

Product: WHEEL LOADER

Model: 928F WHEEL LOADER 2XL

Configuration: 928F WHEEL LOADER 2XL00001-01299 (MACHINE) POWERED BY 3116 ENGINE

Disassembly and Assembly

446 and 446B Backhoe Loaders, Lexion 450 Combine, 3114 and 3116 Engines, IT18F Integrated Toolcarrier, D6M Track-Type Tractor and 928F, 950F and 950G Wheel Loaders

Media Number -SEN3611-18

Publication Date -01/05/2009

Date Updated -27/05/2009

i01935828

Cylinder Head - Remove

SMCS - 1100-011

Removal Procedure

Start By:

- a. Remove the fuel filter base. Refer to Disassembly and Assembly, "Fuel Filter Base - Remove and Install".
- b. Remove the governor. Refer to Disassembly and Assembly, "Governor - Remove".
- c. Remove the fuel control linkage. Refer to Disassembly and Assembly, "Fuel Injection Control Linkage - Remove".
- d. Remove the unit injectors. Refer to Disassembly and Assembly, "Unit Injector - Remove".
- e. Remove the water temperature regulator housing. Refer to Disassembly and Assembly, "Water Temperature Regulator Housing - Remove and Install".
- f. Remove the inlet manifold. Refer to Disassembly and Assembly, "Inlet Manifold - Remove".
- g. Remove the exhaust manifold. Refer to Disassembly and Assembly, "Exhaust Manifold - 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.

Note: For information on the reusability of the cylinder head, refer to Guideline For Reusable Parts And Salvage Operations, SEBF8218, "Specifications for Cylinder Head Assemblies 3114, 3116, and 3126 Engines" and Guideline For Reusable Parts And Salvage Operations, SEBF8162, "Procedure to Measure and Salvage Cylinder Head Assemblies and Related Components".

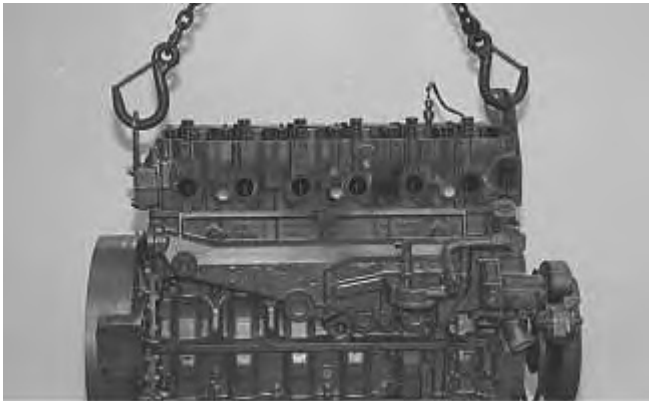


Illustration 1
Typical example

g01007597

1. Attach a suitable lifting device to the cylinder head.
-

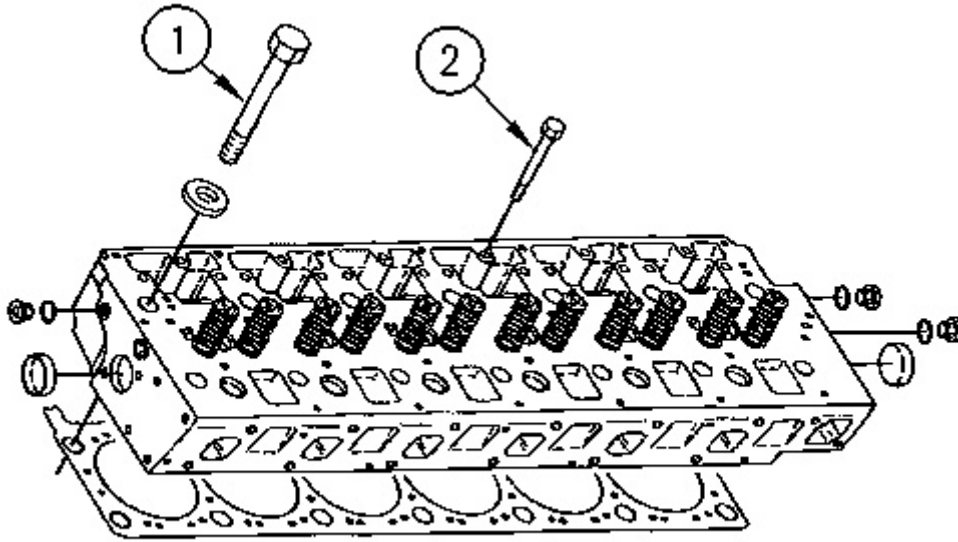


Illustration 2

g00654709

2. Remove bolts (1) and (2) that hold the cylinder head to the cylinder block. Carefully remove the cylinder head from the cylinder block. The cylinder head for the 3116 engine weighs approximately 85 kg (187 lb).

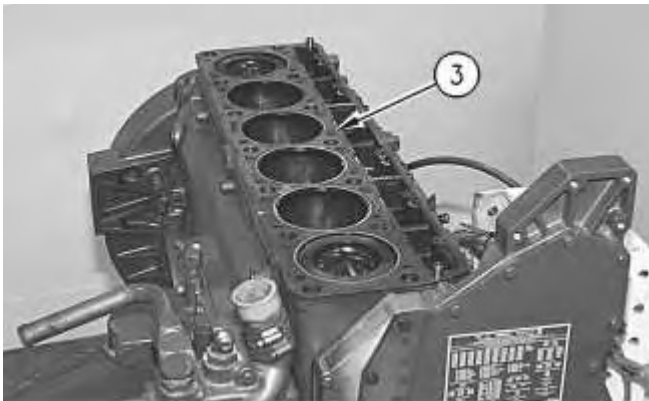


Illustration 3

g00611342

3. Remove cylinder head gasket (3).
-

Product: WHEEL LOADER

Model: 928F WHEEL LOADER 2XL

Configuration: 928F WHEEL LOADER 2XL00001-01299 (MACHINE) POWERED BY 3116 ENGINE

Disassembly and Assembly

446 and 446B Backhoe Loaders, Lexion 450 Combine, 3114 and 3116 Engines, IT18F Integrated Toolcarrier, D6M Track-Type Tractor and 928F, 950F and 950G Wheel Loaders

Media Number -SEN3611-18

Publication Date -01/05/2009

Date Updated -27/05/2009

i04147334

Cylinder Head - Install

SMCS - 1100-012

Installation Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	6V-4876	Lubricant	1

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: For information on the reusability of the cylinder head, refer to Guideline For Reusable Parts And Salvage Operations, SEBF8218, "Specifications for Cylinder Head Assemblies 3114, 3116, and 3126 Engines" and Guideline For Reusable Parts And Salvage Operations, SEBF8162, "Procedure to Measure and Salvage Cylinder Head Assemblies and Related Components".

1. Thoroughly clean the mating surfaces of the cylinder head and the cylinder block.
-

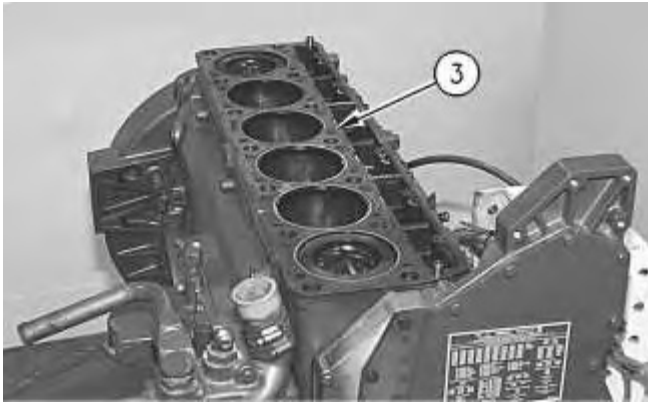


Illustration 1

g00611342

Typical example

2. Install a new cylinder head gasket (3) .

Note: For information on the cylinder head gasket for 3116 engines, refer to Special Instruction, SEHS9395, "3116 Cylinder Head Gasket Usage".

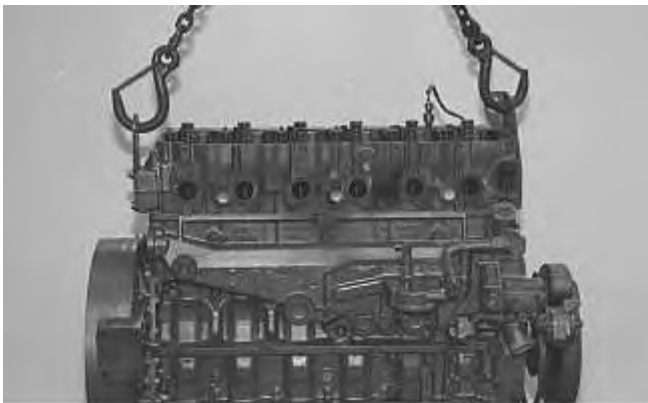


Illustration 2

g01007597

Typical example

- Note:** To avoid damage to the cylinder head gasket, use guide bolts of an appropriate size to install the cylinder head.
3. Attach a suitable lifting device to the cylinder head. Position the cylinder head assembly onto the dowels in the cylinder block. Lower the cylinder head onto the cylinder block.
-

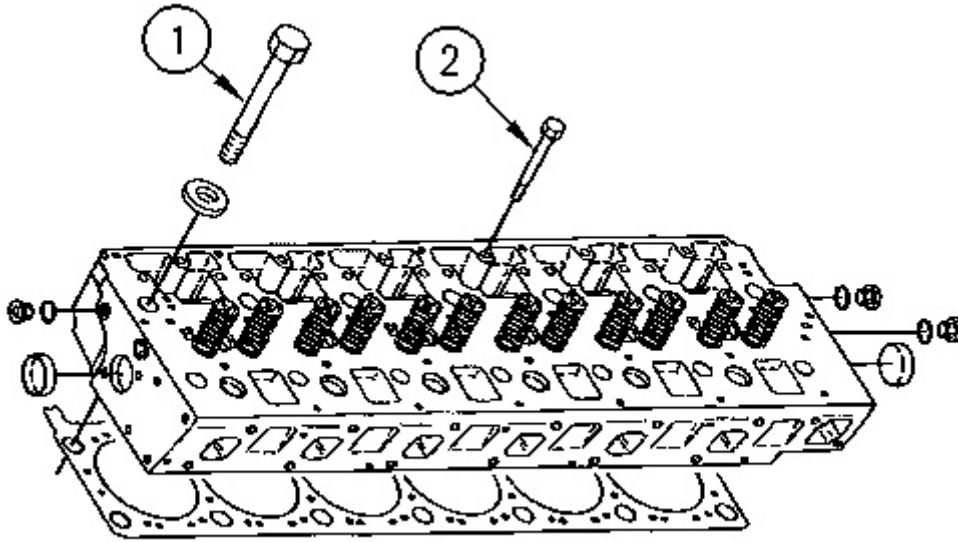


Illustration 3

g00654709

4. Inspect the condition of cylinder head bolts (1) and (2) . For information on the reusability of the bolts, refer to Guideline For Reusable Parts And Salvage Operations, SEBF8301, "Inspection and Reuse of Critical Fasteners Used in All Engines". Replace cylinder head bolts (1) and (2) , if necessary.
5. Lubricate cylinder head bolts (1) and (2) and both sides of the washers with Tooling (A) . Install cylinder head bolts (1) and (2) . Follow Step 6 for the correct tightening procedure.

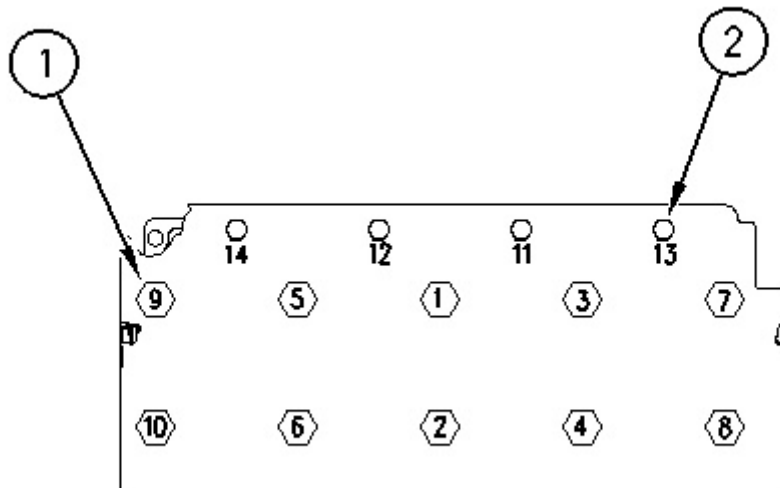


Illustration 4

g00641677

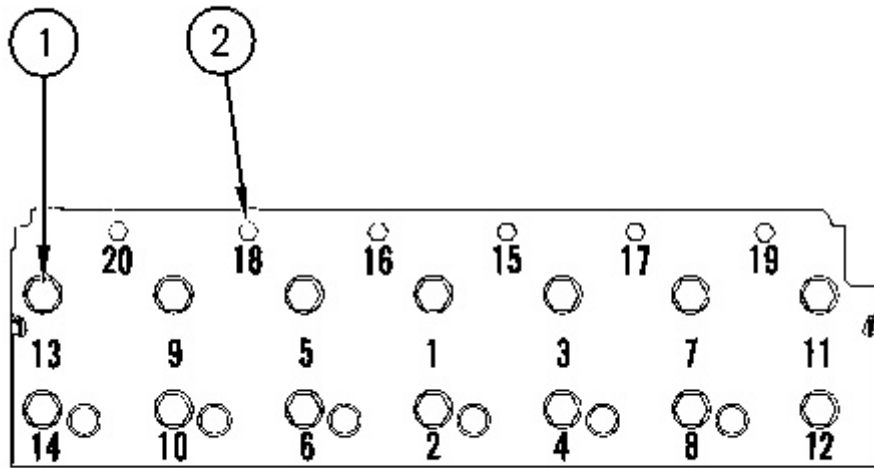


Illustration 5

g00611358

6. Tighten the cylinder head bolts according to the following procedure:
7. Tighten bolts (1) through bolt (14) in a numerical sequence to a torque of 300 ± 15 N·m (221 ± 11 lb ft).
8. Loosen bolts (1) through bolt (14) to a torque of 0 N·m.
9. Tighten bolts (1) through bolt (14) again in a numerical sequence to a torque of 130 ± 15 N·m (96 ± 11 lb ft).
10. Retighten bolts (1) through bolt (14) again in a numerical sequence to a torque of 130 ± 15 N·m (96 ± 11 lb ft).
11. Turn bolts (1) through bolt (14) by numerical sequence an additional 90° (1/4 turn).
12. Tighten bolt (15) through bolt (20) in a numerical sequence to a torque of 55 ± 7 N·m (41 ± 5 lb ft).

End By:

- a. Install the exhaust manifold. Refer to Disassembly and Assembly, "Exhaust Manifold - Remove and Install".
 - b. Install the inlet manifold. Refer to Disassembly and Assembly, "Inlet Manifold - Install".
 - c. Install the water temperature regulator housing. Refer to Disassembly and Assembly, "Water Temperature Regulator Housing- Remove and Install".
 - d. Install the unit injectors. Refer to Disassembly and Assembly, "Unit Injector - Install".
 - e. Install the fuel control linkage. Refer to Disassembly and Assembly, "Fuel Injection Control Linkage - Install".
 - f. Install the governor. Refer to Disassembly and Assembly, "Governor - Install".
 - g. Install the fuel filter base. Refer to Disassembly and Assembly, "Fuel Filter Base - Remove and Install".
-

Product: WHEEL LOADER

Model: 928F WHEEL LOADER 2XL

Configuration: 928F WHEEL LOADER 2XL00001-01299 (MACHINE) POWERED BY 3116 ENGINE

Disassembly and Assembly

446 and 446B Backhoe Loaders, Lexion 450 Combine, 3114 and 3116 Engines, IT18F Integrated Toolcarrier, D6M Track-Type Tractor and 928F, 950F and 950G Wheel Loaders

Media Number -SEN3611-18

Publication Date -01/05/2009

Date Updated -27/05/2009

i01930413

Lifter Group - Remove and Install

SMCS - 1209-010

Removal Procedure

Start By:

- a. Remove the rocker shaft and the pushrods. Refer to Disassembly and Assembly, "Rocker Shaft and Pushrod - Remove".

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.

Note: For information on reusability of components of the lifter group, refer to Guideline For Reusable Parts And Salvage Operations, SEBF8264, "Camshaft Roller Followers Used in 3114 and 3116 Engines" and Guideline For Reusable Parts And Salvage Operations, SEBF8067, "Slipper Followers and Camshaft Roller Followers".

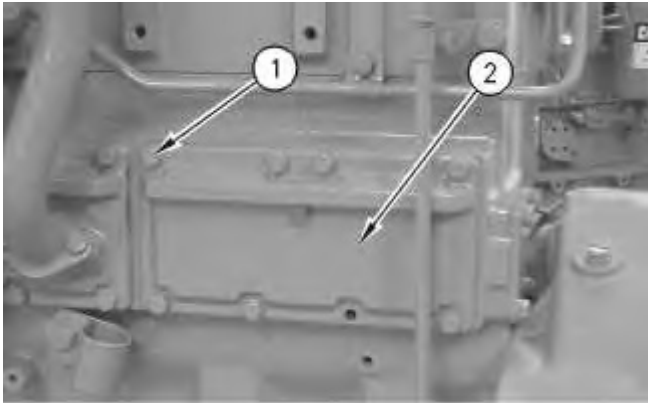


Illustration 1

g00747310

1. Remove bolts (1) from cover (2).
2. Carefully remove cover (2) and the gasket.

Note: It may be necessary to remove the governor in order to remove the cover at the front of the engine.

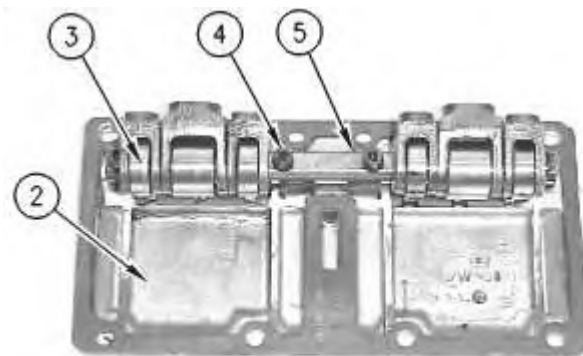


Illustration 2

g00629677

3. Remove bolts (4), lifter shaft (5), and lifters (3) from cover (2).

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: For information on reusability of components of the lifter group, refer to Guideline For Reusable Parts And Salvage Operations, SEBF8264, "Camshaft Roller Followers Used in 3114 and 3116 Engines" and Guideline For Reusable Parts And Salvage Operations, SEBF8067, "Slipper Followers and Camshaft Roller Followers".

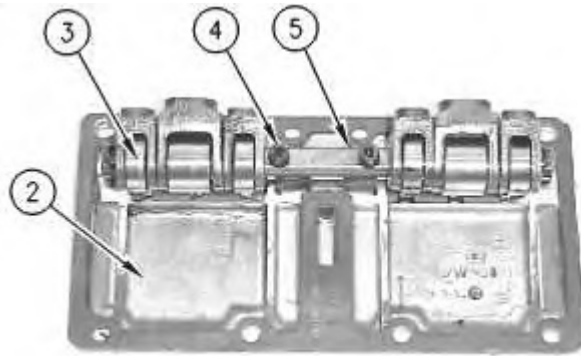


Illustration 3

g00629677

1. Position lifters (3) and lifter shaft (5) on cover (2). Install bolts (4).
-

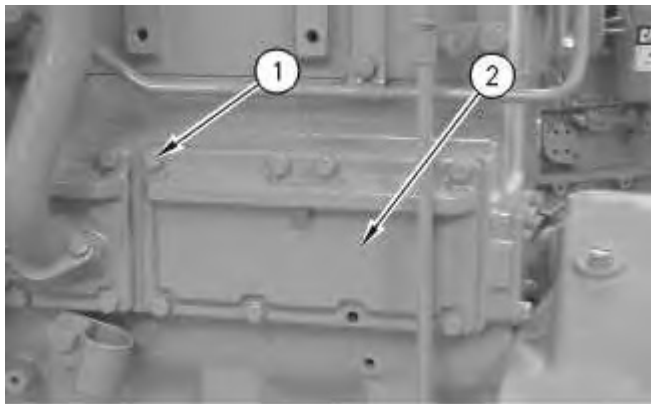


Illustration 4

g00747310

2. Position the gasket and cover (2) on the engine.
3. Install bolts (1) in cover (2).

End By:

- a. Install the rocker shaft and the pushrods. Refer to Disassembly and Assembly, "Rocker Shaft and Pushrod - Install".
-

Product: WHEEL LOADER

Model: 928F WHEEL LOADER 2XL

Configuration: 928F WHEEL LOADER 2XL00001-01299 (MACHINE) POWERED BY 3116 ENGINE

Disassembly and Assembly

446 and 446B Backhoe Loaders, Lexion 450 Combine, 3114 and 3116 Engines, IT18F Integrated Toolcarrier, D6M Track-Type Tractor and 928F, 950F and 950G Wheel Loaders

Media Number -SEN3611-18

Publication Date -01/05/2009

Date Updated -27/05/2009

i01930426

Camshaft - Remove

SMCS - 1210-011

Removal Procedure

Start By:

- a. Remove the governor. Refer to Disassembly and Assembly, "Governor - Remove".
- b. Remove the side covers. Refer to Disassembly and Assembly, "Lifter Group - Remove and Install".
- c. Remove the front cover. Refer to Disassembly and Assembly, "Front Cover - Remove".

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.

Note: For information on reusability of the camshaft, refer to Guideline For Reusable Parts And Salvage Operations, SEBF8097, "Camshaft Measurement", Guideline For Reusable Parts And Salvage Operations, SEBF8146, "Visual Inspection of Camshafts", and Guideline For Reusable Parts And Salvage Operations, SEBF8251, "Specifications for Measurement of Camshafts in 3114/3116 Engines". For information on reusability of the camshaft gear, refer to Guideline For Reusable Parts And Salvage Operations, SEBF8045, "Timing Gears for All Engines".

Note: The air compressor was removed in order to accommodate the engine repair stand.

Note: It is not necessary to remove the cylinder head for removal of the camshaft.

1. Turn the crankshaft to top center compression stroke for the No. 1 piston. Install the timing bolt in the flywheel. This is for timing during installation.



Illustration 1

g01007643

Typical example

2. Ensure that timing mark (1) on the camshaft gear is aligned with timing mark (2) on the idler gear.
-

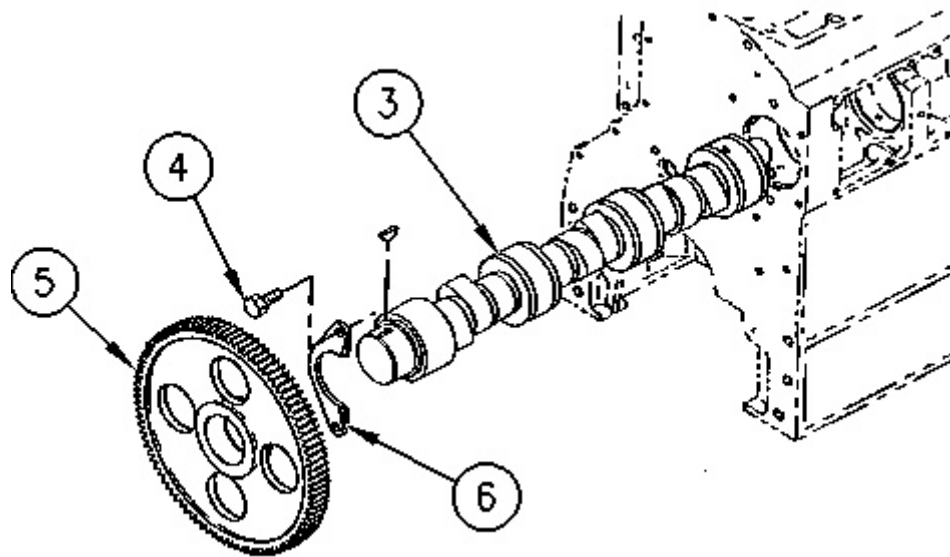


Illustration 2

g01007645

3. Remove bolts (4) and camshaft retainer plate (6).
 4. Remove camshaft gear (5) and camshaft (3) from the cylinder block.
-

Product: WHEEL LOADER

Model: 928F WHEEL LOADER 2XL

Configuration: 928F WHEEL LOADER 2XL00001-01299 (MACHINE) POWERED BY 3116 ENGINE

Disassembly and Assembly

446 and 446B Backhoe Loaders, Lexion 450 Combine, 3114 and 3116 Engines, IT18F Integrated Toolcarrier, D6M Track-Type Tractor and 928F, 950F and 950G Wheel Loaders

Media Number -SEN3611-18

Publication Date -01/05/2009

Date Updated -27/05/2009

i01936378

Camshaft - Install

SMCS - 1210-012

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: For information on reusability of the camshaft, refer to Guideline For Reusable Parts And Salvage Operations, SEBF8097, "Camshaft Measurement", Guideline For Reusable Parts And Salvage Operations, SEBF8146, "Visual Inspection of Camshafts", and Guideline For Reusable Parts And Salvage Operations, SEBF8251, "Specifications for Measurement of Camshafts in 3114/3116 Engines". For information on reusability of the camshaft gear, refer to Guideline For Reusable Parts And Salvage Operations, SEBF8045, "Timing Gears for All Engines".

1. Lubricate the camshaft and the camshaft bearings with clean engine oil.
-

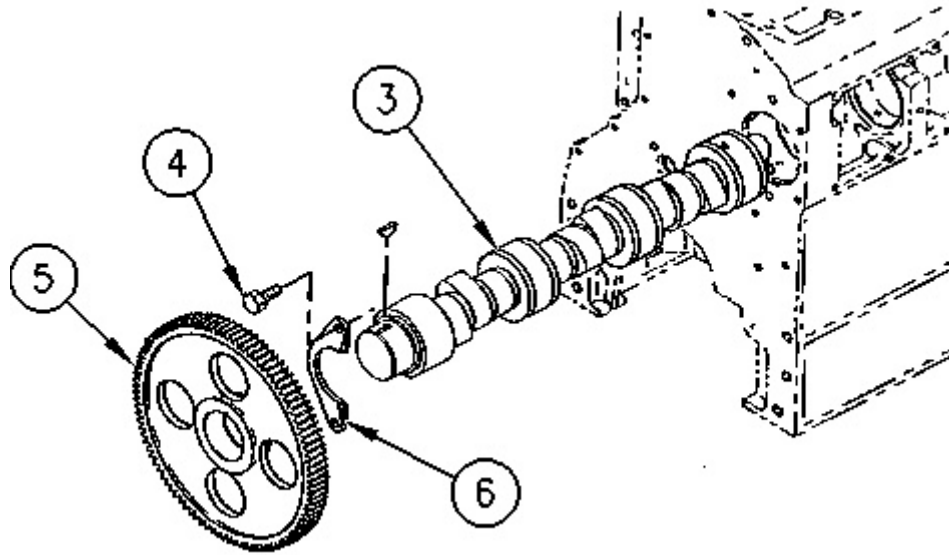


Illustration 1

g01007645

2. Carefully install camshaft (3) and camshaft gear (5) in the engine.

NOTICE

When installing the camshaft, make sure the number one cylinder is at top center of the compression stroke with the timing bolt installed in the flywheel. The camshaft timing is very important. The timing mark on the camshaft drive gear must line up with the timing mark on the idler gear. Refer to the Specifications Manual for more information.



Illustration 2

g01007643

Typical example

3. Ensure that timing mark (1) on the camshaft gear is aligned with timing mark (2) on the idler gear.

4. Install camshaft retainer plate (6) and bolts (4).

End By:

- a. Install the front cover. Refer to Disassembly and Assembly, "Front Cover - Install".
 - b. Install the side cover. Refer to Disassembly and Assembly, "Lifter Group - Remove and Install".
 - c. Install the governor. Refer to Disassembly and Assembly, "Governor - Install".
-

Product: WHEEL LOADER

Model: 928F WHEEL LOADER 2XL

Configuration: 928F WHEEL LOADER 2XL00001-01299 (MACHINE) POWERED BY 3116 ENGINE

Disassembly and Assembly

446 and 446B Backhoe Loaders, Lexion 450 Combine, 3114 and 3116 Engines, IT18F Integrated Toolcarrier, D6M Track-Type Tractor and 928F, 950F and 950G Wheel Loaders

Media Number -SEN3611-18

Publication Date -01/05/2009

Date Updated -27/05/2009

i01171077

Camshaft Gear - Remove and Install

SMCS - 1210-010-GE

Removal Procedure

Start By:

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

Note: For information on reusability of the camshaft gear, refer to Guideline For Reusable Parts And Salvage Operations, SEBF8045, "Timing Gears for All Engines".

1. Wrap the camshaft with a protective covering in order to prevent damage to the camshaft.

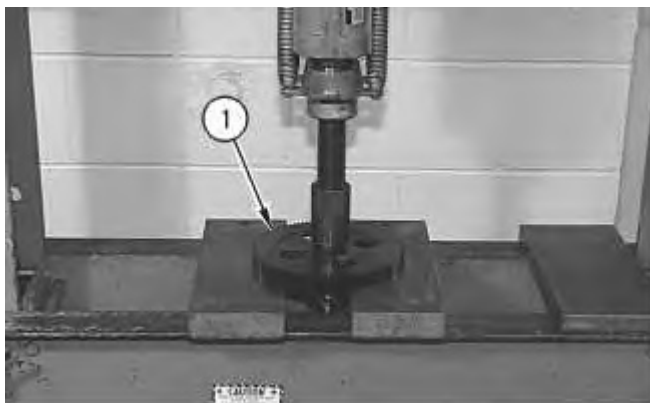


Illustration 1

g00611152

NOTICE

Do not allow the camshaft to fall to the floor when pressing it from the drive gear. Also make sure that the camshaft lobes do not catch on the press plates.

2. Place the camshaft and camshaft gear (1) in a suitable press. Press the camshaft from camshaft gear (1).

Installation Procedure

Note: For information on reusability of the camshaft gear, refer to Guideline For Reusable Parts And Salvage Operations, SEBF8045, "Timing Gears for All Engines".

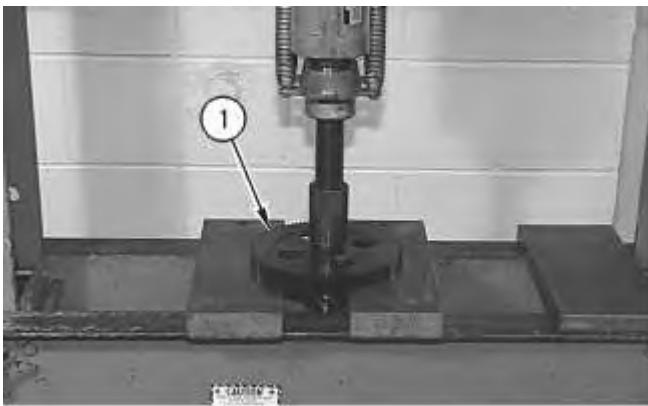


Illustration 2

g00611152

1. Heat the camshaft gear to a maximum temperature of 315 °C (600 °F).
2. Align the key in the camshaft with the groove (keyway) in the camshaft gear.
3. Install the camshaft gear on the end of the camshaft.

End By:

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

Product: WHEEL LOADER

Model: 928F WHEEL LOADER 2XL

Configuration: 928F WHEEL LOADER 2XL00001-01299 (MACHINE) POWERED BY 3116 ENGINE

Disassembly and Assembly

446 and 446B Backhoe Loaders, Lexion 450 Combine, 3114 and 3116 Engines, IT18F Integrated Toolcarrier, D6M Track-Type Tractor and 928F, 950F and 950G Wheel Loaders

Media Number -SEN3611-18

Publication Date -01/05/2009

Date Updated -27/05/2009

i01580049

Pistons and Connecting Rods - Remove

SMCS - 1225-011

Removal Procedure

Start By:

- a. Remove the cylinder head. Refer to Disassembly and Assembly, "Cylinder Head - Remove".
- b. Remove the engine oil pump. Refer to Disassembly and Assembly, "Engine Oil Pump - Remove".
- c. Remove the piston cooling jets. Refer to Disassembly and Assembly, "Piston Cooling Jets - Remove and Install".

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: For information on reusability of the pistons, refer to the following list.

- Guideline For Reusable Parts And Salvage Operations, SEBF8049, "Pistons"
- Guideline For Reusable Parts And Salvage Operations, SEBF8228, "Procedure to Clean and Inspect One and Two-Piece Pistons in 3114/3116 Engines"

- Guideline For Reusable Parts And Salvage Operations, SEBF8290, "Visual Inspection of Two-Piece Pistons"

Note: For information on reusability of the connecting rods, refer to the following list.

- Guideline For Reusable Parts And Salvage Operations, SEBF8206, "Specifications for Connecting Rods on 3116 Engines"
- Guideline For Reusable Parts And Salvage Operations, SEBF8063, "Visual Inspection of Connecting Rods"
- Guideline For Reusable Parts And Salvage Operations, SEBF8064, "Salvage of Non-Serrated Connecting Rods"

Note: For information on reusability of the piston pins, refer to the following list.

- Guideline For Reusable Parts And Salvage Operations, SEBF8051, "Piston Pins and Retaining Rings"
- Guideline For Reusable Parts And Salvage Operations, SEBF8303, "Procedure to Inspect Piston Pins"

Note: For information on reusability of the rod eye bushing, refer to the following list.

- Guideline For Reusable Parts And Salvage Operations, SEBF8242, "Verification of Connecting Rod Eye Bushing Retention Using 5P-8639 Connecting Rod Bushing Press Group"
- Guideline For Reusable Parts And Salvage Operations, SEBF8274, "Using Rod Eye Bushing Installation and Removal Tools"

Note: For information on reusability of the cylinder block and salvage procedures, refer to the following list.

- Guideline For Reusable Parts And Salvage Operations, SEBF8192, "Specifications and Salvage for Cylinder Blocks on 3114, 3116, 3126 Engines"
 - Guideline For Reusable Parts And Salvage Operations, SEBF8261, "Installing a 7C-6208 Cylinder Sleeve in 3114, 3116 Engines and a 107-7604 Cylinder Sleeve in 3126 Engines"
 - Special Instruction, GMG00981, "Using 1P-3537 Dial Bore Gauge Group to Check Cylinder Bore Size"
 - Special Instruction, SMHS7606, " Use of 1P-4000 Line Boring Tool Group"
 - Special Instruction, SEHS8841, " Using the Ironstitch Procedure for Casting Salvage"
 - Special Instruction, SEHS8919, "Salvage Weld Procedure for Cast Iron Cylinder Blocks"
 - Guideline For Reusable Parts And Salvage Operations, SEBF8076, "Specifications to Salvage Cylinder Block Contact Surfaces"
 - Special Instruction, SEHS8869, "Cylinder Block Salvage Procedure Using Belzona Ceramic R Metal"
-

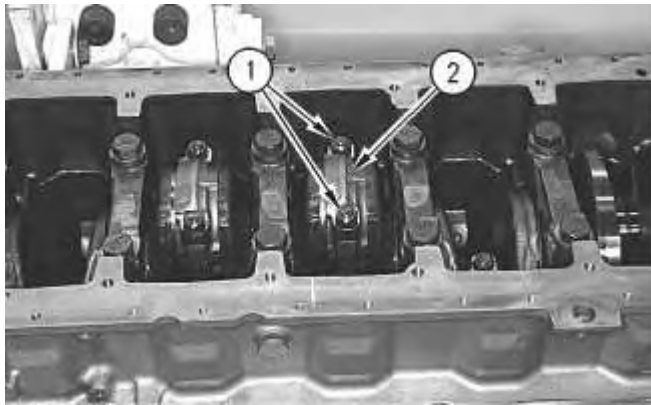


Illustration 1

g00610269

1. Inspect the connecting rod and connecting rod cap (2) for the proper identification mark. The connecting rod and connecting rod cap (2) should have an etched number on the side that is toward the right side of the engine. The number should match the cylinder number. Mark the connecting rod and connecting rod cap (2), if necessary.

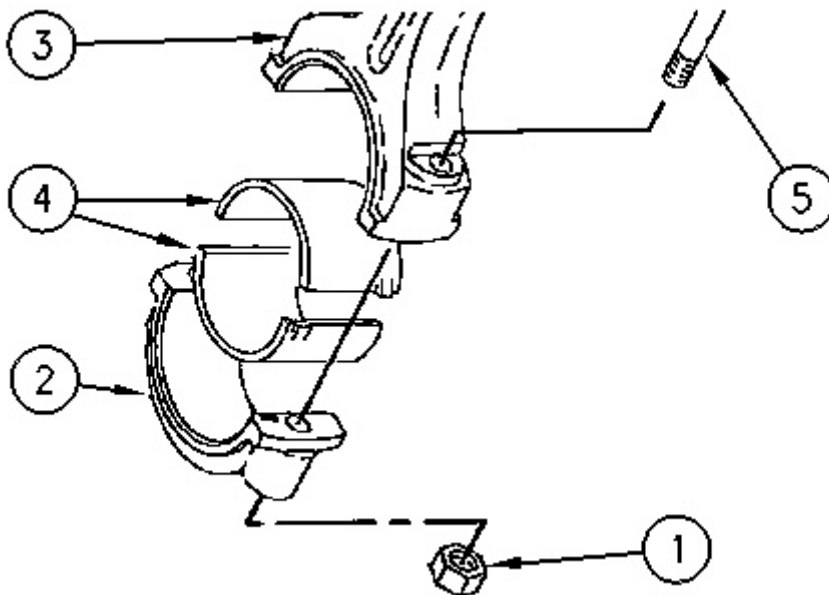


Illustration 2

g00610272

2. Remove connecting rod cap nuts (1), bolts (5), and connecting rod cap (2).
3. Remove the lower half of bearing (4) from connecting rod cap (2).

NOTICE

Install short pieces of rubber hose over both connecting rod bolts in order to protect the crankshaft from the threaded portion of the connecting rod bolts.

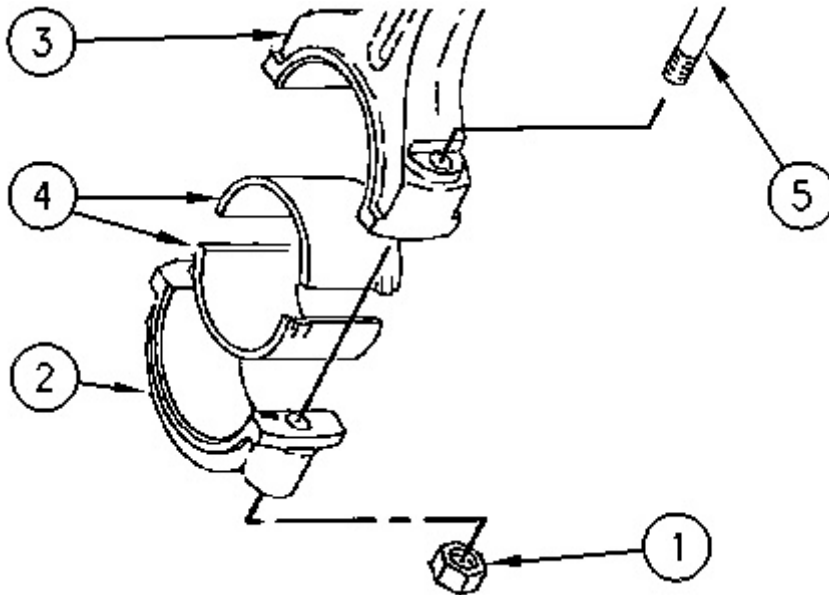


Illustration 3

g00610272

4. Push the piston and connecting rod away from the crankshaft. Remove the upper half of connecting rod bearing (4) from connecting rod (3).
 5. Remove the piston and connecting rod (3) from the cylinder block.
 6. Repeat Steps 1 through 5 for the remaining pistons and connecting rods.
-

Product: WHEEL LOADER

Model: 928F WHEEL LOADER 2XL

Configuration: 928F WHEEL LOADER 2XL00001-01299 (MACHINE) POWERED BY 3116 ENGINE

Disassembly and Assembly

446 and 446B Backhoe Loaders, Lexion 450 Combine, 3114 and 3116 Engines, IT18F Integrated Toolcarrier, D6M Track-Type Tractor and 928F, 950F and 950G Wheel Loaders

Media Number -SEN3611-18

Publication Date -01/05/2009

Date Updated -27/05/2009

i01983492

Pistons and Connecting Rods - Disassemble

SMCS - 1225-015

Disassembly Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	1U-6683	Ring Expander	1
B	1P-1861	Retaining Ring Pliers	1

Start By:

- Remove the pistons and the connecting rods. Refer to Disassembly and Assembly, "Pistons and Connecting Rods - Remove".

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

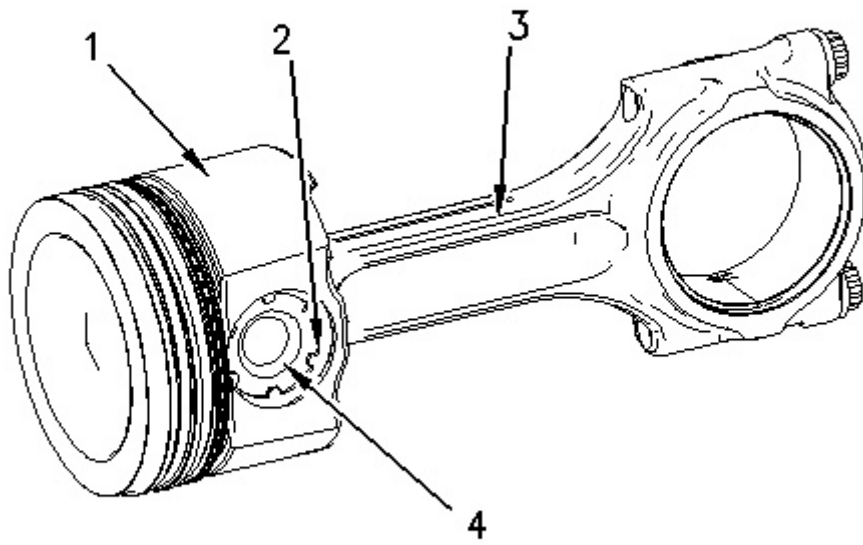


Illustration 1

g00988677

1. Use Tooling (B) to remove retaining ring (2). Remove piston pin (4) and separate piston (1) from connecting rod (3).
-

Thank you so much for reading.
Please click the “Buy Now!”
button below to download the
complete manual.



After you pay.

You can download the most
perfect and complete manual in
the world immediately.

Our support email:

ebooklibonline@outlook.com