CATERPILLAR®

Service Repair Manual

Models

D5HTSK II TRACK SKIDDER

Product: TRACK SKIDDER
Model: D5HTSK II TRACK SKIDDER 7EG
Configuration: D5H Track-Type Skidder Series II 7EG00001-UP (MACHINE) POWERED BY 3304 Engine

Disassembly and Assembly
3304 MACHINE ENGINE FOR D4H SERIES III AND D5H SERIES II TRA
Media Number -SENR3253-01 **Publication Date -01/09/1992** **Date Updated -20/07/2010**

SENR32530027

Valves

SMCS - 1105-011; 1105-012

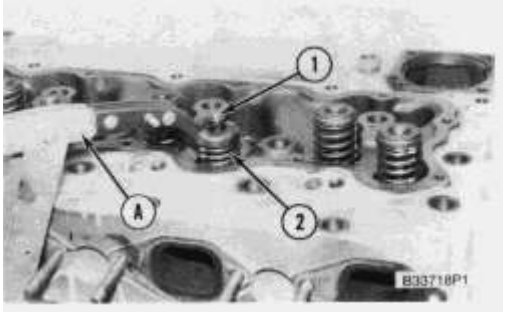
Remove Valves

Tools Needed		A	B
5S1330	Valve Spring Compressor Assembly	1	
8S2263	Valve Spring Tester		1

Start By:

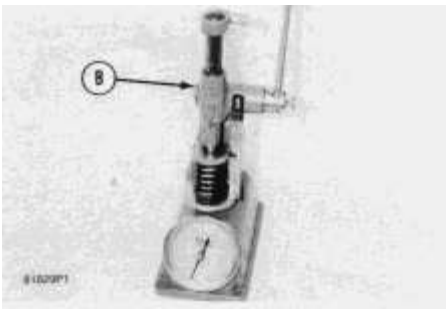
a. remove fuel injection nozzles

b. remove cylinder head assembly and spacer plate



1. Put compression on valve spring (2) with tool (A), and remove locks (1).

2. Remove tool (A), rotocoil, spring, valve stem oil shield and valve. Put identification marks on valves with respect to their location in the cylinder head.

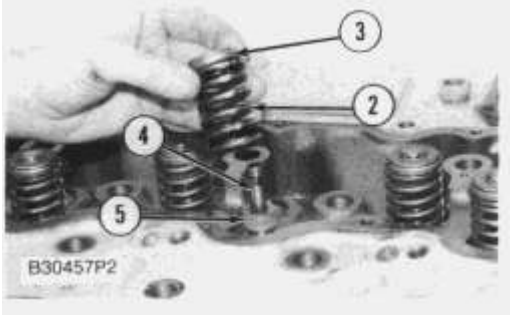


3. Check the spring force with tool (B). The spring force is **257 ± 25 N (57.8 ± 5.6 lb).** The length of spring under test force is **44.86 mm (1.766 in).** The free length after test is **52.07 mm (2.050 in).**

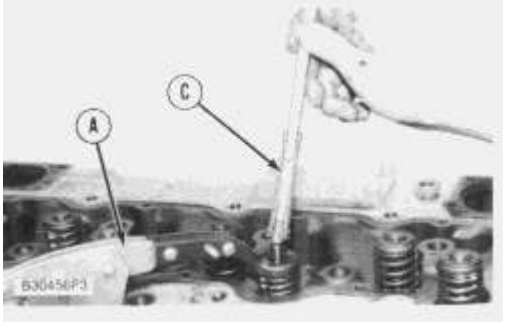
4. Do Steps 1 through 3 again for the remainder of the valves.

Install Valves

Tools Needed		A	C
5S1330	Valve Spring Compressor Assembly	1	
5S1322	Valve Keeper Inserter		1



1. Put clean engine oil on the valve stems. Install valve (4), oil shield (5), spring (2) and rotocoil (3) in the cylinder head.



2. Put tool (A) in position on the valve spring, and install the locks with tool (C).

WARNING

Locks can be thrown from the valve when the compressor is released if they are not in their correct position on the valve stem. Personal injury can be the result if not carefully removed.

3. Remove tool (A), and hit the top of the valve with a plastic hammer to be sure the locks are in their correct position on valve.

4. Do Steps 1 through 3 again for the remainder of the valves.

End By:

a. install cylinder head assembly and spacer plate

b. install fuel injection nozzles

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SENR32530028

Valve Guides

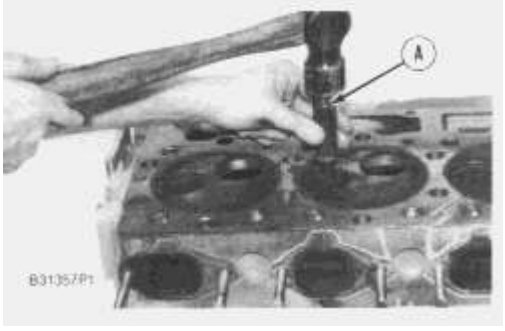
SMCS - 1104-010

Remove And Install Valve Guides

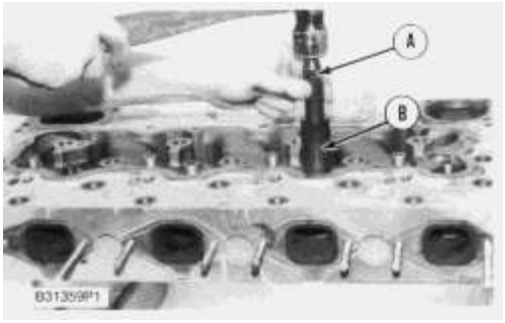
Tools Needed		A	B
7S8859	Guide Driver	1	
7S8858	Bushing		1

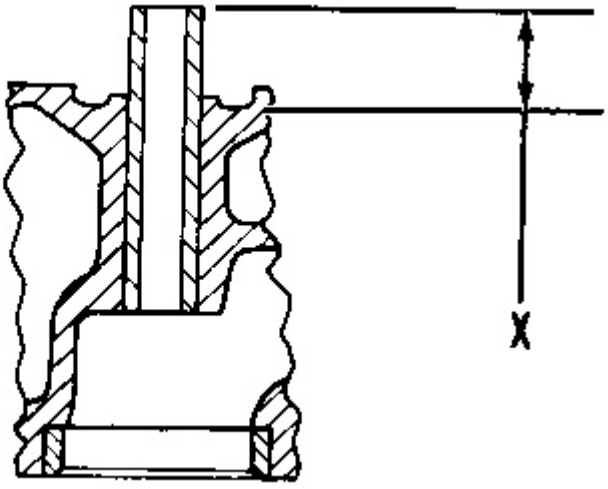
Start By:

a. remove valves



1. Remove the valve guides from the cylinder head with tool (A).





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2. Put clean engine oil on the outside diameter of the valve guide. Install the valve guide with tooling (A) and (B). Dimension "X" from the top of the valve guide to the cylinder head is **22.23 ± .025 mm (.875 ± .010 in).**

3. The inside diameter of a new valve guide after installation must be a minimum of **9.456 mm (.3723 in).** The maximum inside diameter for a worn guide must not be more than **9.581 mm (.3772 in).**

End By:

install valves

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SENR32530029

Valve Seat Inserts

SMCS - 1103-010

Remove And Install Valve Seat Inserts

Tools Needed		A	B
6V4805	Valve Seat Extractor Tool Group*	1	
1P510	Driver Group		1

*Special Instruction, Form No. SMHS7935, Use of 6V4805 Valve Seat Insert Puller Group is included with the tool group.

Start By:

a. remove valves

1. Use tooling (A) to remove the valve seat inserts from the cylinder head.

2. Clean and remove any burrs from the valve seat bores.

NOTE: For reconditioning information of the cylinder head, see Service Training Meeting Guide, Form No. SESV1202.

NOTE: The following steps are for the installation of the valve seat inserts.

3. Lower the temperature of the new valve seat inserts. Use tooling (B), and install the new valve seat inserts in the cylinder head.

End By:

a. install valves

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SENR32530030

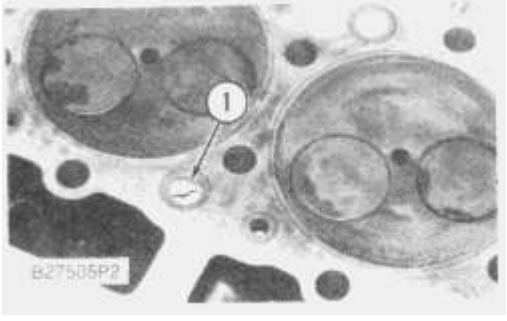
Water Directors

SMCS - 1115-010

Remove And Install Water Directors

Start By:

a. remove cylinder head assembly and spacer plate



1. Remove old water directors (1) from the cylinder head.

2. Clean the cylinder head.

3. Install new water directors in the cylinder head with the notch in the water director in alignment with the "V" mark on the cylinder head. Install the water director to a depth of **0.8 ± 0.6 mm (.03 ± .02 in)** below the surface of the cylinder head.

End By:

a. install cylinder head assembly and spacer plate

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SENR32530031

Pistons And Connecting Rods

SMCS - 1225-011; 1225-012; 1225-015; 1225-016

Remove Pistons And Connecting Rods

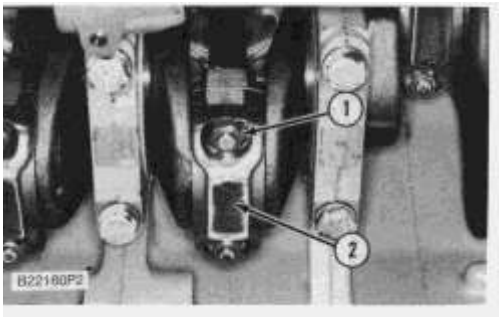
Start By:

a. remove cylinder head assembly and spacer plate

b. remove oil pan plate

c. remove oil pump

1. Remove the carbon ring and lip from the inner surface of the cylinder liner.



2. Turn the crankshaft until two of the pistons are at bottom center. Remove the nuts and bolts (1) from the connecting rods that are at bottom center. Remove connecting rod caps (2), and put identification marks on them for installation purposes.

NOTICE

Do not let the connecting rods hit the crankshaft or the bottom edge of the cylinder liners when the pistons are removed.

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3. Push the connecting rods and pistons away from the crankshaft until the piston rings are out of the cylinder liners. Remove the two pistons from the engine.

4. Keep each connecting rod cap with its respective connecting rod and piston. Put identification marks on each piston as to its location in the engine.

5. Do Steps 1 through 4 for the removal of the remaining pistons.

Install Pistons And Connecting Rods

Tools Needed		A
5P3525	Ring Compressor	1

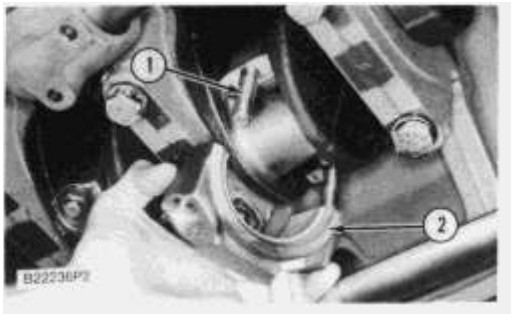
1. Turn the crankshaft until the bearing journals for the pistons to be installed are at bottom center.

2. Put clean engine oil on the crankshaft journals and on the inside of the cylinder liners. Put clean engine oil on the piston rings and the connecting rod bearings.

3. Move the piston rings on the pistons until the ring openings are approximately **90° apart.**

4. Put the piston in the cylinder liner with the "V" mark on the piston in alignment with the "V" mark on the cylinder block. Put tooling (A) in position on the cylinder block and compress the piston rings.

5. Push the piston into the cylinder liner and out of the ring compressor.



6. Pull the connecting rod into position on the crankshaft as shown. Install connecting rod bolts (1) in the connecting rods.

7. Put clean engine oil on the lower half of the connecting rod bearing. Put **2P2506 Thread Lubricant** on the bolt threads and on the surfaces of the nuts that make contact with the connecting rod caps.

NOTICE

When the connecting rod caps are installed, make sure the number on the side of the cap is next to, and respective with, the number on the side of the connecting rod.

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8. Install connecting rod caps (2) and the nuts that hold them. Tighten the nuts to a torque of **40 ± 4 N·m (30 ± 3 lb ft).** Put a mark on each nut as to its location, and tighten them **90° more.**

9. Do Steps 1 through 8 for the remainder of the pistons.

End By:

a. install oil pump

b. install oil pan plate

c. install cylinder head assembly and spacer plate

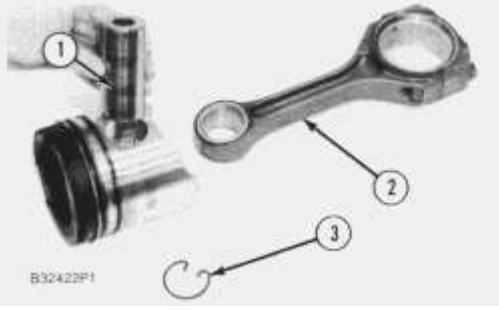
Disassemble Pistons and Connecting Rods

Tools Needed		A	B
7S9470	Ring Expander	1	
5P8639	Press Group		1
6V2049	Adapter		1
6V3029	Spacer		1
5P8645	Adapter		1
2D2825	Hand Pump		1
8F24	Hose Assembly		1
1P2375	Coupler Assembly		1
1P2376	Coupler Assembly		1

Start By:

a. remove pistons and connecting rods

1. Remove the rings from the pistons with tool (A).



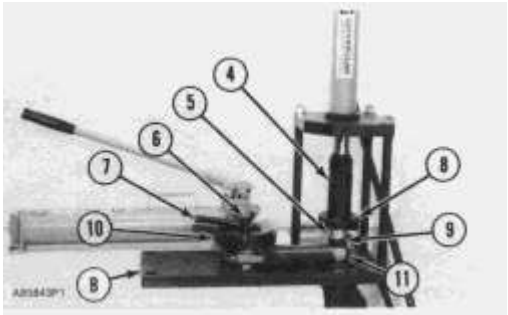
2. Remove retaining ring (3), piston pin (1) and connecting rod (2) from the piston.

3. Clean the piston ring grooves on the old piston with an acceptable ring groove tool.

4. See, Use Of Piston Pin Bearing Removal And Installation Tools, Special Instruction, Form No. SMHS7295, for more information about removal and installation of piston pin bearings.

NOTE: Be sure to remove the bearings from the crankshaft end of connecting rod.

5. Heat the connecting rod in an oven to a temperature of **177° to 260° C (350° to 500° F).** Never use a direct flame to heat a connecting rod.



6. Put **6V3029 Spacer** (11) in the base plate. Put the connecting rod on the base plate of tooling (B).

7. Put the connecting rod piston pin bearing end in the center of the port assembly of tooling (B). Install pin (6) in the center of the bore of the connecting rod bearing.

8. Install **6V2049 Adapter** (9). Put the hole in the adapter in alignment with the hole in the base plate of tooling (B).

9. Install clamp bar (10) and clamp pin (7).

NOTE: The old bearing is pushed out by tooling (B) as the new bearing is installed.

10. Put **5P8645 Pusher Adapter** (8) in position, as shown, with the taper side down. The piston pin bearing joint must be in alignment with the hole in adapter (9) and the base plate of tooling (B).

11. Put pusher (4) on adapter (8).

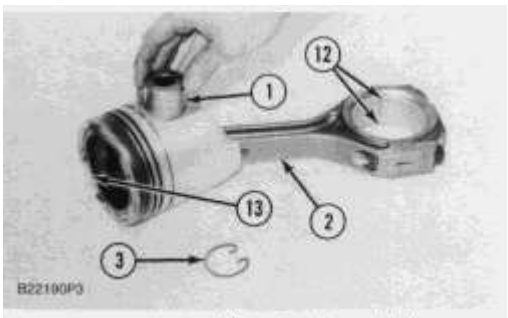
12. Use tooling (B) to push the new piston pin bearing (5) into the connecting rod until adapter (8) of tooling (B) makes full contact with the connecting rod surface.

13. Remove the connecting rod and the old piston pin bearing from tooling (B).

14. Check the piston pin bearing bore diameter after the bearing is installed. The correct dimension is **43.210 ° 0.008 mm (1.7012 ° .0003 in).** The maximum permissible clearance between the bearing and piston pin (worn) must not be more than **0.08 mm (.003 in).**

Assemble Pistons And Connecting Rods

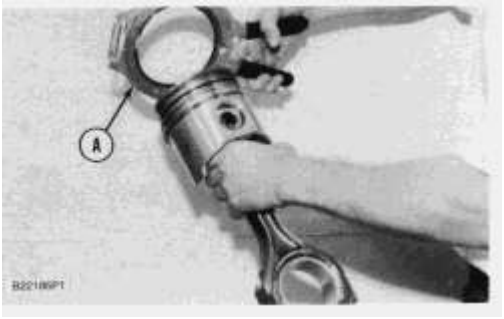
Tools Needed		A
7S9470	Ring Expander	1



1. Install connecting rod (2) in the piston with the bearing tab groove (slot) (12) on the same side as the cutout (depression) (13) on the head of the piston.

2. Install piston pin (1) and retaining rings (3) in the piston.

3. When old pistons are to be used, clean the piston grooves with an acceptable piston groove cleaning tool.



4. Install the spring for the oil ring. Install the oil ring with tool (A). The gap in the ring must be approximately **180°** from the ring spring connections.

5. The two compression rings have marks **"UP-1" and "UP-2".** The rings must be installed with these marks toward the top of the piston with **"UP-1"** as the top ring. After installation of all three piston rings, put piston rings in position so the gaps in rings are **120° apart.**

NOTE: Compression rings that do not have identification can be installed either way.

6. To check the clearance between the piston ring grooves and rings, see Specifications.

7. See Specifications to check the clearance between the ends of the piston rings (end gap).

End By:

a. install pistons and connecting rods

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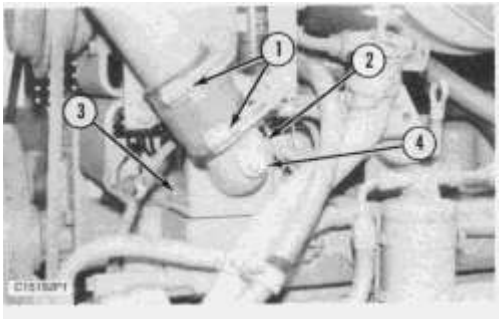
SENR32530032

Water Temperature Regulator

SMCS - 1355-010

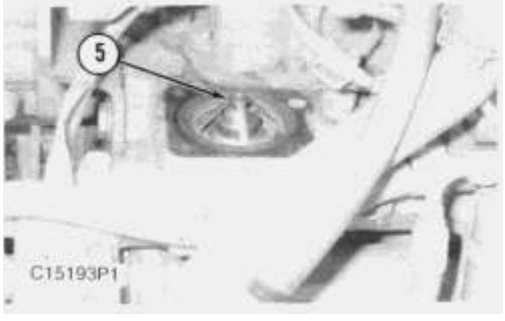
Remove And Install Water Temperature Regulator

1. Drain the coolant in the cooling system to a level below the water temperature regulator.



2. Loosen two hose clamps (1), and move the hose off of elbow (4).

3. Remove two bolts (2) and two bolts (3). Remove elbow (4) and the gasket from the cylinder head.



4. Remove water temperature regulator (5) from the cylinder head.

NOTE: The following steps are for installation of the water temperature regulator.

5. Clean all gasket material and rust from the contact surfaces of the elbow and cylinder head.

NOTICE

The engine will run hot if the water temperature regulator is installed incorrectly.

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6. Install water temperature regulator (5) in the cylinder head with the spring toward the inside as shown.

NOTICE

Make sure the vent hole is open, and do not use liquid gasket material on the gasket. The cylinder head assembly can be damaged if the vent hole is not open and if the gasket is installed wrong.

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7. Install the gasket with the notch over the vent hole in the cylinder head.

8. Put elbow (4) in position on the cylinder head. Install two bolts (2) and two bolts (3) that hold the elbow.

9. Move the hose into position on elbow (4), and tighten two hose clamps (1).

10. Fill the cooling system with coolant to the correct level. See the Maintenance Guide.

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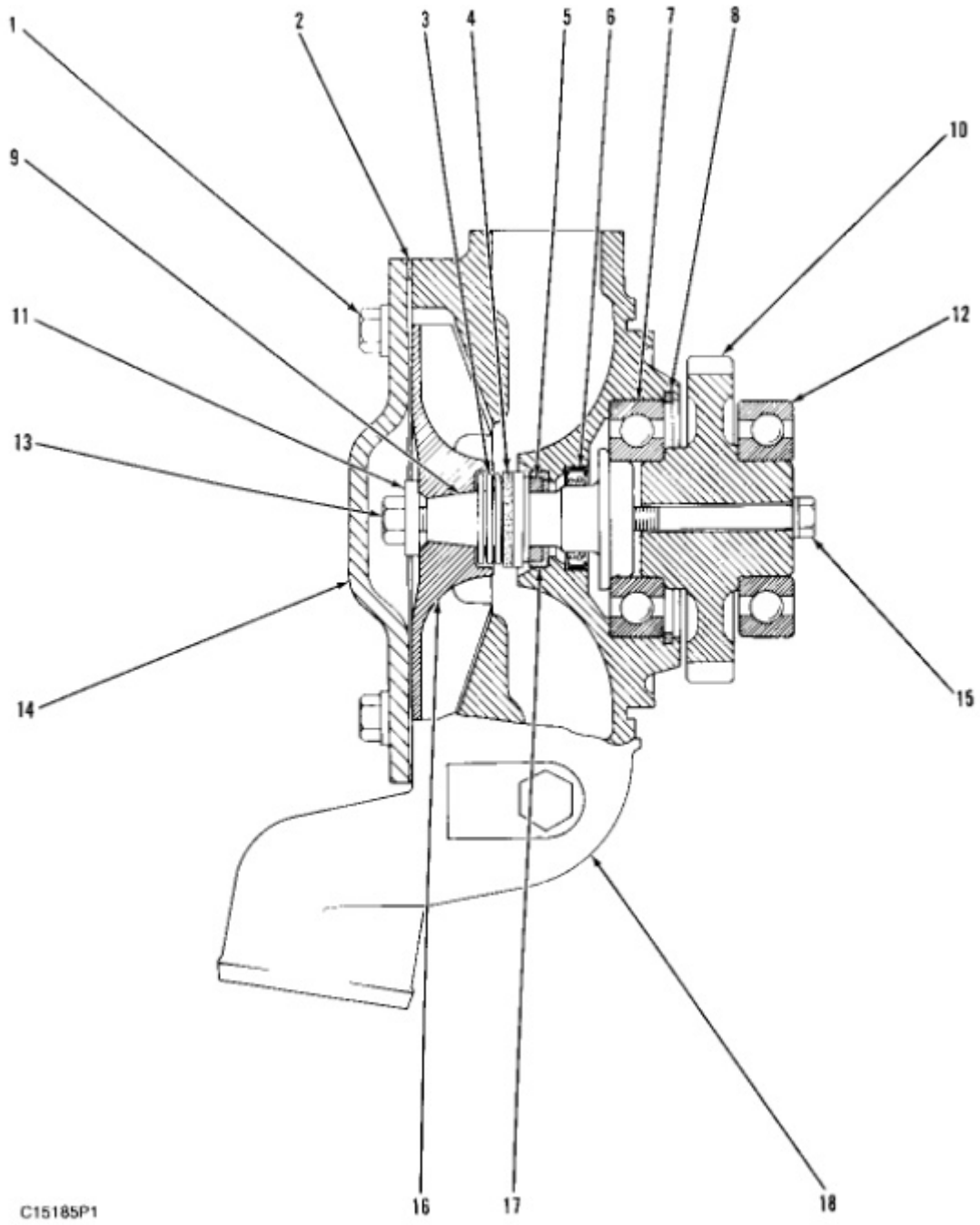
SENR32530033

Water Pump

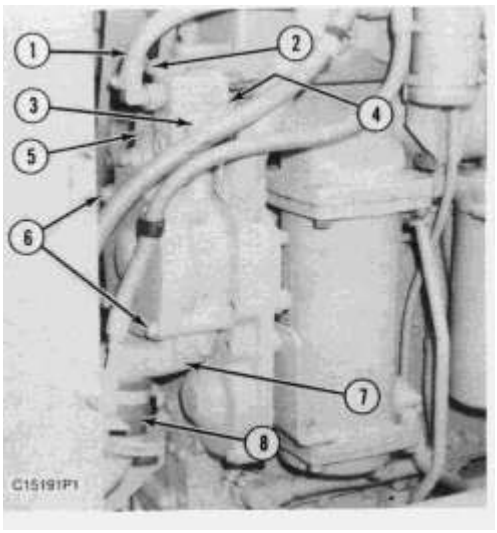
SMCS - 1361-016; 1361-010; 1361-015



Remove And Install Water Pump

1. Remove the guard assembly from the left side of the engine.

2. Drain the coolant from the cooling system.



3. Loosen the hose clamp and remove hose (1) from elbow (5).

4. Remove two bolts (2) and two bolts (3). Loosen hose clamp (4), and remove elbow (5) from the hose and the water pump.

5. Loosen the two hose clamps, and slide hose (8) away from the water pump.

6. Remove two bolts (6) and remove water pump (7) from the timing gear cover.

NOTE: The following steps are for installation of the water pump.

7. Check the O-ring seal on the water pump, and make a replacement if necessary, Put water pump (7) in position on the timing gear cover. Install two bolts (6) that hold it.

8. Put hose (8) in position on the water pump, and tighten the hose clamps that hold it.

9. Put a new gasket on elbow (5), and position it on the hose and water pump. Install two bolts (2) and two bolts (3) that hold it. Tighten hose clamp (4).

10. Install hose (1) on the elbow, and tighten the hose clamp that holds it.

11. Fill the cooling system to the correct level with coolant. See the Maintenance Guide.

12. Install the guard assembly on the left side of the engine.

Disassemble Water Pump

Tools Needed		A	B	C
8H663	Bearing Pulling Attachment	1		
1P1861	Retaining Ring Pliers		1	
1P510	Driver Group			1

Start By:

a. remove water pump

1. Remove bolt (15) and the washer. Remove bearing (12) and gear (10) as a unit.

2. Use tooling (A), (C) and a press, and remove bearing (12) from gear (10).

3. Remove snap ring (8) with tool (B).

4. Remove two bolts (1), the washers, cover (14) and gasket (2) from water pump housing (18).

5. Loosen bolt (13) **6.4 mm (.25 in).** Hit the bolt with a soft hammer to loosen impeller (16) from shaft (9).

6. Remove bolt (13), washer (11), impeller (16), spring (3) and seal assembly (4) from shaft (9).

7. Remove bearing (7) and shaft (9) as a unit.

8. Use tooling (A), (C) and a press to remove bearing (7) from shaft (9).

9. Remove ceramic seal (5) and seal (17) from water pump housing (18).

10. Use tool (C) to remove lip-type seal (6) from the water pump housing.

Assemble Water Pump

Tools Needed		B	C	D
1P1861	Retaining Ring Pliers	1		
1P510	Driver Group		1	
2W9102	Seal Installation Tool			1

1. Install lip-type seal (6) in water pump housing (18) with tool (C). The lip of the seal must be toward the bearings. Put clean engine oil on the lip of the seal.

2. Install shaft (9) in bearing (7) with a press.

3. Install shaft (9) and bearing (7) as a unit in water pump housing (18).

4. Install snap ring (8) with tool (B).

NOTICE

Clean water only is permitted for use as a lubricant for assembly. Do not damage or put hands on the wear surface of the carbon ring or the ceramic ring. Install the ceramic ring with the smoothest face of the ring toward the carbon seal assembly.

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5. Put ceramic ring (5) in position in seal (17). Use hand pressure and tool (D) to install the ceramic ring.

6. Remove spring (3) from seal assembly (4). Use hand pressure and tool (D) to install the seal assembly, push seal assembly (4) on shaft (9) until it makes light contact with ceramic ring (5).

7. Install spring (3) on seal assembly (4). Put impeller (16) in position on shaft (9), and install washer (11) and bolt (13) that hold it. Tighten bolt (13) to a torque of **38.0 ± 1.5 N·m (28 ± 1 lb ft).**

8. Put gasket (2) and cover (14) in position on water pump housing (18), and install the two washers and bolts (1) that hold them.

9. Install bearing (12) on gear (10) with a press.

10. Position gear (10) and bearing (12) as a unit on shaft (9). Install the washer and bolt (15) that hold them together. Tighten bolt (15) to a torque of **97 ± 7 N·m (72 ± 5 lb ft).**

End By:

a. install water pump

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SENR32530034

Fan And Fan Drive

SMCS - 1356; 1359-017; 1359-010

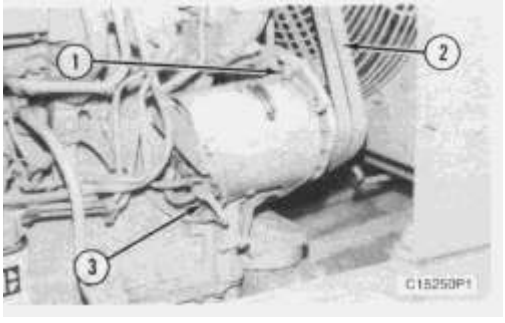
Remove And Install Fan And Fan Drive

Tools Needed	A
5P9736 Link Bracket	2

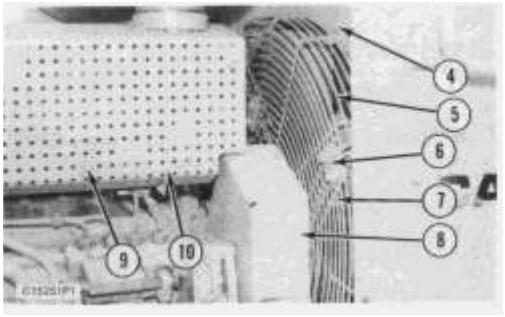
Start By:

a. remove belt tightener

1. Remove the hood. Remove the guard assembly from the right side of the engine.



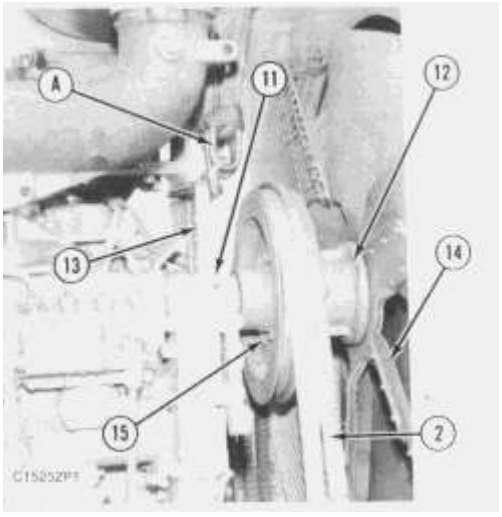
2. Loosen bolts (1) and (3) and move the alternator toward the engine. Remove the v-belts from the alternator pulley.



3. Remove three bolts (9), the nuts, spacers and heat shield (10) from the exhaust elbow.

4. Remove the bolts and guard (8) from the timing gear cover.

5. Remove four bolts (4), the bolts and plates (6) and guard assemblies (5) and (7) from the radiator.



6. Remove six bolts (15) and fan assembly (14) and adapter (12) as a unit from the fan drive.

7. Remove v-belts (2) from the fan drive pulley.

8. Fasten a hoist and tooling (A) to fan drive (13). Remove four bolts (11), and remove the spacer and fan drive (13) from the engine. The weight of the fan drive is **18 Kg (40 lb)**.

NOTE: The following steps are for installation of the fan and fan drive.

9. Use tooling (A) and a hoist to position the spacer and fan drive (13) on the engine. Install four bolts (11) that hold the fan drive.

10. Put v-belts (2) in position on the fan drive pulley.

11. Fill the cavity in adapter (12) with **2S3230 Bearing Lubricant**.

12. Position adapter (12) and fan assembly (14) as a unit on the fan drive. Install six bolts (15) that hold them in place.

13. Position guard assemblies (5) and (7) on the radiator, and install bolts (4) and the bolts and plates (6) that hold the guard assemblies in place.

14. Install guard (8) on the timing gear cover.

15. Position heat shield (10) on the exhaust elbow and install the three spacers, nuts and bolts (9) that hold it.

16. Put v-belts (2) in position on the alternator pulley.

17. Use a belt tension gauge, such as a **Burroughs BT-33-72C gauge** to check the belt tension. Adjust a new belt set to a gauge reading of **534 ± 22 N (120 ± 5 lb).** Adjust a used belt set to a gauge reading of **400 ± 44 N (90 ± 10 lb).** Tighten bolts (1) and (3).

18. Install the hood. Install the guard assembly on the right side of the engine.

End By:

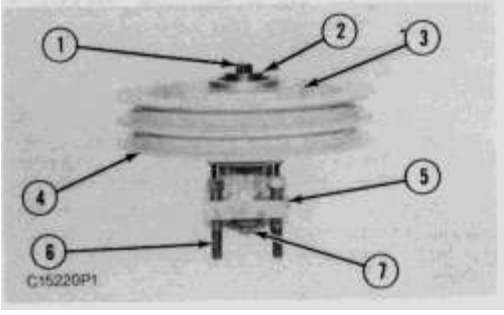
a. install belt tightener

Disassemble And Assemble Fan Drive

Tools Needed		A
1P510	Driver Group	1

Start By:

a. remove fan and fan drive



1. Move pulley (4) away from hub (3).

2. Remove bolt (1), washer (2) and nut (7).

3. Remove hub (3) and the bearings from bracket assembly (5) as an assembly.

Suggest:

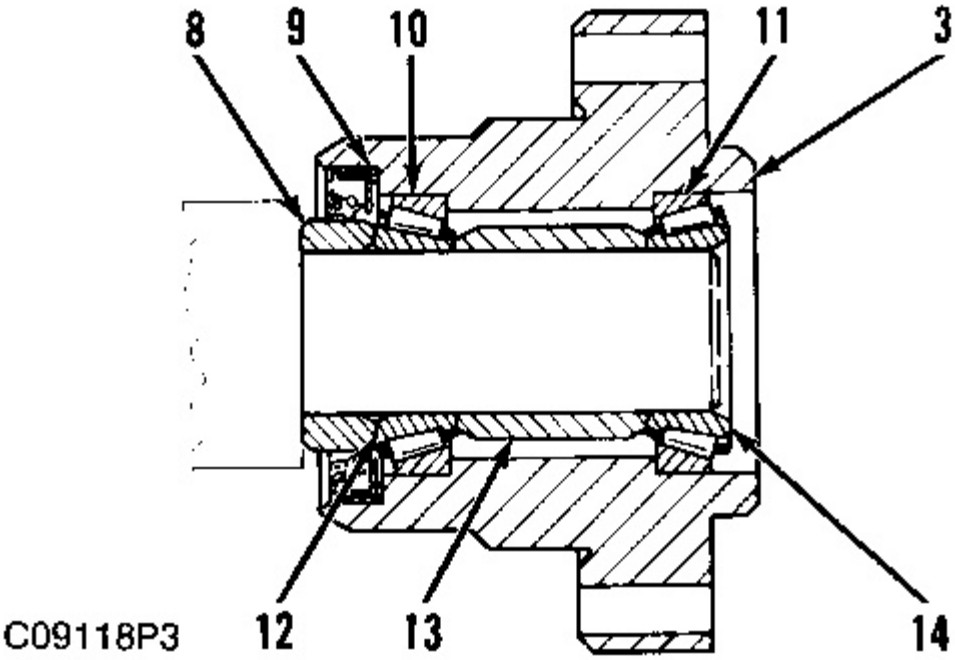
If the above button click is invalid.

Please download this document

first, and then click the above link

to download the complete manual.

Thank you so much for reading



4. Remove spacer (8) and pulley (4) from bracket assembly (5).

5. Remove bearing cone (14) and spacer (13) from hub (3).

6. Remove seal (9) and bearing cone (12) from the hub.

7. If necessary, remove bearing cups (10) and (11) from hub (3).

NOTE: The following steps are for assembly of the fan drive.

8. If bearing cups (10) and (11) were removed, lower the temperature of the bearing cups, and install them in hub (3).

9. Put bearing cone (12) in position in the hub, and install seal (9) with tool (A). Install the seal with the lip toward the inside of hub (3). Put a thin coat of **2S3230 Bearing Lubricant** on the lip of the seal.

10. Install spacer (8) on bracket assembly (5).

11. Make sure four mounting bolts (6) are put in position in bracket assembly (5). Put pulley (4) and hub (3) in position on the bracket assembly.

12. Install spacer (13) in hub (3).

13. Fill the cavity between the bearings with **2S3230 Bearing Lubricant**, and install bearing (14).

14. Put washer (2) in position on the bearing cone, and install bolt (1) and nut (7).

15. Put pulley (4) in position on hub (3).

End By:

a. install fan and fan drive