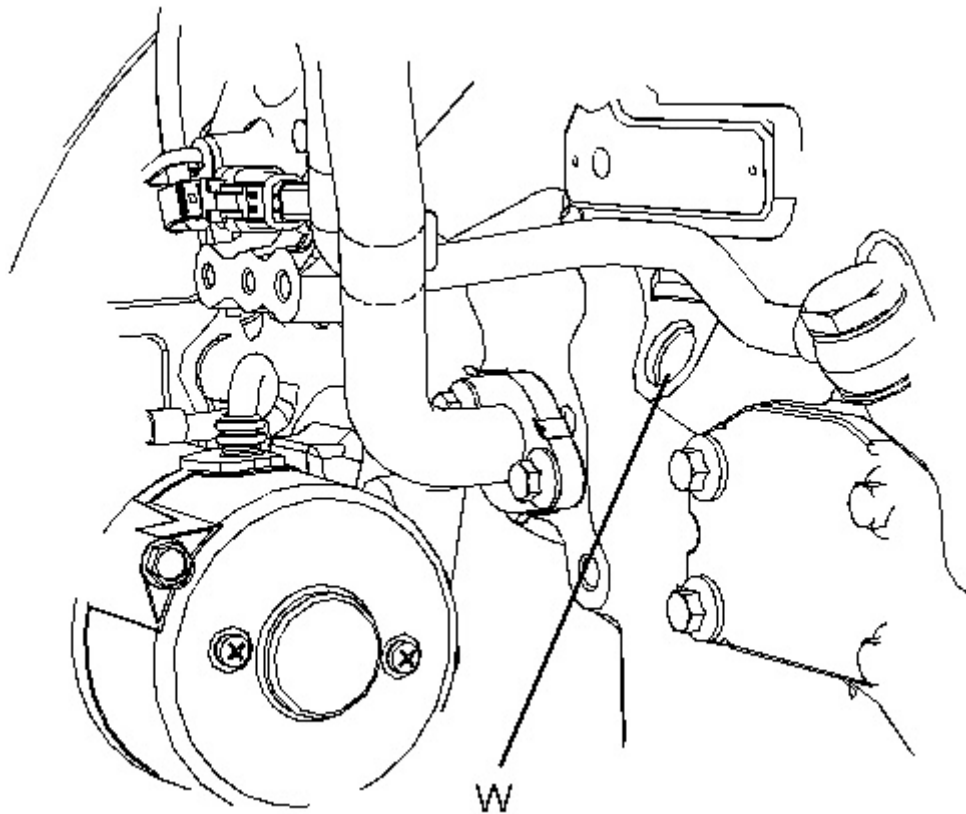
**Keep all parts clean from contaminants.**

**Contaminants may cause rapid wear and shortened component life.**

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**Note:** The fuel injection pump must remain locked until the procedure instructs you to unlock the fuel injection pump.

1. Ensure that number one piston is at top dead center on the compression stroke. Refer to System Operation, Testing and Adjusting, "Finding Top Center Position for No.1 Piston" for the correct procedure.
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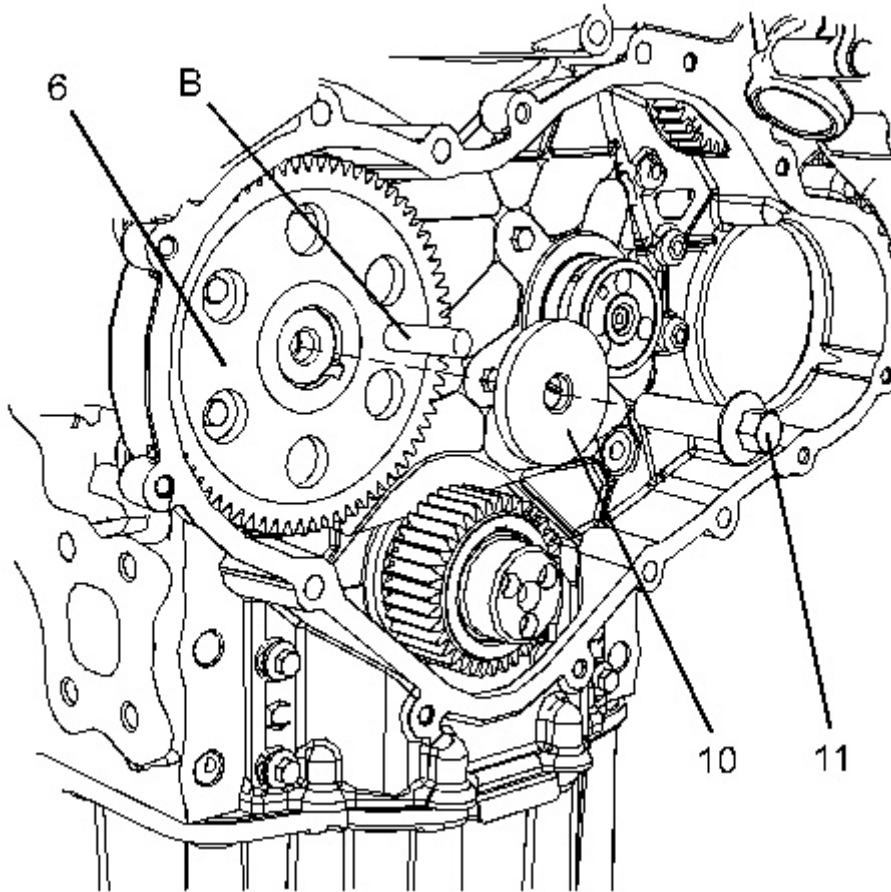
Illustration 5

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2. If necessary, install Tooling (D) into Hole (W) in the cylinder block. Use Tooling (D) in order to lock the crankshaft in the correct position. Refer to System Operation, Testing and Adjusting, "Finding Top Center Position for No.1 Piston" for the correct procedure.

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

3. Ensure that all of the components of the front gear group are clean and free from wear and damage. If necessary, replace any components that are worn or damaged.
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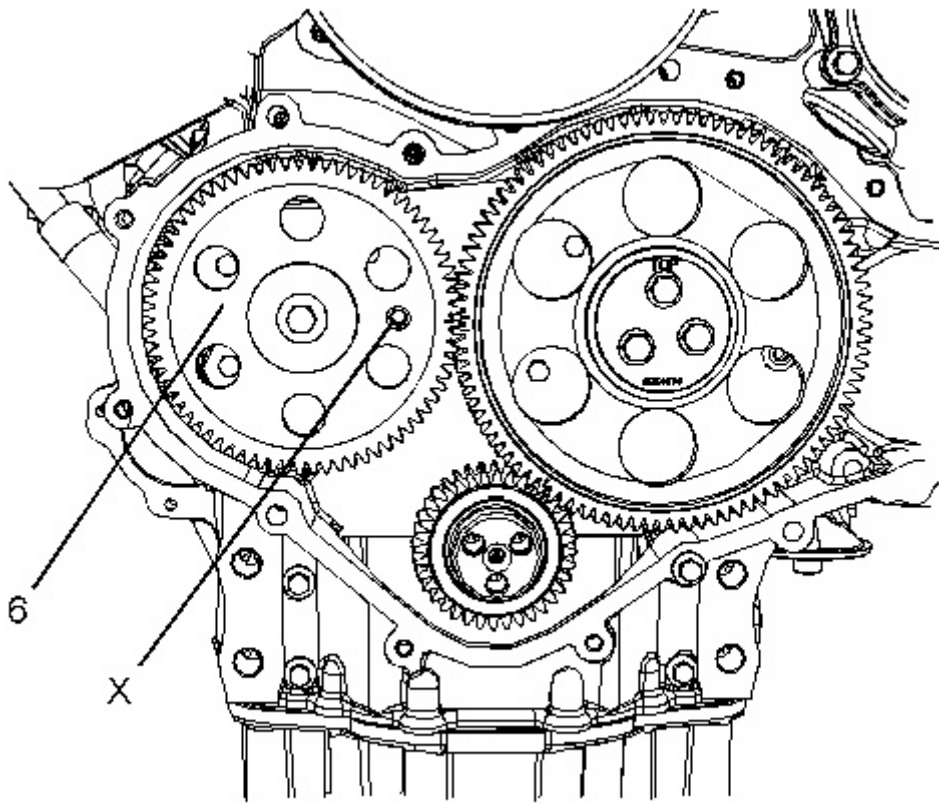


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Illustration 6

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4. Install camshaft gear (6). Loosely install bolt (11) and washer (10) for the camshaft gear. Refer to Disassembly and Assembly, "Camshaft Gear - Remove and Install" for more information.
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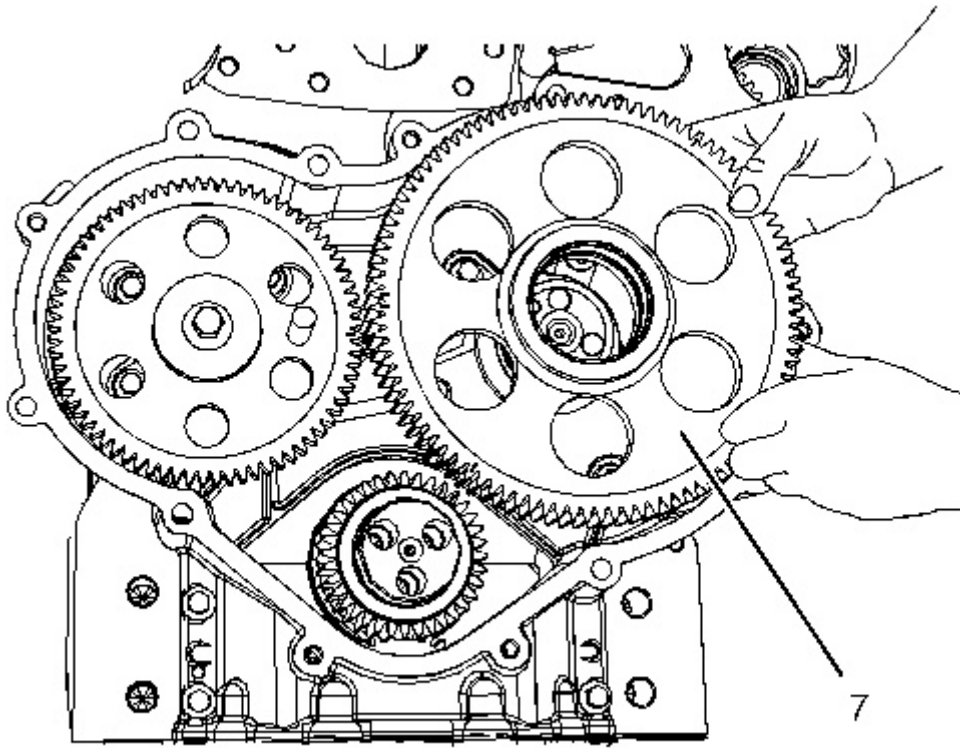


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Illustration 7

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5. Install Tooling (B) through Hole (X) in camshaft gear (6) into the front housing.
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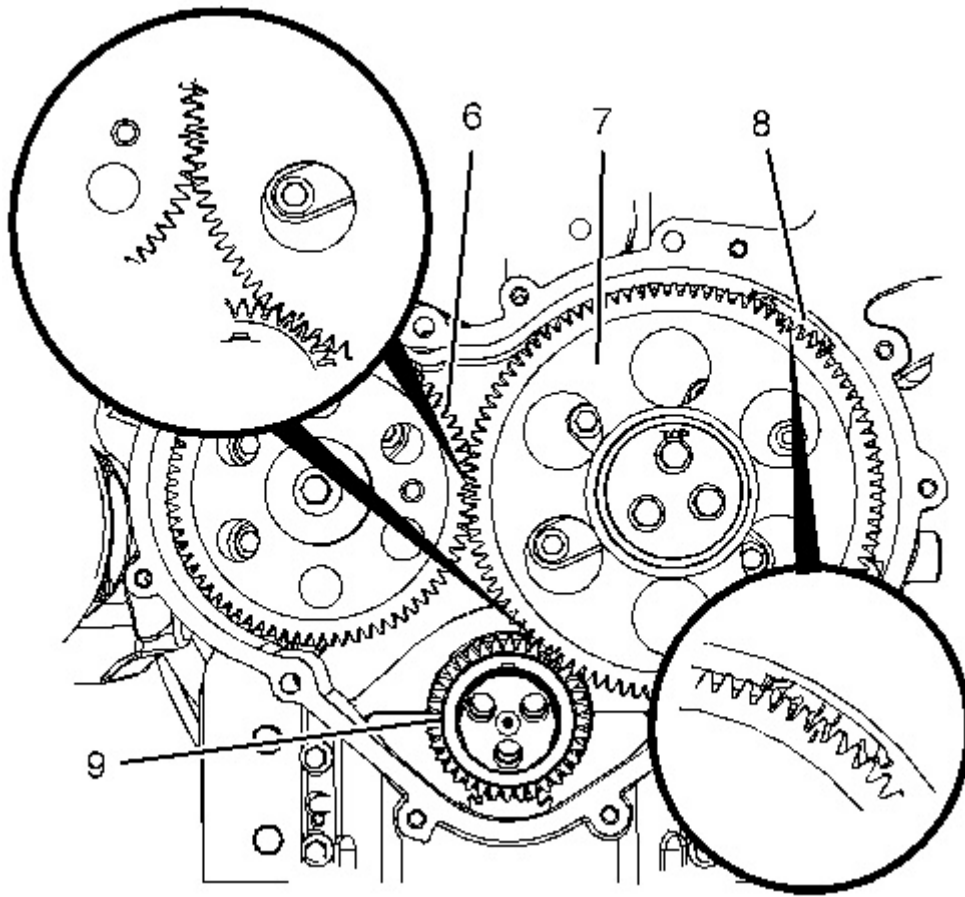


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Illustration 8

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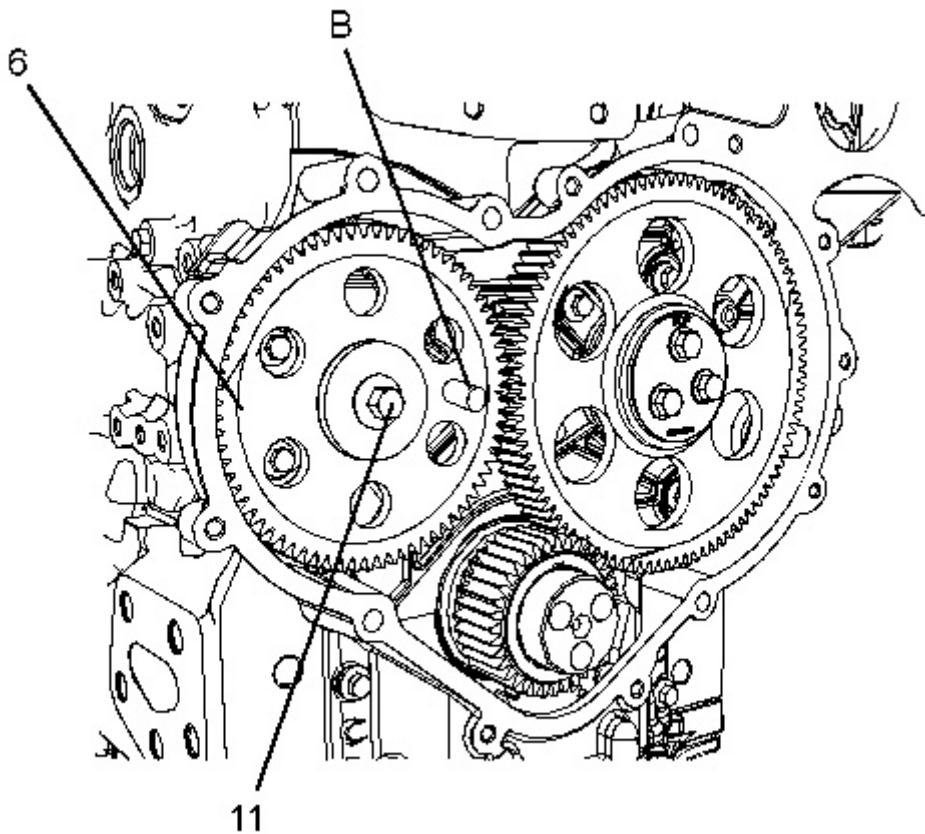
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Illustration 9

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Alignment of timing marks

6. Install idler gear (7). Ensure that the timing marks on gear (6), gear (7), gear (8) and gear (9) are in alignment and that the mesh of the gears is correct.
  7. Refer to Disassembly and Assembly, "Idler Gear - Remove and Install" for the correct procedure.
  8. Use Tooling (F) in order to check the end play of the idler gear. Refer to Specifications, "Gear Group (Front)" and refer to Disassembly and Assembly, "Idler Gear - Remove and Install" for further information.
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Illustration 10

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9. Ensure that the fuel injection pump is locked in the correct position. Refer to Disassembly and Assembly, "Fuel Injection Pump - Install" for the correct procedure.
  10. Remove Tooling (B) and Tooling (C).
  11. When bolt (11) is a 8.8 Grade. Tighten bolt (11) for camshaft gear (6) to a torque of 95 N·m (70 lb ft).  
When bolt (11) is a 10.9 Grade. Tighten bolt (11) to a torque of 120 N·m (89 lb ft).
  12. Use Tooling (F) in order to check the end play of the camshaft gear. Refer to Specifications, "Camshaft" for more information.
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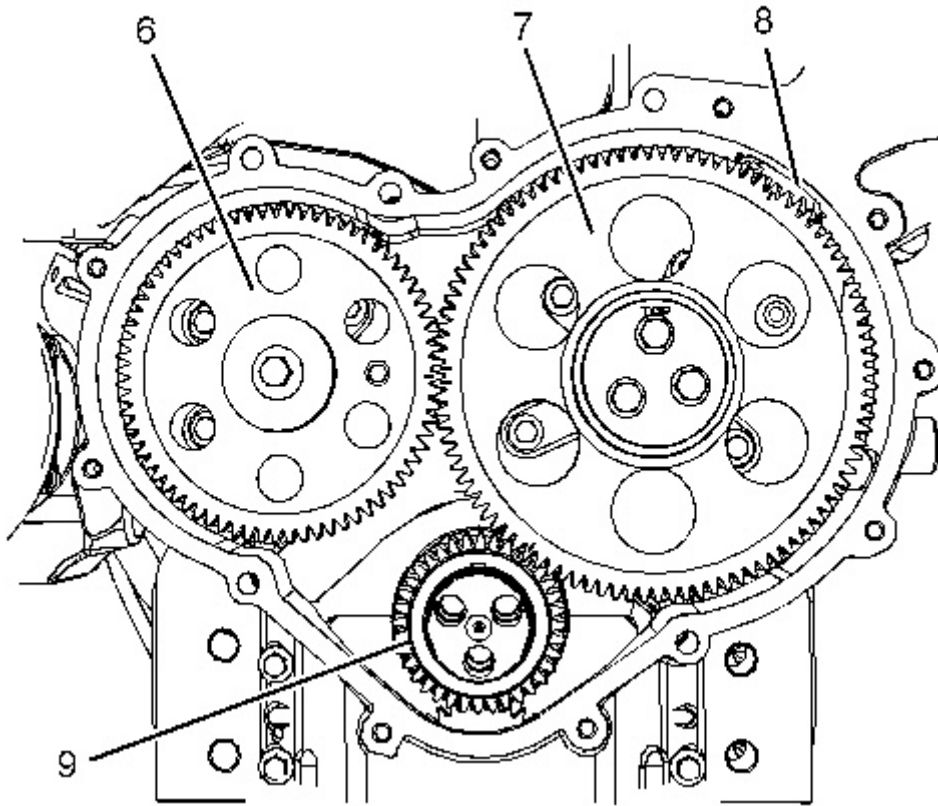


Illustration 11

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13. Use Tooling (F) in order to measure the backlash for gear (6), gear (7), gear (8) and gear (9). Refer to Specifications, "Gear Group (Front)" for further information.
14. Lubricate each gear with clean lubricating engine oil.
15. If necessary, use Tooling (A) in order to rotate the crankshaft so that number one piston is at top dead center on the compression stroke. Refer to System Operation, Testing and Adjusting, "Finding Top Center Position for No.1 Piston" for the correct procedure. If necessary, use Tooling (D) in order to lock the crankshaft so that number one piston is at top dead center on the compression stroke.
16. Remove Tooling (D).

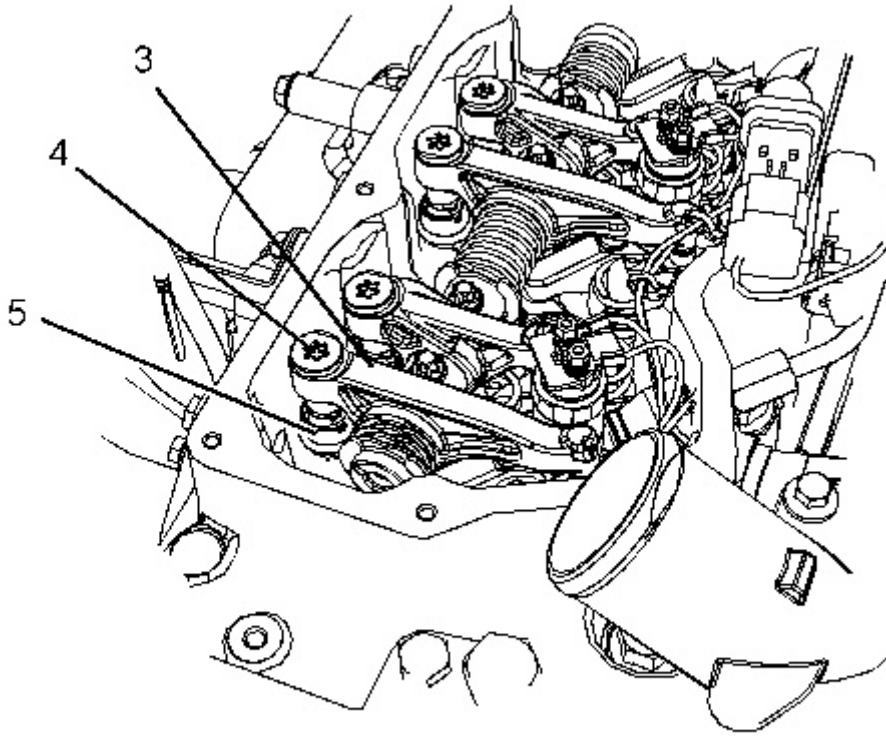
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### NOTICE

**Failure to ensure that the crankshaft is positioned at the safe position will result in interference between the pistons and the valves. Interference between the pistons and the valves will result in damage to the engine.**

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17. Use Tooling (A) in order to rotate the crankshaft in a clockwise direction and position the crankshaft at the safe position. Refer to System Operation, Testing and Adjusting, "Position the Valve Mechanism Before Maintenance Procedures" for the correct procedure.
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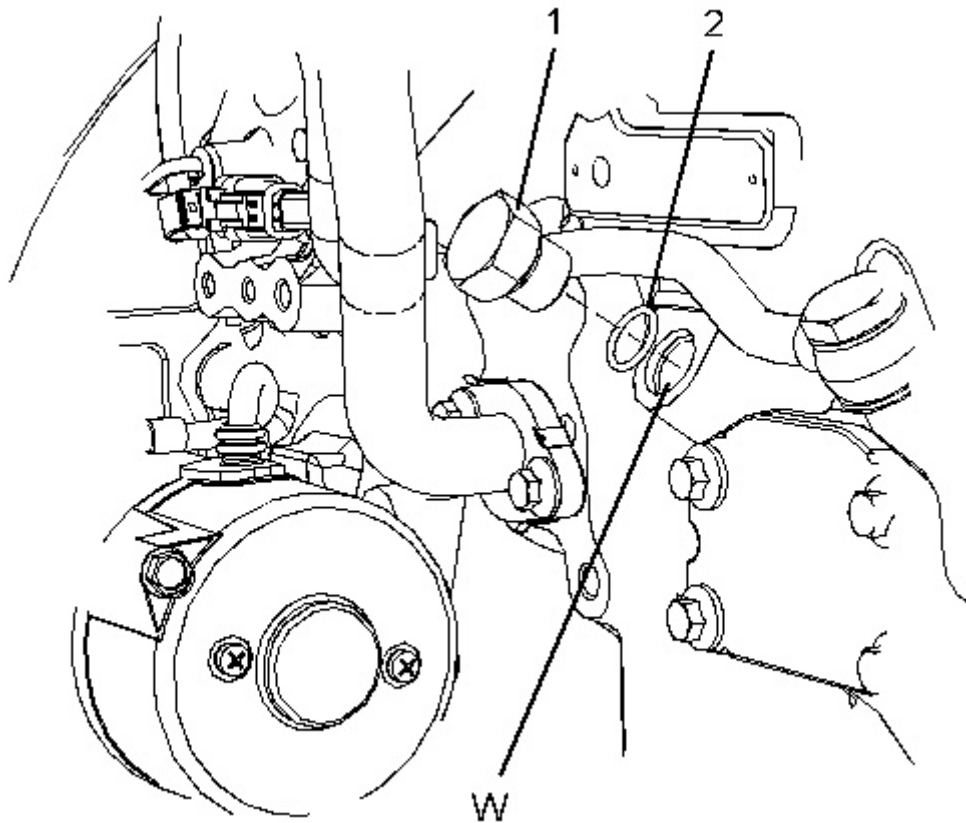
Illustration 12

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18. Ensure that the guides (5) for the pushrods are correctly positioned on the threaded inserts (4). Use Tooling (E) in order to tighten threaded inserts (4) on all rocker arms (3). Tighten the threaded inserts to a torque of 30 N·m (265 lb in).

**Note:** When the threaded insert is tightened, the threaded insert must be correctly seated into the cup for the pushrod.

19. The engine should not be operated for a period 30 minutes after the threaded inserts on all the rocker arms have been tightened. This period of time will allow the force from the valve springs to purge off excessive engine oil from the hydraulic lifters.
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Illustration 13

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20. Install a new O-ring seal (1) to plug (2). Install the plug into Hole (W) in the cylinder block. Tighten plug (2) to a torque of 21 N·m (186 lb in).

**End By:**

- a. Install the front cover. Refer to Disassembly and Assembly, "Front Cover - Remove and Install" for the correct procedure.
- b. Install the valve mechanism cover. Refer to Disassembly and Assembly, "Valve Mechanism Cover - Remove and Install" for the correct procedure.

[Previous Screen](#)

Product: EXCAVATOR

Model: 314E CR EXCAVATOR ECN

Configuration: 314E CR/SR &amp; 314E LCR Excavators ECN00001-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

i04048579

## Idler Gear - Remove

SMCS - 1206-011

### Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	9U-7336	Housing	1
	5P-7306	Engine Turning Tool	1
B	364-9107	Timing Pin (Fuel Injection Pump)	1
C	230-6284	Timing Pin (Camshaft)	1
D	136-4632	Timing Pin (Crankshaft)	1
	268-1966	Adapter	1
E	298-5564	T40 Torx Socket	1

#### Start By:

- a. Remove the front cover. Refer to Disassembly and Assembly, "Front Cover - Remove and Install" for the correct procedure.
- b. Remove the valve mechanism cover. Refer to Disassembly and Assembly, "Valve Mechanism Cover - Remove and Install" for the correct procedure.

**Note:** Care must be taken in order to ensure that the fuel injection pump timing is not lost during the removal of the fuel pump gear. Carefully follow the procedure in order to remove the fuel pump gear.

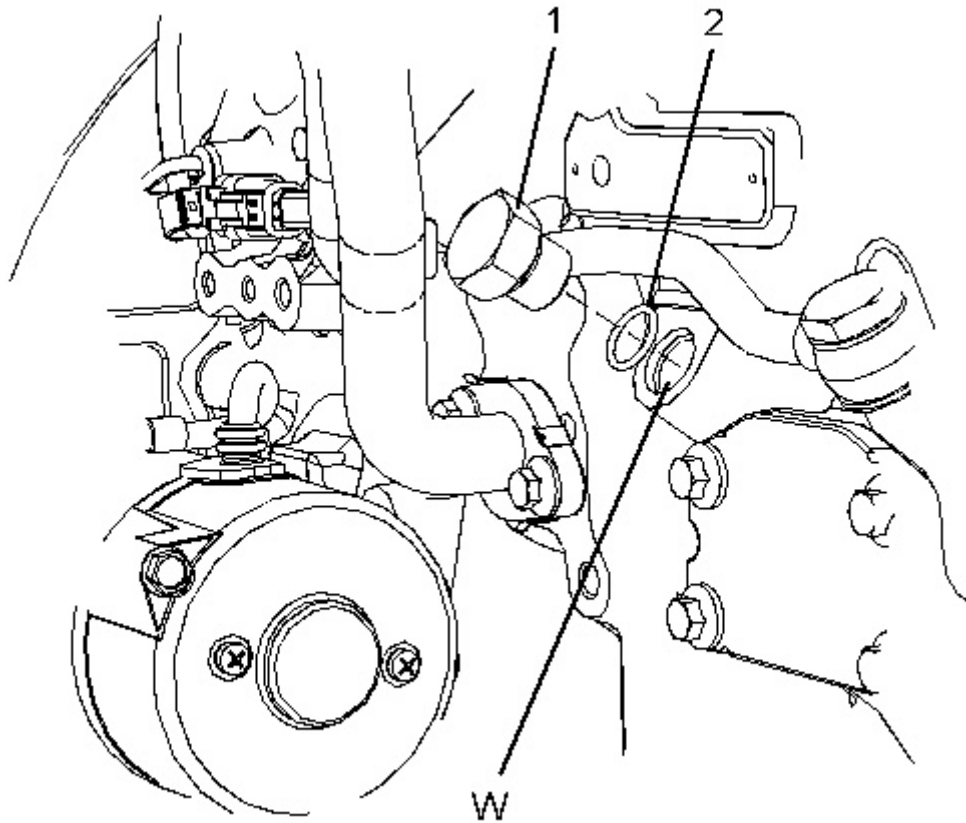
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## NOTICE

**Keep all parts clean from contaminants.**

**Contaminants may cause rapid wear and shortened component life.**

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Illustration 1

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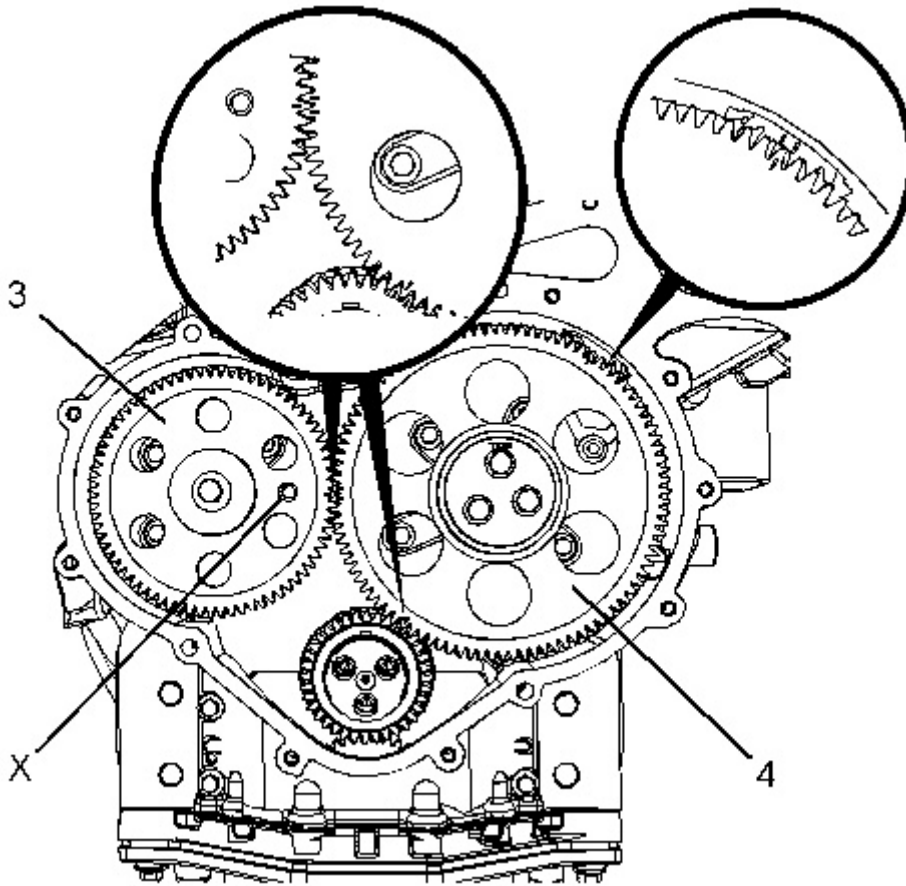


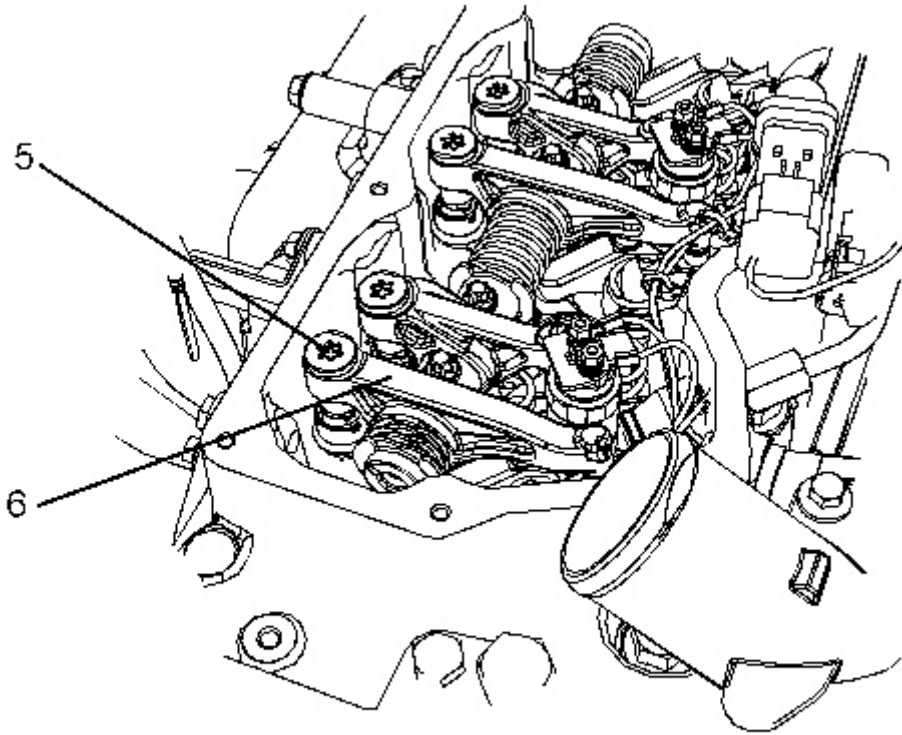
Illustration 2

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1. Remove plug (1) from the cylinder block and remove O-ring seal (2) from the plug.
2. Use Tooling (A) in order to rotate the crankshaft so that number one piston is at top dead center on the compression stroke. Refer to System Operation, Testing and Adjusting, "Finding Top Center Position for No.1 Piston" for the correct procedure.
3. Install Tooling (D) through Hole (W) in order to lock the crankshaft so that number one piston is at top dead center on the compression stroke.
4. Ensure that Tooling (C) is installed into Hole (X) in camshaft gear (3). Use Tooling (C) in order to lock the camshaft in the correct Position.

**Note:** Ensure that the gears are marked in order to show alignment. Refer to Illustration 2.

5. Use Tooling (B) in order to lock the fuel injection pump gear in the correct position. Refer to Disassembly and Assembly, "Fuel Injection Pump - Remove" for the correct procedure.



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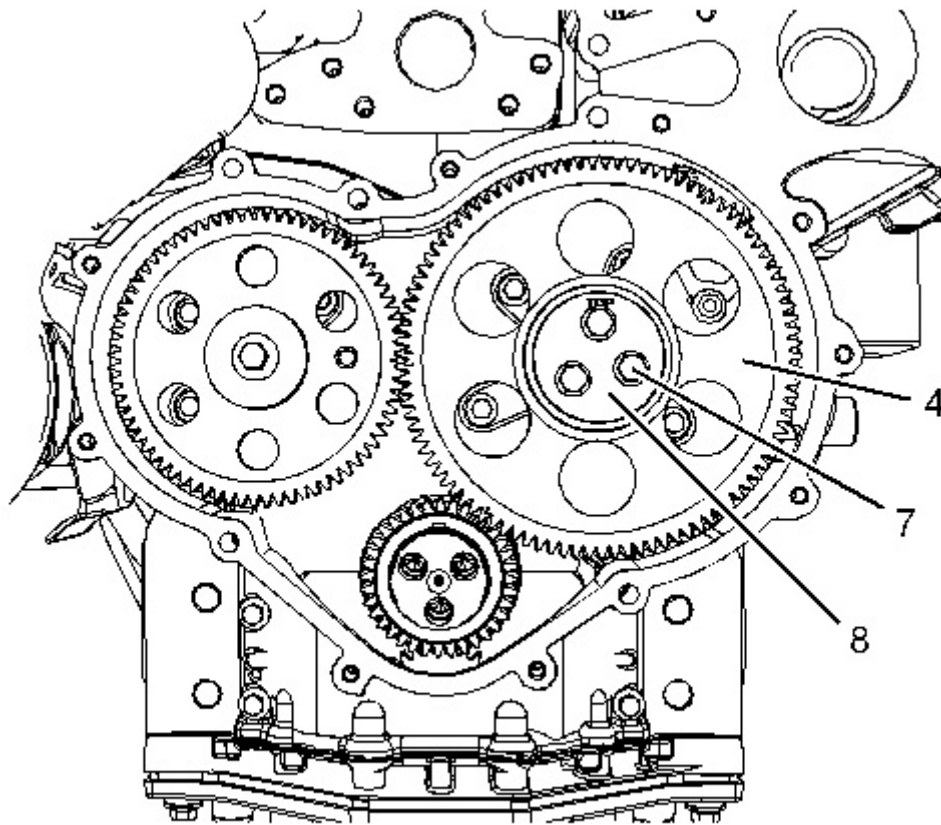
Illustration 3

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6. Use Tooling (E) in order to loosen threaded inserts (5) on all rocker arms (6). Unscrew threaded inserts (5) on all rocker arms (6) until all valves are fully closed.

**Note:** Failure to ensure that ALL threaded inserts are fully unscrewed can result in contact between the valves and pistons.

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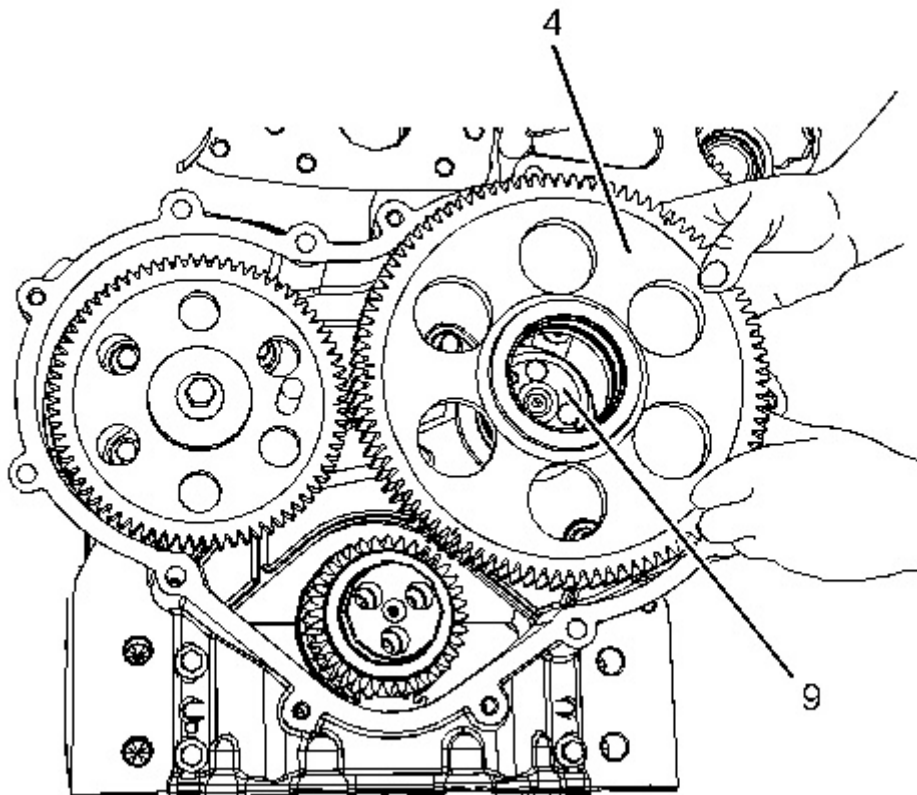


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Illustration 4

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Illustration 5

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7. Mark plate (8) in order to show orientation.

**Note:** Identification will ensure that the plate can be installed in the original orientation.

8. Remove bolts (7).

9. Remove plate (8).

10. Remove the assembly of idler gear (4).

11. Remove hub (9) from the recess in the front housing.

[Previous Screen](#)

Product: EXCAVATOR

Model: 314E CR EXCAVATOR ECN

Configuration: 314E CR/SR &amp; 314E LCR Excavators ECN00001-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

i04048578

## Idler Gear - Install

SMCS - 1206-012

## Installation Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A <sup>(1)</sup>	9U-6198	Crankshaft Turning Tool	1
A <sup>(2)</sup>	5P-7306	Housing	1
	5P-7305	Engine Turning Tool	1
B	364-9107	Timing Pin (Fuel Injection Pump)	1
C	230-6284	Timing Pin (Camshaft)	1
D	136-4632	Timing Pin (Crankshaft)	1
	268-1966	Adapter	1
E	298-5564	T40 Torx Socket	1
F	9U-7324	Indicator Bracket	1
	7H-1942	Dial Indicator	1
	3S-3268	Indicator Contact Point	1
	7H-1940	Universal Attachment	1

<sup>(1)</sup> The Crankshaft Turning Tool is used on the front pulley.

<sup>(2)</sup> This Tool is used in the aperture for the electric starting motor.

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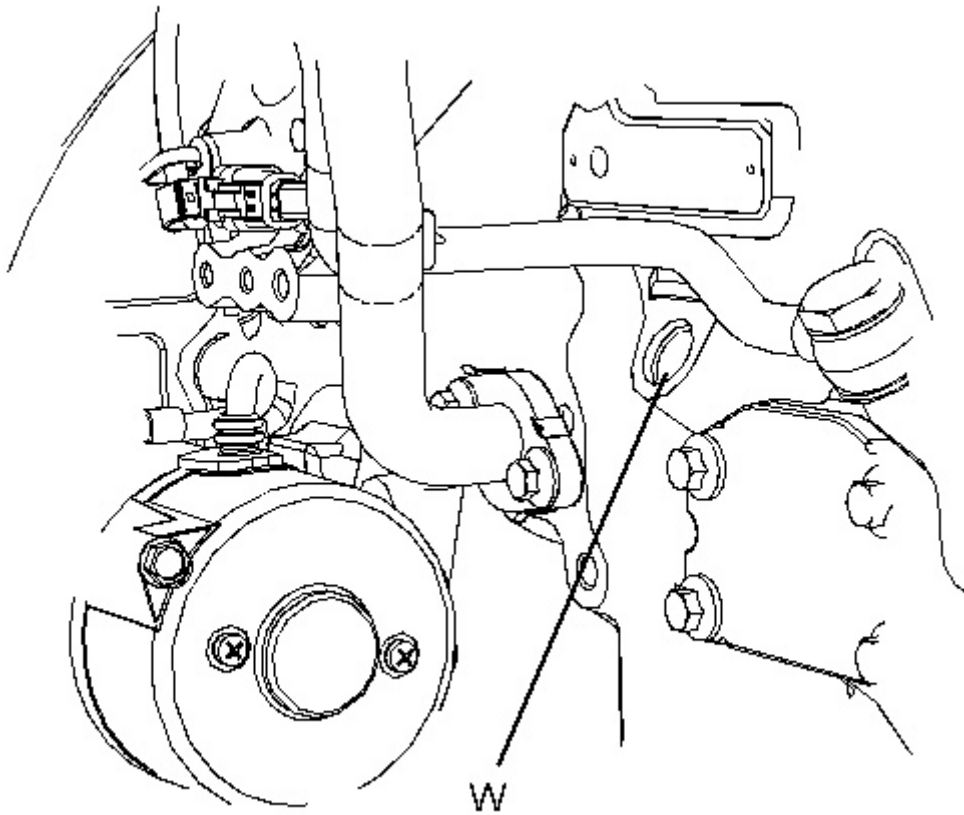
## NOTICE

**Keep all parts clean from contaminants.**

**Contaminants may cause rapid wear and shortened component life.**

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1. Ensure that number one piston is at top dead center on the compression stroke. Refer to System Operation, Testing and Adjusting, "Finding Top Center for No. 1 Piston" for the correct procedure.
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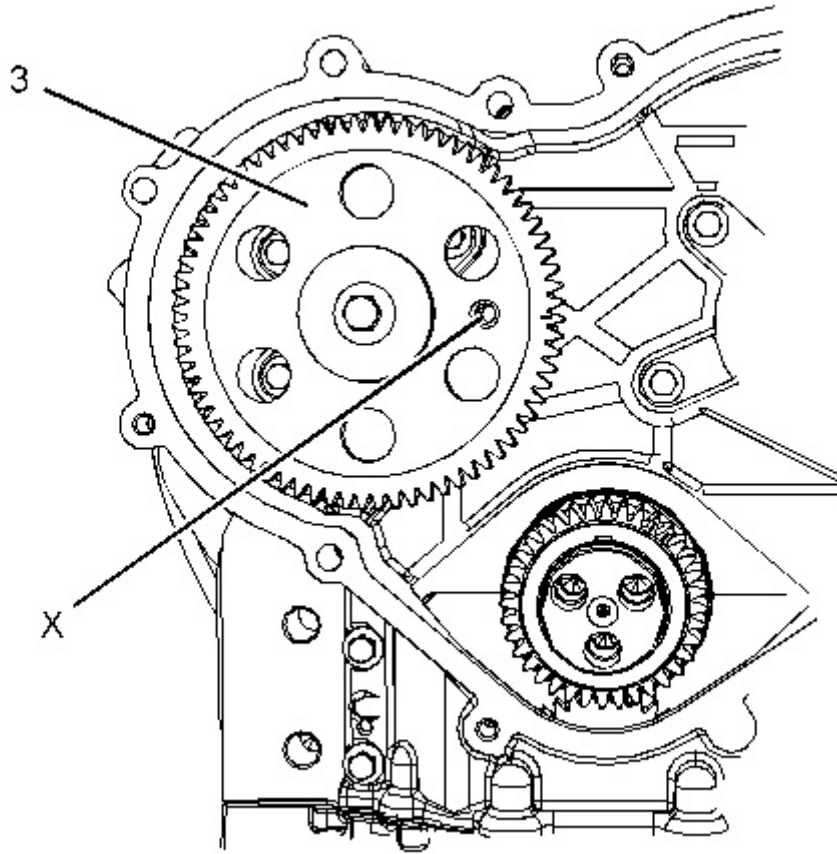


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Illustration 1

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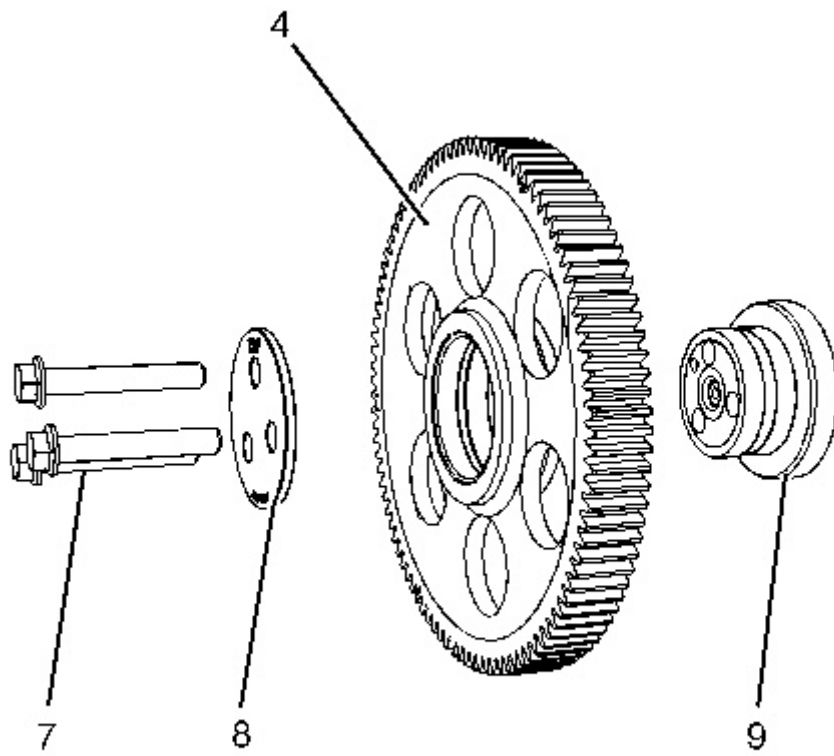


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Illustration 2

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2. Ensure that Tooling (D) is installed in Hole (W) in the cylinder block. Use Tooling (D) in order to lock the crankshaft in the correct Position. Refer to System Operation, Testing and Adjusting, "Finding Top Center Position for No.1 Piston" for the correct procedure.
  3. Ensure that Tooling (C) is installed into Hole (X) in camshaft gear (3).
  4. Use Tooling (B) in order to lock the fuel injection pump gear in the correct position. Refer to Disassembly and Assembly, "Fuel Injection Pump - Remove" for the correct procedure.
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Illustration 3

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**Suggest:**

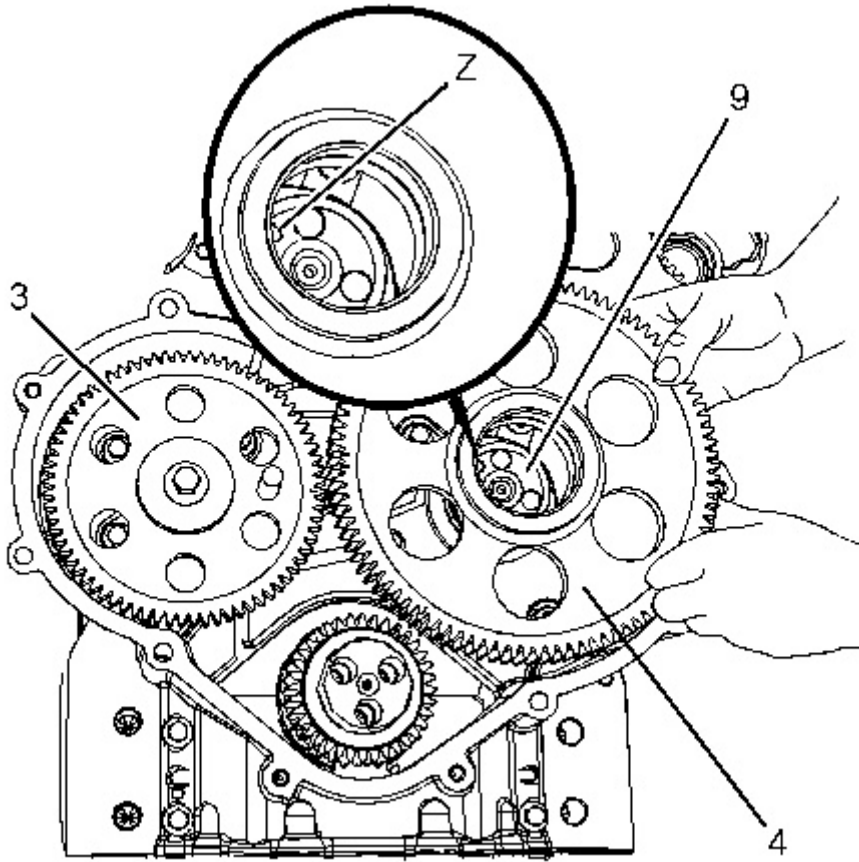
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Illustration 4

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