

Product: WHEEL TRACTOR

Model: 623G WHEEL TRACTOR CES

Configuration: 623G Wheel Tractor CES00001-UP (MACHINE) POWERED BY 3406E Engine

Disassembly and Assembly 3406E and 3456 Engines for Caterpillar Built Machines

Media Number -REN1364-06

Publication Date -01/05/2008

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i02963221

Camshaft - Install

SMCS - 1210-012

Installation Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	9U-7257	Cradle	1
B	9U-7256	Guide	1
C	9U-7225	Camshaft Pilot	2
D	9U-7240	Camshaft Hook	2
H	9U-7243	Alignment Sleeve	1
J	9S-3263	Thread Lock Compound	1
K	8T-2998	Lubricant	1

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Ensure that the camshaft and camshaft bearings are thoroughly clean. Lubricate the camshaft lobes with a 50/50 mixture of Tooling (K) and clean engine oil. Apply a thin coat of clean engine oil on the camshaft bearings.

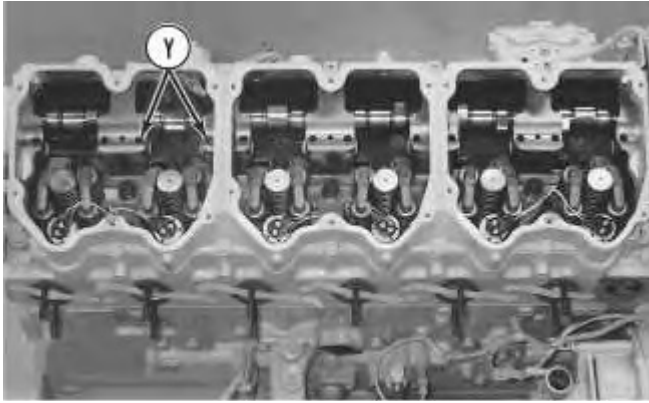


Illustration 1

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Illustration 2

g00581441

2. Install Tooling (A) on the cylinder head at Location (Y) .

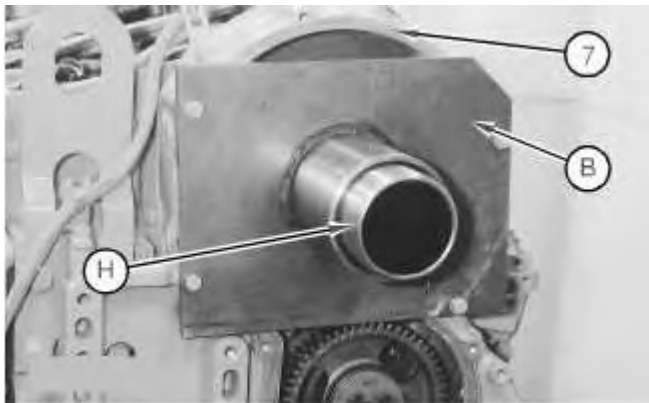


Illustration 3

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3. Install Tooling (B) on front housing (7) . Do not tighten the bolts that hold Tooling (B) to front housing (7) at this time.
4. Use Tooling (H) to align Tooling (B) with the camshaft bearings. Tighten the bolts that hold Tooling (B) to front housing (7) . Remove Tooling (H) .

Note: Tooling (H) should move freely from the bore of Tooling (B) .

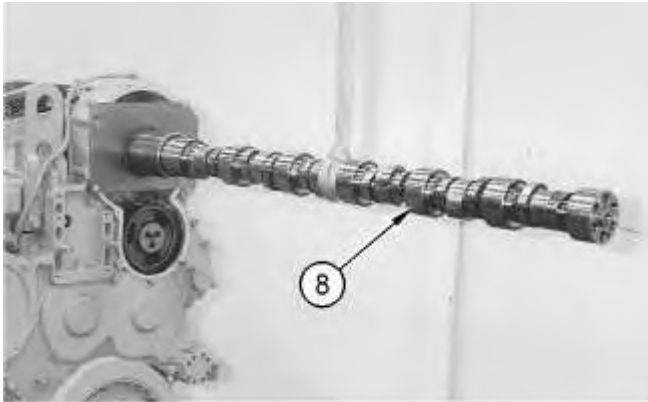


Illustration 4

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5. Install Tooling (C) in the end of camshaft (8) .

Note: Rotate the camshaft during installation. This will prevent the camshaft from binding in the camshaft bearings.

6. Use a suitable lifting device in order to position camshaft (8) into Tooling (B) and the cylinder head. The weight of the camshaft is approximately 39 kg (86 lb).

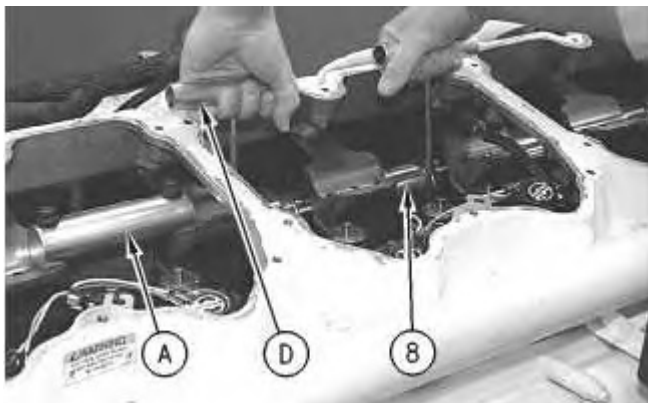


Illustration 5

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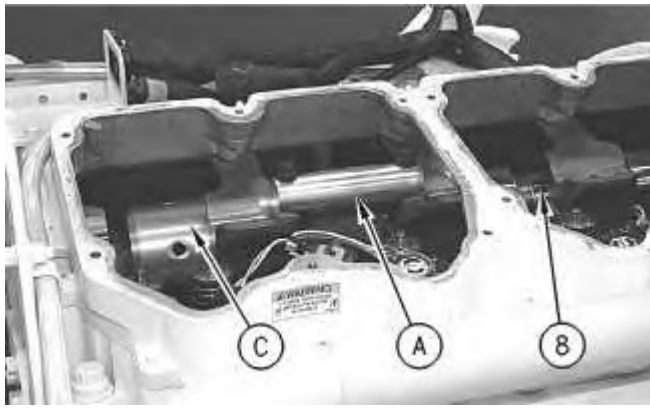


Illustration 6

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Note: Tooling (C) must be removed before the camshaft can be completely installed in the cylinder head.

7. Remove the lifting device. Rotate the camshaft during installation. Use care not to allow the end of the camshaft and Tooling (C) to drop. Use Tooling (D) to assist in aligning camshaft (8) with the camshaft bearings.
8. Remove Tooling (C) and finish installing camshaft (8) in the bore.
9. Remove Tooling (A) and Tooling (B) .

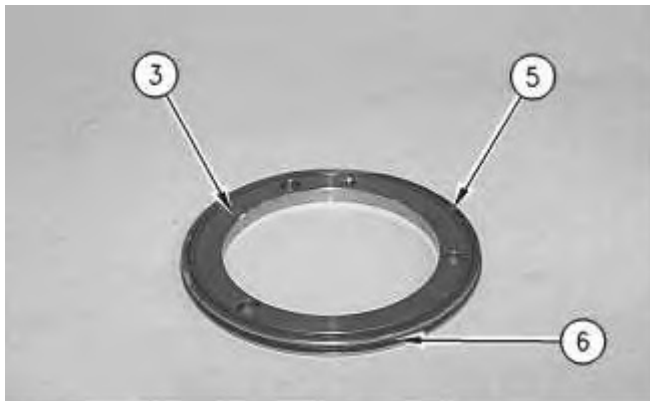


Illustration 7

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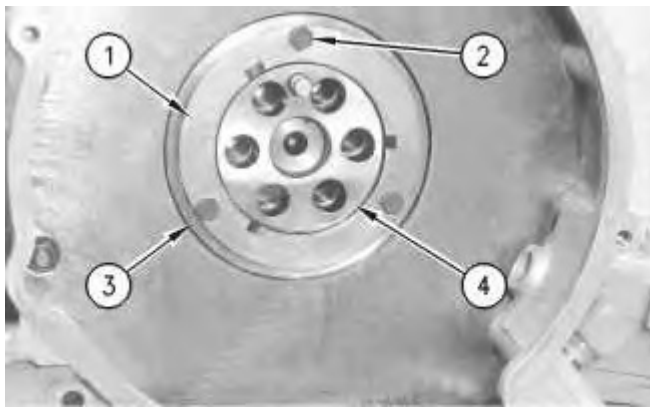


Illustration 8

g00576839

10. Install O-ring seals (5) and (6) in seal assembly (3) . Lubricate seal (6) with Tooling (K) .
11. Install seal assembly (3) . Position adapter (4) . Ensure that the dowel in adapter (4) engages the hole in the camshaft.
12. Position thrust plate (1) . Apply Tooling (J) to bolts (2) . Hold thrust plate (1) in position and install bolts (2) . Evenly tighten bolts (2) until seal assembly (3) and O-ring seal (5) are seated against the cylinder head.

Note: Be careful in order to ensure that O-ring seal (5) stays in the groove in seal assembly (3) .

End By:

- a. Install the rocker arms and the rocker shafts. Refer to Disassembly and Assembly, "Rocker Arm and Shaft - Install".
- b. Install the camshaft gear. Refer to Disassembly and Assembly, "Camshaft Gear - Remove and Install".

Alternative Installation Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
E ⁽¹⁾	177-8001	Sleeve	1
F	177-8002	Adapter	1
G	6L-4697	Bolts	3
J	9S-3263	Thread Lock Compound	1
K	8T-2998	Lubricant	1

⁽¹⁾ Part of **177-8003** Engine Tool Group

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Ensure that the camshaft and camshaft bearings are thoroughly clean. Lubricate the camshaft lobes with a 50/50 mixture of Tooling (K) and clean engine oil. Apply a thin coat of clean engine oil on the camshaft bearings.

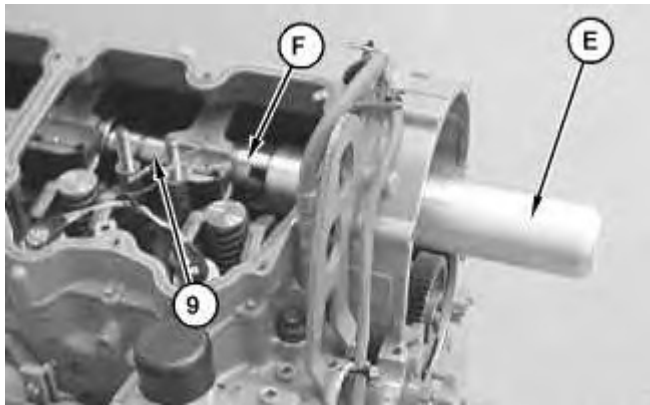
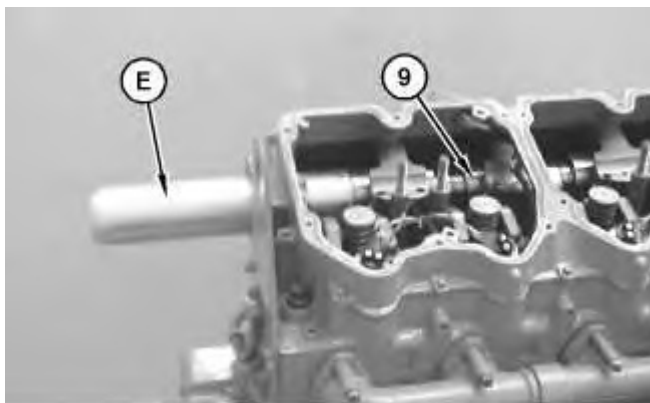


Illustration 9

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2. Install Tooling (F) on the front of camshaft (9) with Tooling (G) .
3. Install Tooling (E) .
4. Use two technicians to install the camshaft. Carefully slide camshaft (9) into the cylinder head from the rear of the engine. Keep the camshaft level while the camshaft is being installed in the cylinder head. The weight of the camshaft is approximately 39 kg (86 lb).
5. Remove Tooling (F) .



6. Install Tooling (F) on the end of the camshaft.
7. Use two technicians to install the camshaft. Carefully slide camshaft (9) into the cylinder head from the rear of the engine. Keep the camshaft level while the camshaft is being installed in the cylinder head. The weight of the camshaft is approximately 39 kg (86 lb).
8. Remove Tooling (F) .

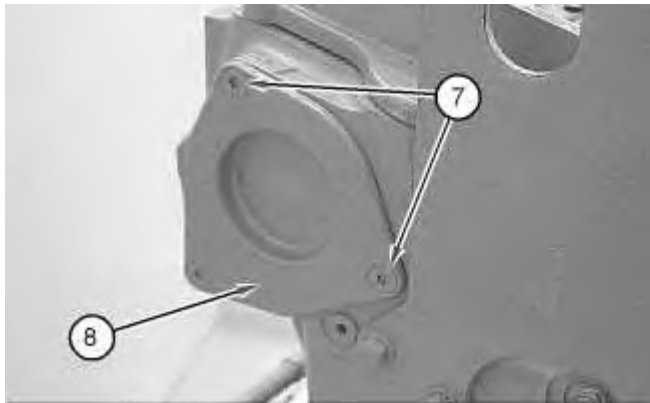


Illustration 11

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9. Position cover (8) on the rear of the cylinder head. Install bolts (7) .

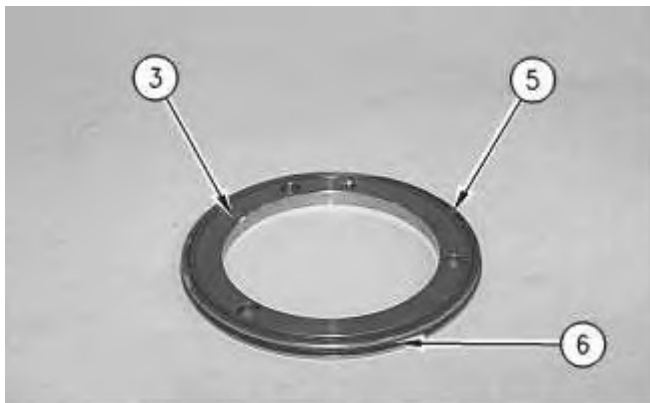


Illustration 12

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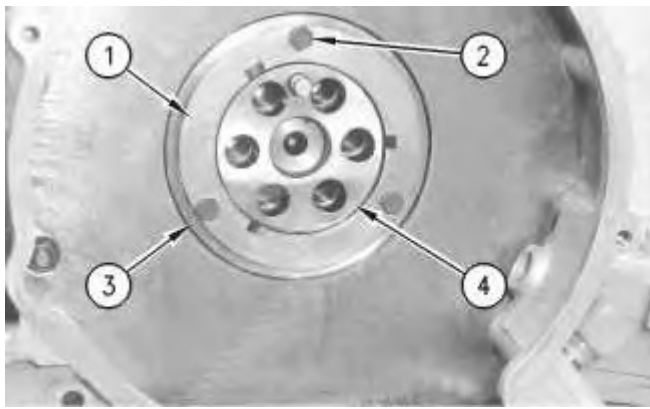


Illustration 13

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10. Install O-ring seals (5) and (6) in seal assembly (3) . Lubricate seal (6) with Tooling (K) .
11. Install seal assembly (3) . Position adapter (4) . Ensure that the dowel in adapter (4) engages the hole in the camshaft.
12. Position thrust plate (1) . Apply Tooling (J) to bolts (2) . Hold thrust plate (1) in position and install bolts (2) . Evenly tighten bolts (2) until seal assembly (3) and O-ring seal (5) are seated against the cylinder head.

Note: Be careful in order to ensure that O-ring seal (5) stays in the groove in seal assembly (3) .

End By:

- a. Install the rocker arms and the rocker shafts. Refer to Disassembly and Assembly, "Rocker Arm and Shaft - Install".
 - b. Install the camshaft gear. Refer to Disassembly and Assembly, "Camshaft Gear - Remove and Install".
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i06094319

Camshaft Gear - Remove and Install

SMCS - 1210-010-GE

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	9U-6896	Guide Bolt	1

Start By:

- A. Remove the front cover. Refer to Disassembly and Assembly, "Front Cover - Remove".



Illustration 1

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Illustration 2

g00579966

1. Position the No. 1 piston at the top center of the compression stroke. Refer to Testing and Adjusting, "Finding Top Center Position for No. 1 Piston".
2. Verify that the timing mark on camshaft gear (1) is aligned with Timing Mark (X) on front housing (3) .
3. Remove top bolt (2) from camshaft gear (1) . Install Tooling (A) in place of the bolt.
4. Remove remaining bolts (2) and remove camshaft gear (1) .

NOTICE

Do not turn the crankshaft or the camshaft while the camshaft gear is removed. If the front gear group is not correctly timed during installation, interference can occur between the pistons and the valves, resulting in damage to the engine.

5. Remove Tooling (A) .

Installation Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
A	9U-6896	Guide Bolt	1

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.



Illustration 3

g00579966

NOTICE

Do not turn the crankshaft or the camshaft while the camshaft gear is removed. If the front gear group is not correctly timed during installation, interference can occur between the pistons and the valves, resulting in damage to the engine.

1. Install Tooling (A) in the top hole in the camshaft.
2. Align the hole in the back of camshaft gear (1) with the dowel in the adapter. Install camshaft gear (1) over Tooling (A) .



Illustration 4

g00579965

Note: Camshaft timing is critical. The timing mark on the camshaft gear must be aligned with the timing mark on the front cover when the No. 1 piston is at the top center of the compression stroke. Refer to Testing and Adjusting, "Gear Group (Front) - Time".

3. Verify that the timing mark on camshaft gear (1) is aligned with Timing Mark (X) on front housing (3) .

Note: If the timing marks are not aligned, remove camshaft gear (1) and rotate the camshaft until the timing marks are aligned.

4. Install bolts (2) . Remove Tooling (A) and install remaining bolt (2) .

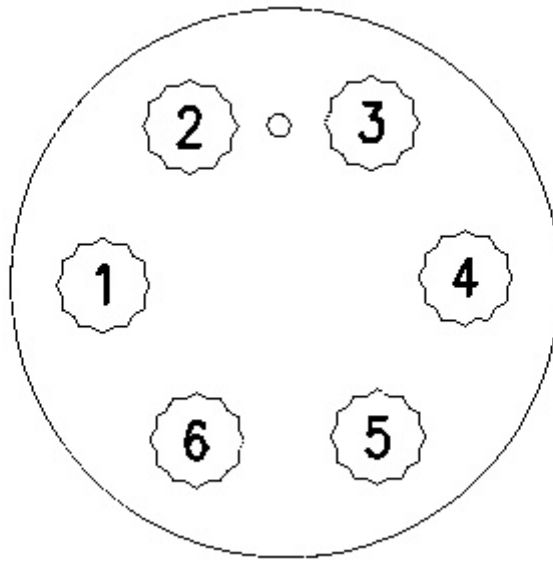


Illustration 5

g00593987

5. Tighten the bolts in a numeric sequence 1, 4, 2, 5, 3, 6, 1, 4 to a torque of 240 ± 40 N·m (175 ± 30 lb ft).
6. Check the backlash between the camshaft gear and the adjustable idler gear. The backlash should be 0.356 ± 0.254 mm (0.014 ± 0.010 inch). Refer to Testing and Adjusting, "Gear Group (Front) - Time" for the backlash adjustment procedure.

End By: Install the front cover. Refer to Disassembly and Assembly, "Front Cover - Install".

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i01995165

Camshaft Bearings - Remove

SMCS - 1211-011

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A ⁽¹⁾	8S-2241	Camshaft Bearing Tool Group	1
	8S-8290	Nut	1
	8S-8291	Threaded Shaft	1
	8S-8287	Thrust Bearing Assembly	1
	8S-8288	Cone	1
	8S-8292	Extension (Short)	2
	8S-8293	Extension (Long)	1
B	9U-7222	Camshaft Bearing Pilot	1
	8M-8778	Taperlock Stud (1/2 inch - 13 UNC by 1 9/16 inch)	1
C	9U-7223	Alignment Bushing	1
D	9U-7210	Puller Plate	1

⁽¹⁾ Part of the **8S-2241** Camshaft Bearing Tool Group

Start By:

- Remove the camshaft. Refer to Disassembly and Assembly, "Camshaft - Remove".
-

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