

Disassembly and Assembly

Supplemental Information

320C Excavator Supplement for 3066 Engine

APA1-Up (Machine)
ANB1-Up (Machine)
BCB1-Up (Machine)
BDB1-Up (Machine)
BGB1-Up (Machine)
AMC1-Up (Machine)
BBC1-Up (Machine)
BDC1-Up (Machine)
CC01-Up (Machine)
ALF1-Up (Machine)
BEF1-Up (Machine)
AKH1-Up (Machine)
BKK1-Up (Machine)
CLM1-Up (Machine)
BER1-Up (Machine)
BPR1-Up (Machine)
ALX1-Up (Machine)
BRX1-Up (Machine)
CLZ1-Up (Machine)

Important Safety Information

Most accidents that involve product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards. This person should also have the necessary training, skills and tools to perform these functions properly.

Improper operation, lubrication, maintenance or repair of this product can be dangerous and could result in injury or death.

Do not operate or perform any lubrication, maintenance or repair on this product, until you have read and understood the operation, lubrication, maintenance and repair information.

Safety precautions and warnings are provided in this manual and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or to other persons.

The hazards are identified by the "Safety Alert Symbol" and followed by a "Signal Word" such as "DANGER", "WARNING" or "CAUTION". The Safety Alert "WARNING" label is shown below.

WARNING

The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

The message that appears under the warning explains the hazard and can be either written or pictorially presented.

Operations that may cause product damage are identified by "NOTICE" labels on the product and in this publication.

Caterpillar cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are, therefore, not all inclusive. If a tool, procedure, work method or operating technique that is not specifically recommended by Caterpillar is used, you must satisfy yourself that it is safe for you and for others. You should also ensure that the product will not be damaged or be made unsafe by the operation, lubrication, maintenance or repair procedures that you choose.

The information, specifications, and illustrations in this publication are on the basis of information that was available at the time that the publication was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service that is given to the product. Obtain the complete and most current information before you start any job. Caterpillar dealers have the most current information available. For a list of the most current publication form numbers available, see the Service Manual Contents Microfiche, REG1139F.

WARNING

When replacement parts are required for this product Caterpillar recommends using Caterpillar replacement parts or parts with equivalent specifications including, but not limited to, physical dimensions, type, strength and material.

Failure to heed this warning can lead to premature failures, product damage, personal injury or death.

Table of Contents

Disassembly and Assembly Section

Hydraulic System Pressure - Release.....	4
Alternator - Remove and Install.....	6
Electric Starting Motor - Remove and Install.....	8
Governor Control Motor - Remove and Install.....	9
Fuel Priming Pump - Remove and Install.....	12
Fuel Filter (Primary) and Fuel Filter Base - Remove and Install.....	13
Water Separator-Remove and Install.....	14
Engine Oil Level Gauge (Dipstick) - Remove and Install.....	16
Engine Oil Filter and Oil Filter Base - Remove and Install.....	17
Engine Oil Filter Base - Disassemble.....	19
Engine Oil Filter Base - Assemble.....	21
Engine Oil Cooler - Remove and Install.....	23
Hydraulic Oil Cooler - Remove.....	25
Hydraulic Oil Cooler - Install.....	27
Air Cleaner - Remove and Install.....	30
Air Inlet Manifold - Remove.....	33
Air Inlet Manifold - Install.....	35
Air Inlet Heater - Remove and Install.....	36
Muffler - Remove and Install.....	38
Exhaust Manifold - Remove and Install.....	40
Turbocharger - Remove.....	41
Turbocharger - Install.....	43
Water Temperature Regulator - Remove and Install.....	45
Fuel Injection Lines - Remove and Install.....	47
Fuel Injection Pump - Remove.....	51
Fuel Injection Pump - Install.....	54
Fuel Injection Nozzles - Remove.....	56
Fuel Injection Nozzles - Install.....	57
Valve Mechanism Cover - Remove and Install.....	57
Rocker Shaft and Push Rod - Remove.....	60
Rocker Shaft and Push Rod - Install.....	61
Cylinder Head - Remove.....	61
Cylinder Head - Install.....	63
Radiator- Remove.....	64
Radiator- Install.....	67
V-Belts - Remove and Install.....	69
Fan - Remove and Install.....	70
Water Pump - Remove.....	72
Water Pump - Disassemble.....	73
Water Pump - Assemble.....	74
Water Pump - Install.....	75
Water Outlet Manifold - Remove.....	76
Water Outlet Manifold - Install.....	77
Crankshaft Pulley - Remove and Install.....	78
Housing (Front) - Remove.....	80
Housing (Front) - Install.....	82
Crankshaft Front Seal - Remove.....	85
Crankshaft Front Seal - Install.....	86
Oil Pan - Remove and Install.....	87
Refrigerant Compressor - Remove and Install.....	91
Refrigerant Condenser - Remove and Install.....	94
Hood - Remove and Install.....	97
Engine and Main Hydraulic Pump - Remove.....	99

Engine and Main Hydraulic Pump - Install.....	109
Flywheel and Ring Gear - Remove and Install ..	119
Crankshaft Rear Seal - Remove.....	121
Crankshaft Rear Seal - Install.....	122

Index Section

Index.....	124
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WARNING

Accidental machine starting can cause injury or death to personnel working on the machine.

To avoid accidental machine starting, turn the battery disconnect switch to the OFF position and remove the key. If the machine is not equipped with a battery disconnect switch, disconnect the battery cables from the battery and tape the battery clamps.

Place a do not operate tag at the battery disconnect switch location to inform personnel that the machine is being worked on.

Disassembly and Assembly Section

Hydraulic System Pressure - Release

SMCS Code: 3000-553-PX; 4250-553-PX;
4300-553-PX; 5050-553-PX

Pressure Release Procedure

The release of hydraulic pressure in an hydraulic circuit is required before service is performed to that hydraulic circuit. Release the pressure in the following hydraulic circuits before any hydraulic lines are disconnected from that hydraulic circuit or hydraulic components are removed.

- Boom hydraulic circuit
- Stick hydraulic circuit
- Bucket hydraulic circuit
- Swing hydraulic circuit
- Travel hydraulic circuit
- Attachment hydraulic circuits (if equipped)
- Pilot hydraulic circuit
- Return hydraulic circuit

Release Of Hydraulic Pressure From A Single Hydraulic Circuit

WARNING

Personal injury can result from hydraulic oil pressure and hot oil.

Hydraulic oil pressure can remain in the hydraulic system after the engine has been stopped. Serious injury can be caused if this pressure is not released before any service is done on the hydraulic system.

Make sure all of the attachments have been lowered to the ground, and the oil is cool before removing any components or lines. Remove the oil filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand.

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Perform the following Steps in order to release the hydraulic pressure from a single hydraulic circuit of the main hydraulic system.

1. Position the machine on level ground.

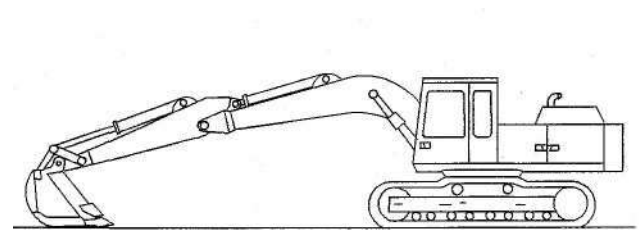


Illustration 1

2. Fully retract the stick cylinder rod. Adjust the position of the bucket so that the bucket is parallel to the ground. Lower the boom until the bucket is flat on the ground. Refer to Illustration 1.
3. Shut off the engine.
4. Turn the engine start switch to the ON position without starting the engine.
5. Place the hydraulic activation control lever in the UNLOCKED position.
6. Move only the joysticks or the pedals of the hydraulic circuit that requires service to the FULL STROKE positions. This will release the high pressure only in that single hydraulic circuit. This will also release any pressure that might be present in the pilot hydraulic circuit.

Note: If the desired hydraulic circuit that requires service requires the activation of a switch for operation, activate the necessary switches for the operation of the hydraulic circuit.

7. Place the hydraulic activation control lever in the LOCKED position.
8. Turn the engine start switch to the OFF position.
9. Slowly loosen the filler plug on the hydraulic tank and release the pressure from the hydraulic tank. Leave the filler plug loose for a minimum of 45 seconds. This will release the pressure that may be present in the return hydraulic circuit.
10. Tighten the filler plug on the hydraulic tank to the specified torque.
11. The pressure in the single hydraulic circuit that requires service is now released and lines and components can be disconnected or removed from that hydraulic circuit.

Release Of Hydraulic Pressure From Multiple Hydraulic Circuits

WARNING

Personal injury can result from hydraulic oil pressure and hot oil.

Hydraulic oil pressure can remain in the hydraulic system after the engine has been stopped. Serious injury can be caused if this pressure is not released before any service is done on the hydraulic system.

Make sure all of the attachments have been lowered to the ground, and the oil is cool before removing any components or lines. Remove the oil filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand.

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Perform the following Steps in order to release the hydraulic pressure from multiple hydraulic circuits of the main hydraulic system.

1. Position the machine on level ground.

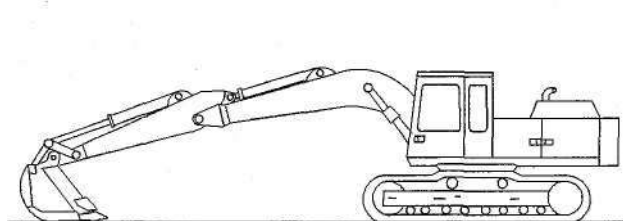


Illustration 2

2. Fully retract the stick cylinder rod. Adjust the position of the bucket so that the bucket is parallel to the ground. Lower the boom until the bucket is flat on the ground. Refer to Illustration 2.
3. Shut off the engine.
4. Turn the engine start switch to the ON position without starting the engine.
5. Place the hydraulic activation control lever in the UNLOCKED position.
6. Move only the joysticks or the pedals of the hydraulic circuit that requires service to the FULL STROKE positions. This will release the high pressure only in that hydraulic circuit. This will also release any pressure that might be present in the pilot hydraulic circuit.

Note: If the hydraulic circuit that requires service requires the activation of a switch for operation, activate the necessary switches for the operation of the hydraulic circuit.

7. Place the hydraulic activation control lever in the LOCKED position.
8. Start the engine.
9. Place the hydraulic activation control lever in the UNLOCKED position. **Do not move any joysticks or pedals from the NEUTRAL position during this step. Do not activate any switches during this Step.**
10. Return the hydraulic activation control lever to the LOCKED position.
11. Shut off the engine.

12. Repeat Steps 4 through 11 for each additional hydraulic circuit that requires service.
13. After releasing the hydraulic pressure in each of the desired hydraulic circuits, place the hydraulic activation control lever in the LOCKED position.
14. Turn the engine start switch to the OFF position.
15. Slowly loosen the filler plug on the hydraulic tank and release the pressure. Leave the filler plug loose for a minimum of 45 seconds. This will release the pressure that may be present in the return hydraulic circuit.
16. Tighten the filler plug on the hydraulic tank to the specified torque.
17. The pressure in the multiple hydraulic circuits that require service is now released and lines and components can be disconnected or removed from those hydraulic circuits.

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Alternator - Remove and Install

SMCSCode: 1405-010

Removal Procedure

Start By:

- a. Deactivate the electrical system. Refer to Operation and Maintenance Manual, "Battery Disconnect Switch" in order to deactivate the electrical system.
- b. Remove the V-Belts. Refer to Disassembly and Assembly, "V-Belts - Remove and Install" in this manual.

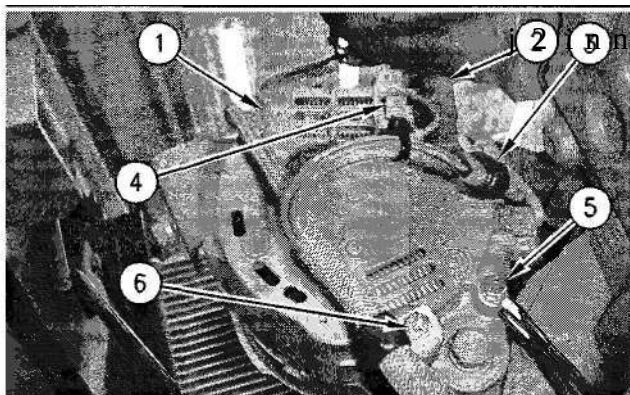


Illustration 3

Rear view of the alternator

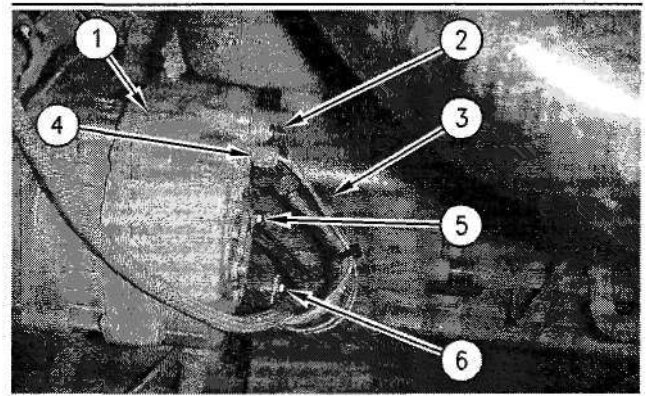


Illustration 4

Top view of the alternator

1. Remove the nut and the washer behind rubber boot (2). Disconnect the wire behind the rubber boot.
2. Remove electrical connection (4) from the alternator (1).
3. Disconnect electrical connection (3).
4. Remove bolt (5) and the washer in order to disconnect the ground wires from alternator (1).
5. Remove bolt (6), the washer, and the spacer in order to remove the wiring harness from alternator (1).

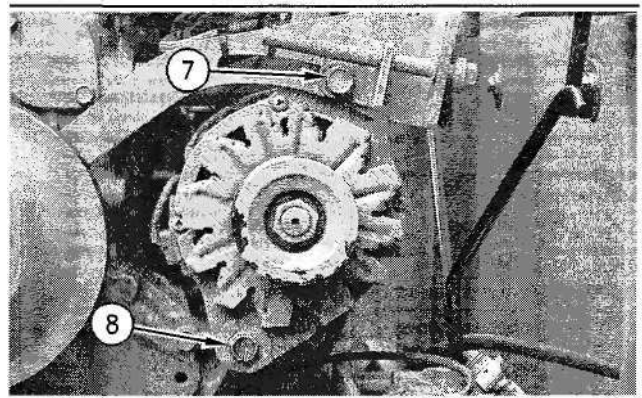


Illustration 5

The radiator is removed for photographic purposes.

6. Remove bolt (7) and the washer from the alternator.
7. Remove bolt (8), the washer, and the spacer from the alternator.

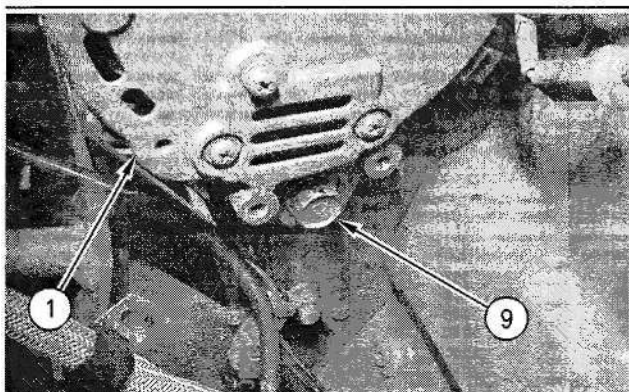


Illustration 6
Rear view of the alternator

8i Support alternator (1). Remove bolt (9), the washer, and the spacer from alternator (1).

9. Remove alternator (1) from the machine.

Installation Procedure

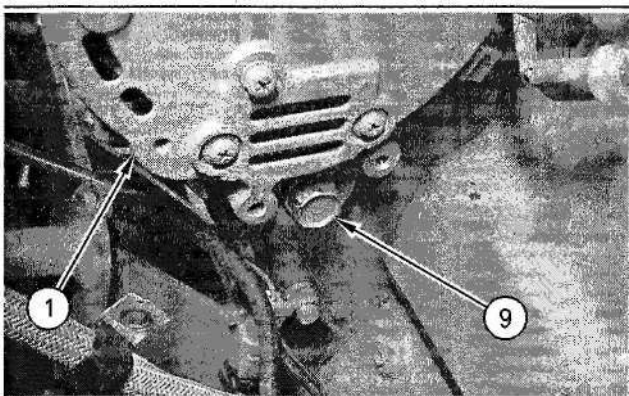


Illustration 7

1. Install alternator (1) to the machine.

2. Install the spacer, the washer, and bolt (9)

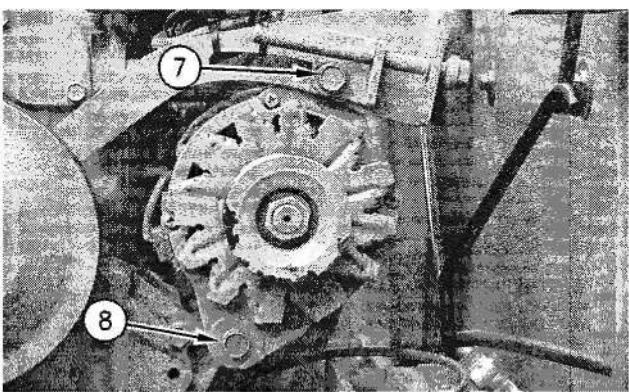


Illustration 8
The radiator is removed for photographic purposes.

3. Install the spacer, the washer, and bolt (8) to the alternator.

4. Install the washer and bolt (7) to the alternator.

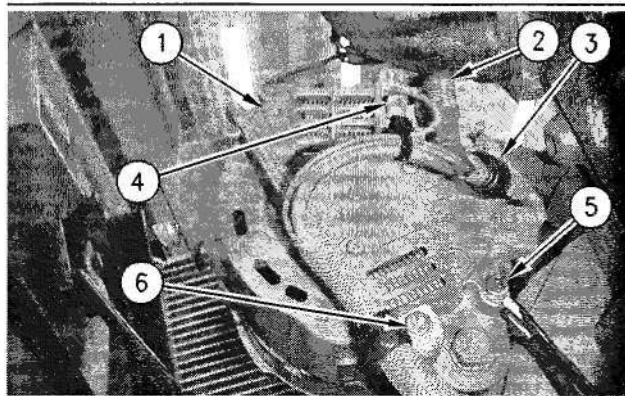


Illustration 9
Rear view of the alternator

5. Install the wiring harness to alternator (1). Install the spacer, the washer, and bolt (6) to alternator (1).

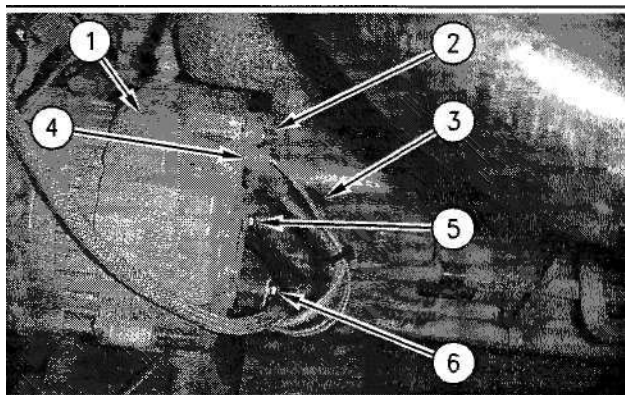


Illustration 10
Top view of the alternator

6. Connect two ground wires to alternator (1). Install the washer and bolt (5).

7. Connect electrical connection (3).

8. Install electrical connection (4) to alternator (1).

9. Connect the wire that is behind rubber boot (2). Install the washer and the nut that is located behind rubber boot (2).

End By:

- a. Install the V-Belts. Refer to Disassembly and Assembly, "V-Belts - Remove and Install" in this manual.
- b. Activate the electrical system. Refer to Operation and Maintenance Manual, "Battery Disconnect Switch" in order to activate the electrical system.

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Electric Starting Motor - Remove and Install

SMCS Code: 1453-010

Removal Procedure

Start By:

- a. Deactivate the electrical system. Refer to Operation and Maintenance Manual, "Battery Disconnect Switch" in order to deactivate the electrical system.
- b. Remove the hood. Refer to Disassembly and Assembly, "Hood - Remove and Install" in this manual.

Note: Put identification marks on all wires prior to the removal of the electric starting motor.

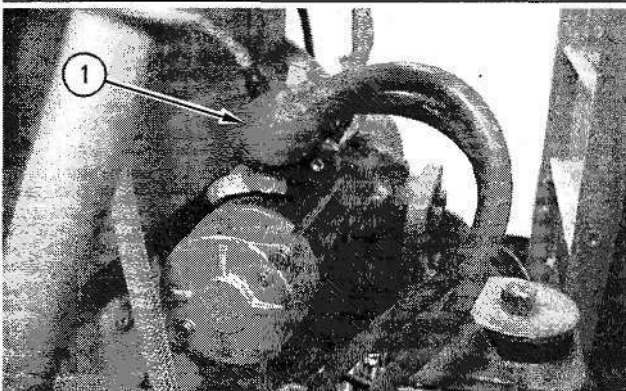


Illustration 11

1. Remove rubber boot (1). Slide the rubber boot down the battery cable in order to access the nut under the rubber boot.

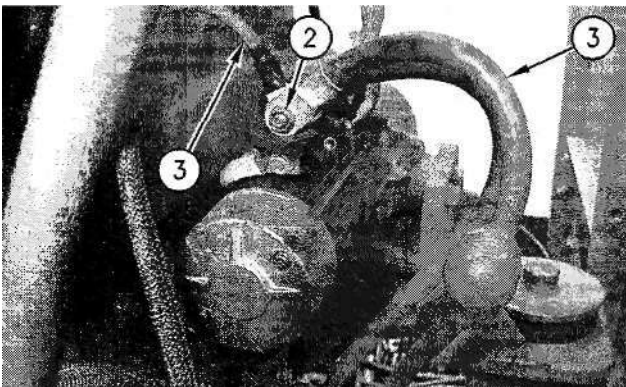


Illustration 12

2. Remove nut (2) and the washer. Disconnect battery cables (3).



Illustration 13

3. Remove bolt (5) and the washer. Disconnect grounding strap (4).

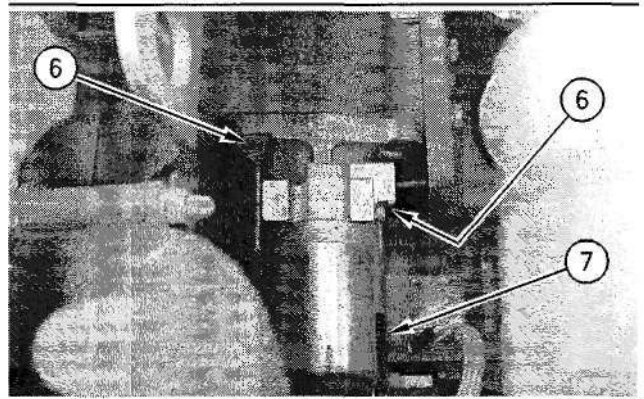


Illustration 14

4. Remove nuts (6). Remove electrical starting motor (7).

Installation Procedure

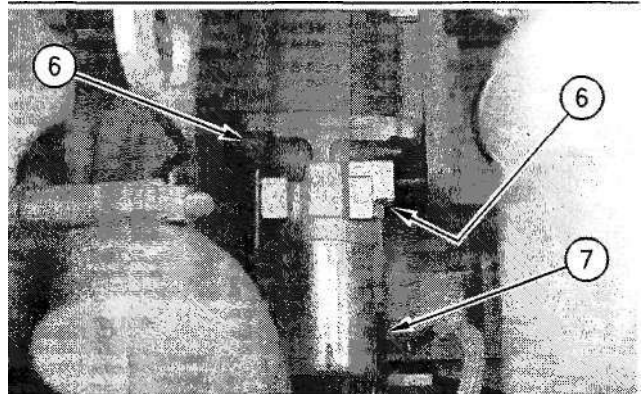


Illustration 15

1. Install electrical starting motor (7) in the flywheel housing. Install nuts (6).

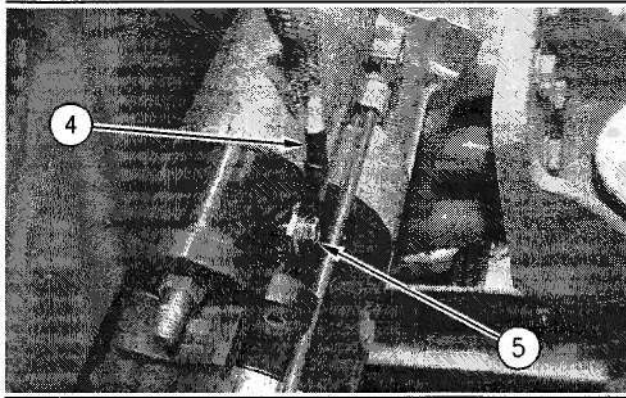


Illustration 16

2. Connect grounding strap (4). Install the washer and bolt (5). Tighten the bolt to a torque of 3.5 ± 1.0 N-m (31 ± 9 lb in).

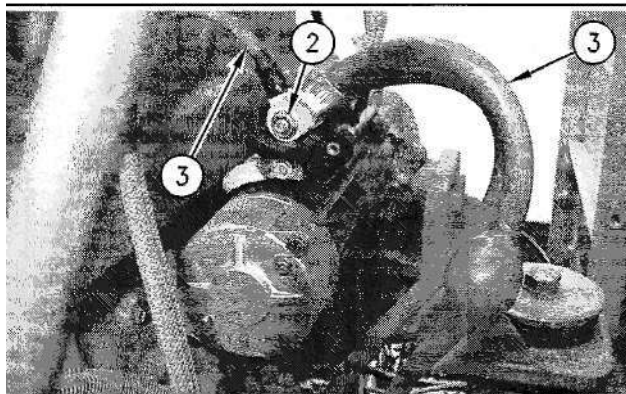


Illustration 17

3. Connect battery cables (3). Install the washer and nut (2). Tighten the nut to a torque of 11 ± 1 N-m (97 ± 9 lb in).

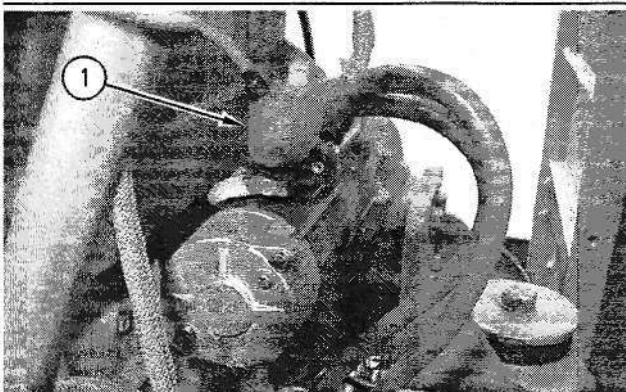


Illustration 18

4. Install rubber boot (1) over nut (2).

End By:

- a. Install the hood. Refer to Disassembly and Assembly, "Hood - Remove and Install" in this manual.
- b. Activate the electrical system. Refer to Operation and Maintenance Manual, "Battery Disconnect Switch" in order to activate the electrical system.

Governor Control Motor - Remove and Install

SMCSCode: 1716-011; 1716-012

Removal Procedure

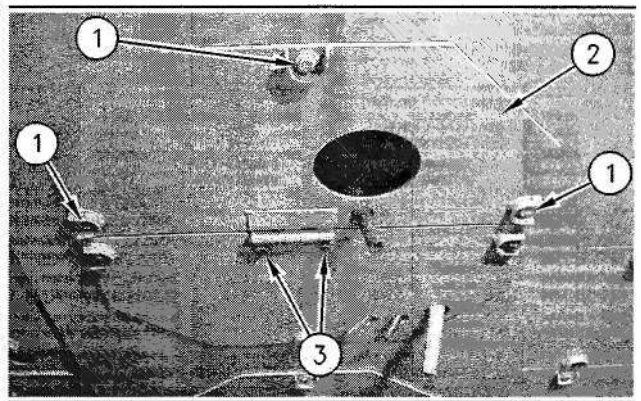


Illustration 19

1. Remove two bolts (3) and the washers from the hinge.
2. Remove three bolts (1) and the washers in order to remove access panel (2).

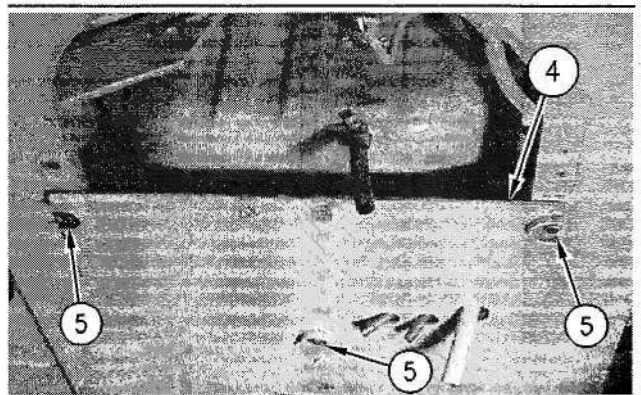


Illustration 20

3. Remove three bolts (5) and the washers in order to remove access panel (4).
4. Open the engine hood.

10

Excavator Supplement for 3066 Engine
Disassembly and Assembly Section

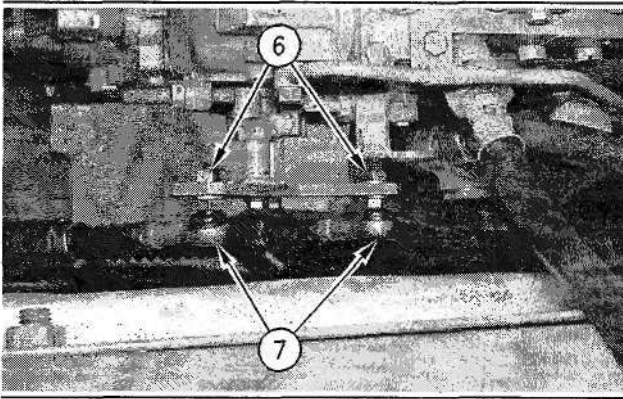


Illustration 21

5. Remove two nuts (6) that secure governor linkage (7) to the fuel injection pump.

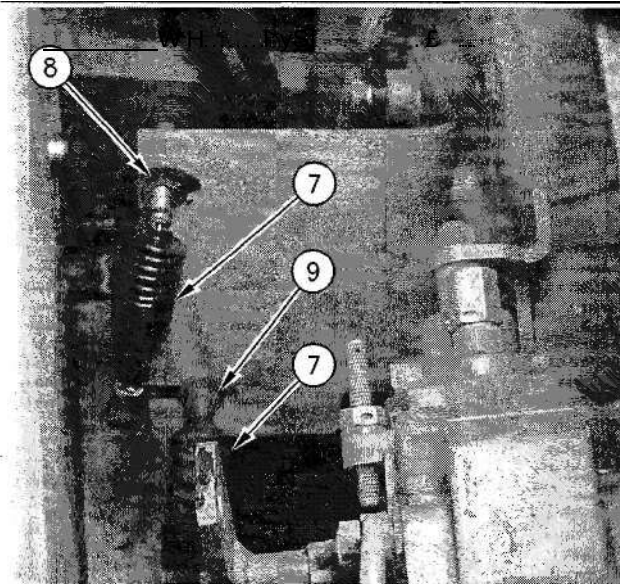


Illustration 22

6. Loosen nut (8) and (9) that secures governor linkage (7) to the engine.

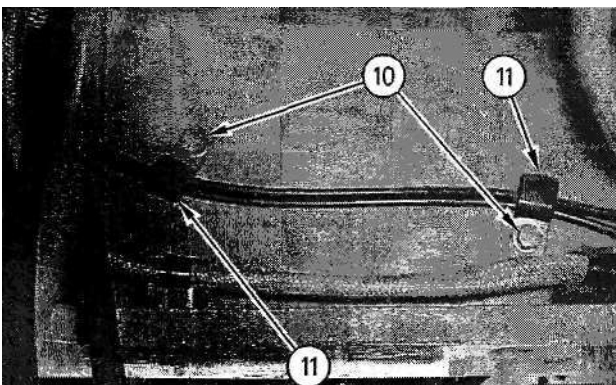


Illustration 23

7. Remove two bolts (10) and the washers in order to remove two clamps (11) that secure the governor linkage to the chassis.

Note: Some models may only have one clamp (11).

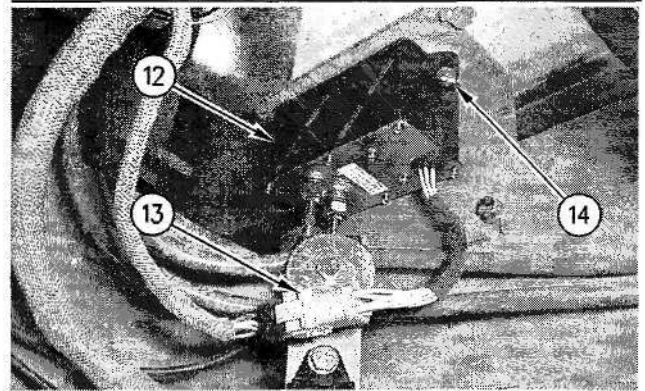


Illustration 24

8. Disconnect electrical connector (13).
9. Remove two bolts (14) and the two washers. Remove governor control motor (12).

Installation Procedure

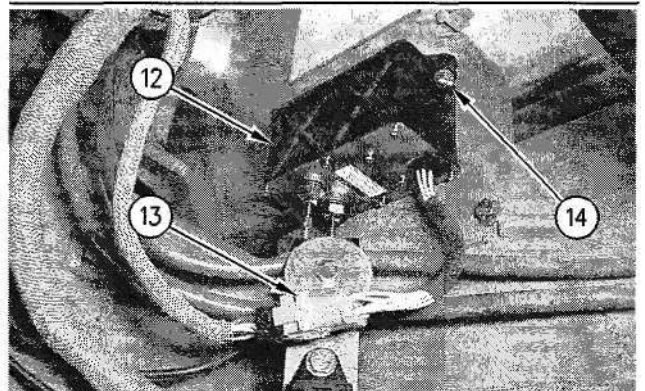


Illustration 25

1. Position governor control motor (12) on the mounting bracket. Install the two washers and two bolts (14).
2. Connect electrical connector (13).

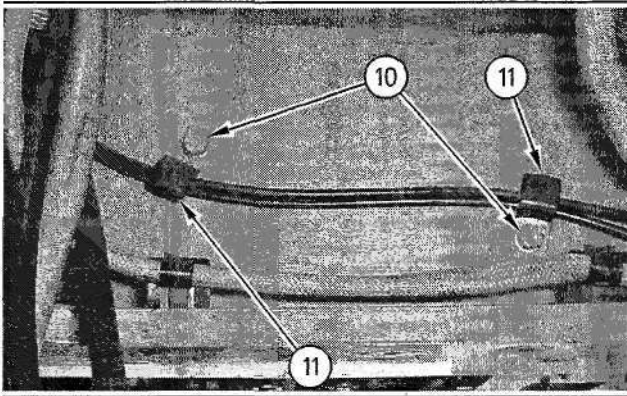


Illustration 26

3. Install two clamps (11) that secure the governor linkage to the chassis.

Note: Some models may only have one clamp (11).

4. Install two bolts (10) and the washers that hold clamps (11) in position.

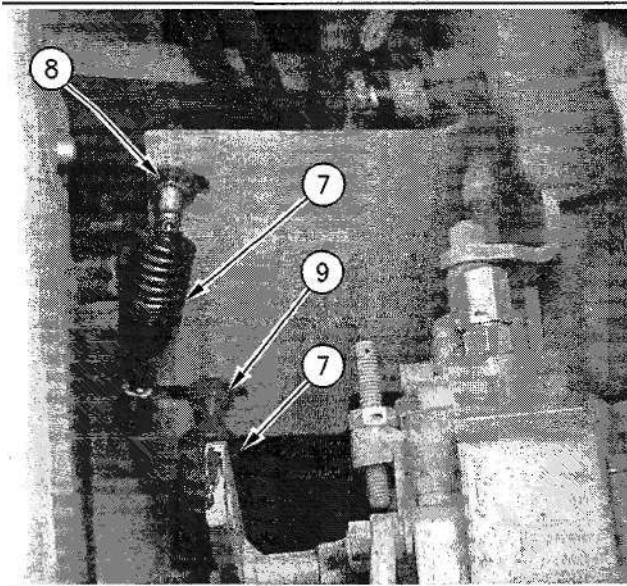


Illustration 27

5. Install governor linkage (7). Fasten governor linkage (7) with nut (8) and nut (9).

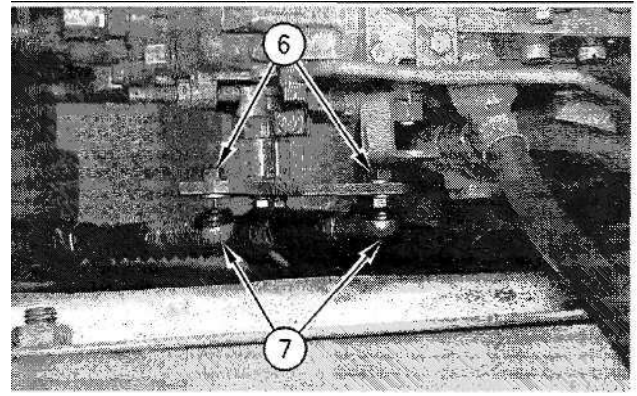


Illustration 28

6. Install governor linkage (7) to the fuel injection pump. Fasten governor linkage (7) with washers and two nuts (6).

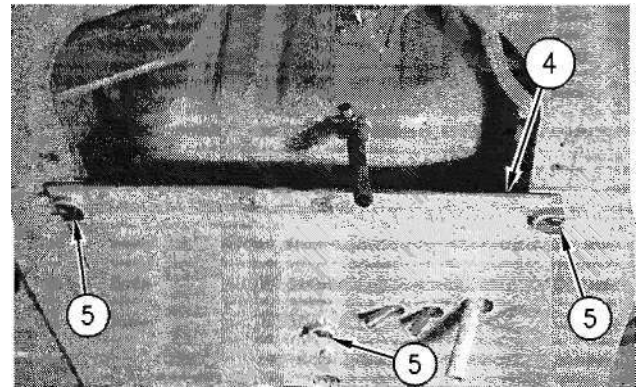


Illustration 29

7. Install access panel (4). Install the washers and three bolts (5).

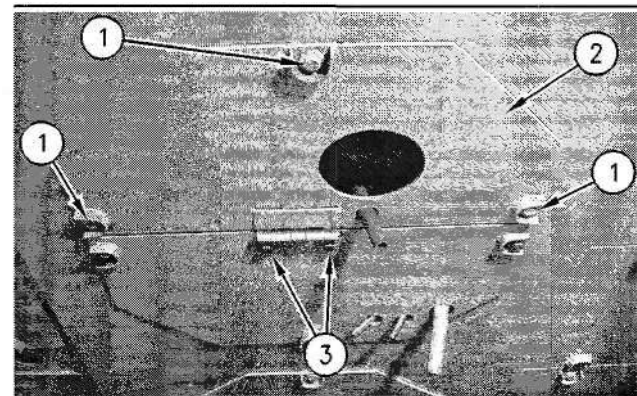


Illustration 30

8. Install access panel (2). Install the washers and three bolts (1).

9. Install the washers and two bolts (3) to the hinge.

10. Close the engine hood.

11. Check the governor actuator.

Reference: Refer to Systems Operation/Testing and Adjusting, "Governor Actuator - Calibrate" for further information.

Fuel Priming Pump - Remove and Install

SMCS Code: 1258-010

Removal Procedure

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

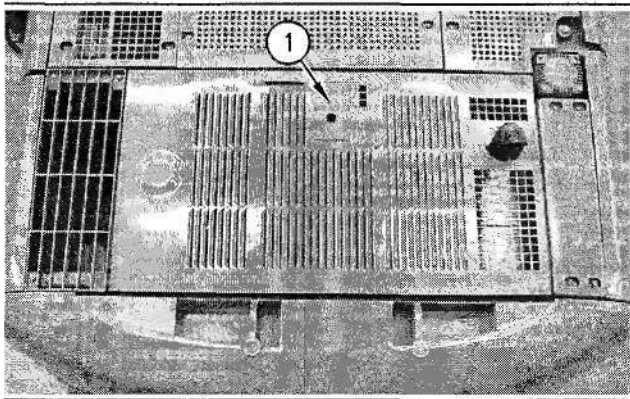


Illustration 31

1. Open hood (1).

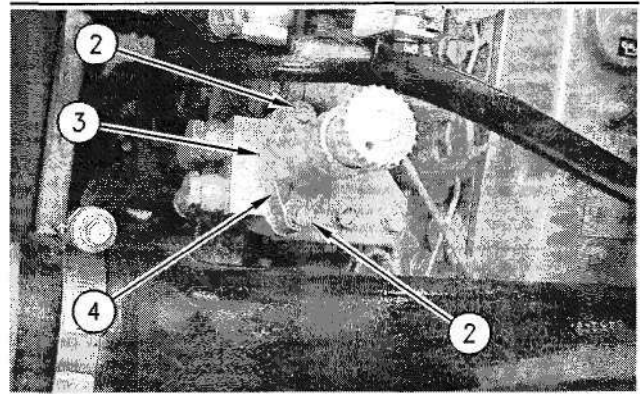


Illustration 32

2. Remove two bolts (2) and the washers.

3. Remove fuel priming pump (4).

Note: Fuel will drain from the fuel priming pump during the removal. Collect the fuel in a suitable container for storage or disposal.

4. Remove gasket (3).

Installation Procedure

NOTICE

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Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

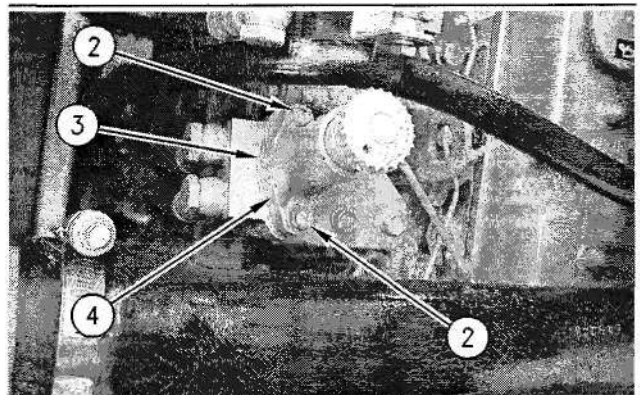


Illustration 33

- Note: O-rings, gaskets, and seals should always be replaced.
1. Clean the surfaces that make contact with gasket (3). Install new gasket (3).
 2. Install fuel priming pump (4).
 3. Install the washers and two bolts (2).

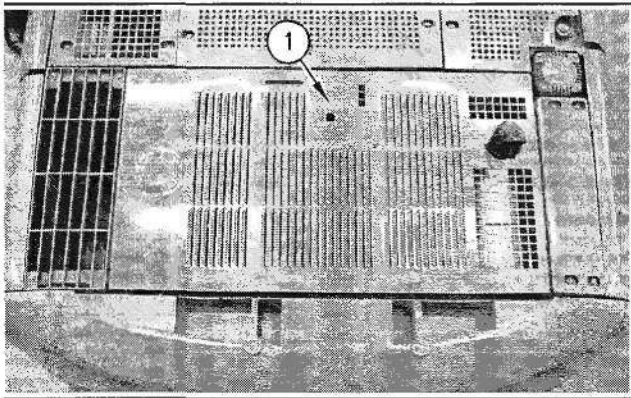


Illustration 34

4. Close hood (1).

Fuel Filter (Primary) and Fuel Filter Base - Remove and Install

SMCSCode: 1261-010; 1262-010

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	2P-8250	Strap Wrench As	1

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.

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Dispose of all fluids according to local regulations and mandates.

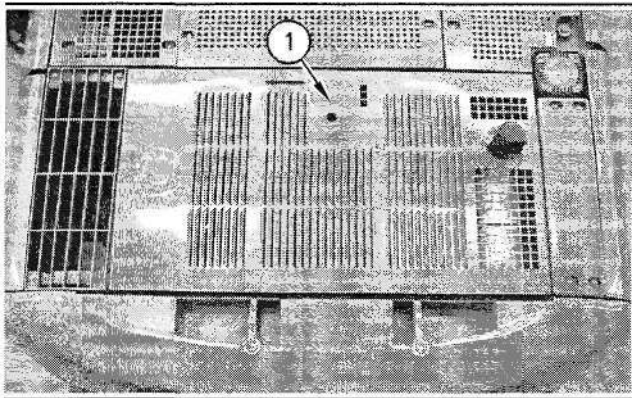


Illustration 35

1. Open hood (1).

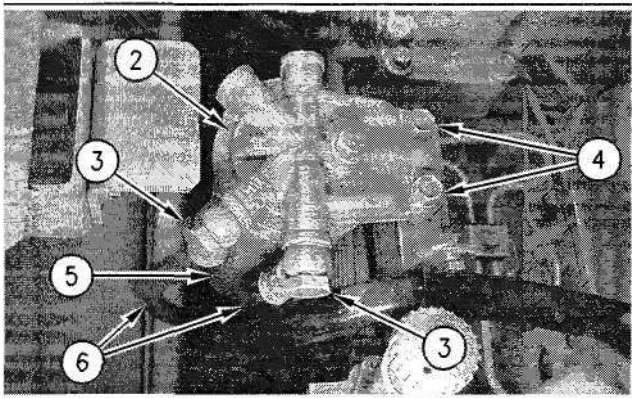


Illustration 36

2. Use Tooling (A) to remove fuel filter (5) from fuel filter base (2).
 3. Remove two banjo bolts (3) and the gaskets (not shown) in order to disconnect fuel lines (6) from fuel filter base (2).
- Note: Cap all openings or plug all openings immediately in order to prevent contamination of the fuel system.
4. Remove two bolts (4) and the washers.
 5. Remove fuel filter base (2).

Installation Procedure

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

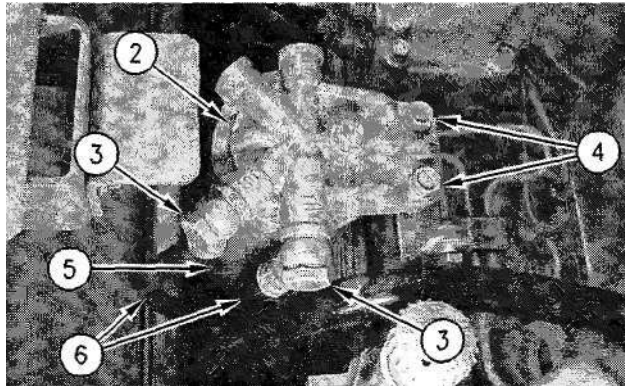


Illustration 37

900710552

1. Place fuel filter base (2) in position. Install the washers and two bolts (4) that secure the fuel filter base.
2. Install banjo bolts (3) and the gaskets (not shown) in order to connect fuel lines (6) to fuel filter base (2).
3. Install fuel filter (5) on the fuel filter base (2). The fuel filter is hand tightened only.

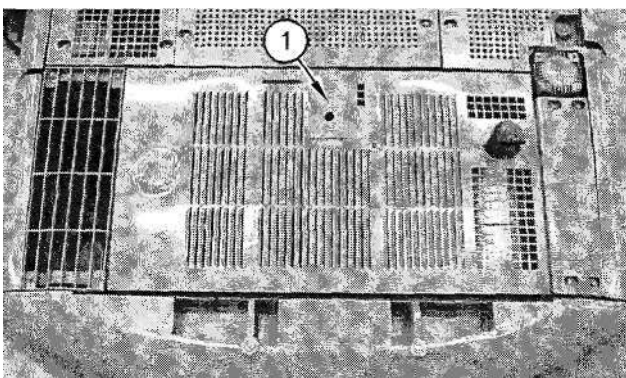


Illustration 38

g00709388

4. Close hood (1).

Water Separator - Remove and Install

SMCSCode: 1263

S/N: APA1-Up

S/N: ANB1-Up

S/N: BCB1-Up

S/N: BGB1-Up

S/N: AMC1-Up

S/N: BBC1-Up

S/N: BDC1-Up

S/N: CCD1-Up

S/N: ALF1-Up

S/N: BEF1-Up

S/N: AKH1-Up

S/N: BKK1-Up

S/N: CLM1-Up

S/N: BER1-Up

S/N: BPR1-Up

S/N: ALX1-Up

S/N: BRX1-Up

S/N: CLZ1-Up

Removal Procedure

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

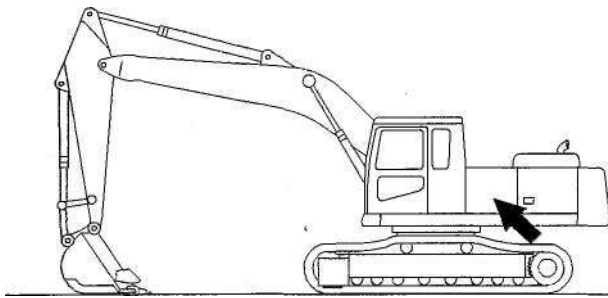


Illustration 39

1. Open the left side access doors.

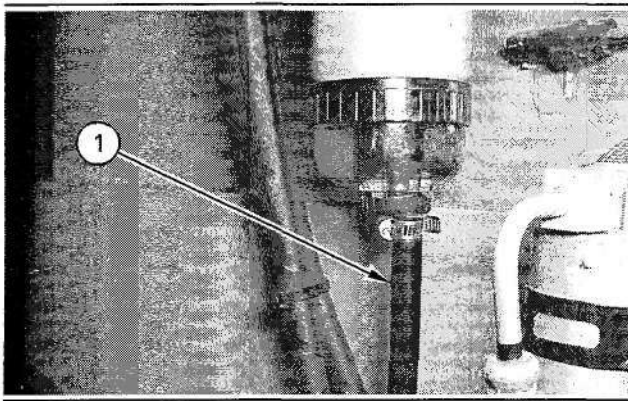


Illustration 40

2. Disconnect drain line (1) from the water separator.

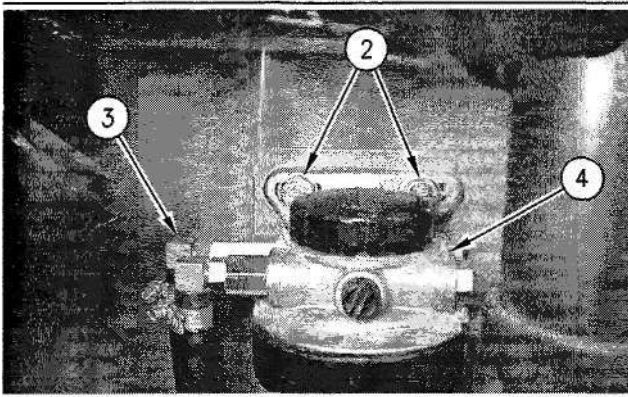


Illustration 41

3. Put identification marks on hoses (3) for installation purposes.
4. Disconnect hoses (3) from water separator (4).

Note: Plug the ends of hoses (3) in order to prevent contaminating the fuel system.

5. Remove two bolts (2) and the washers. Remove water separator (4).

Installation Procedure

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

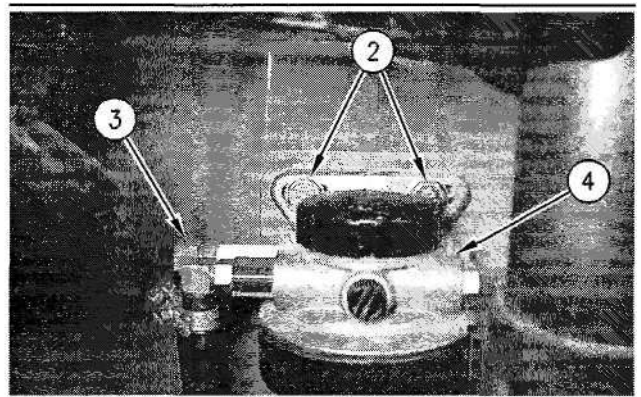


Illustration 42

1. Place water separator (4) in position. Install the washers and bolts (2).
2. Connect hoses (3) in the original location.

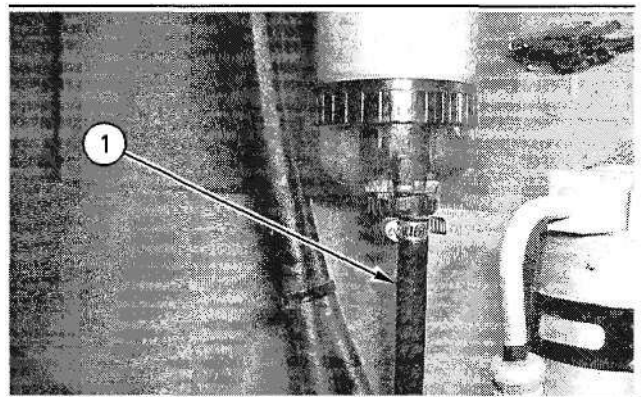


Illustration 43

3. Connect drain line (1).

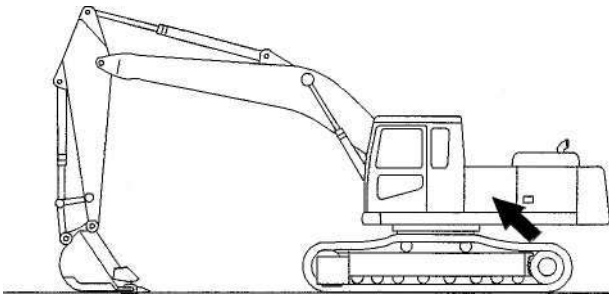


Illustration 44

4. Close the left side access doors.

Engine Oil Level Gauge (Dipstick) - Remove and Install

SMCSCode: 1326-011; 1326-012

Removal Procedure

1. Open the engine hood. Lock the engine hood in the OPEN position.

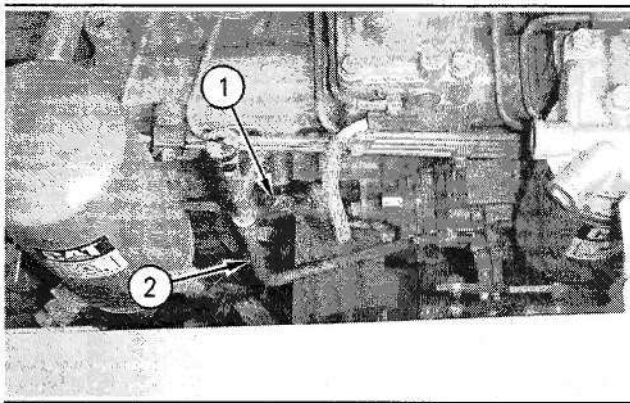


Illustration 45

2. Remove bolt (1), the washer, and the spacer from the dipstick tube and the harness clip.
3. Remove dipstick tube (2).

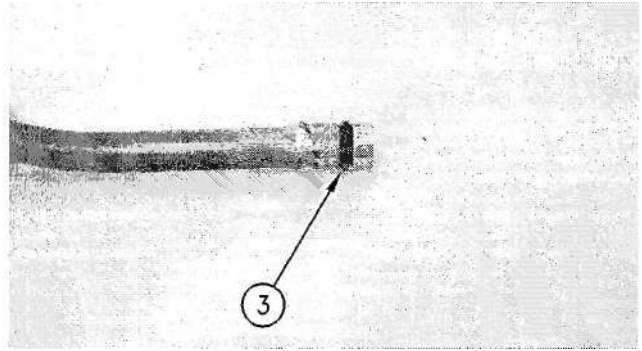


Illustration 46

4. Remove O-ring seal (3) from the dipstick tube.

Installation Procedure

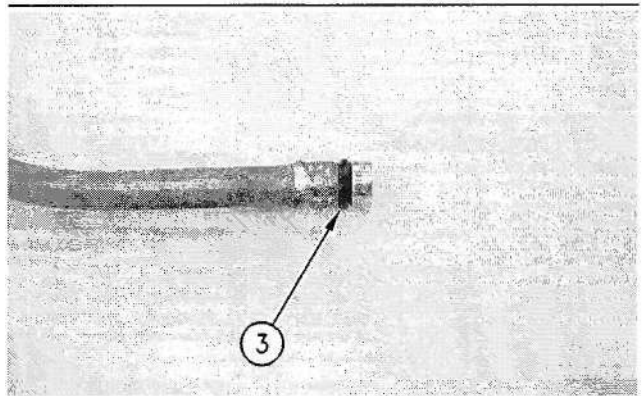


Illustration 47

900709879

1. Install new O-ring seal (3) on the dipstick tube.

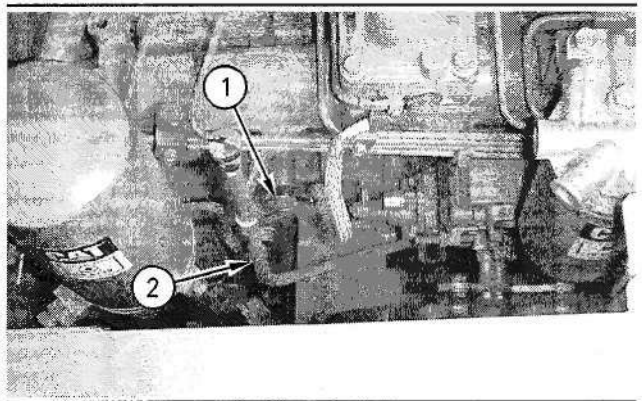


Illustration 48

2. Install dipstick tube (2).
3. Install the spacer, the washer, and bolt (1) in the dipstick tube and the harness clip.
4. Close the engine hood.

i01342042

Engine Oil Filter and Oil Filter Base - Remove and Install

SMCS Code: 1306-010; 1308-010

Removal Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	2P-8250	Strap Wrench Assembly	1

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Open the engine hood. Lock the engine hood in the OPEN position.

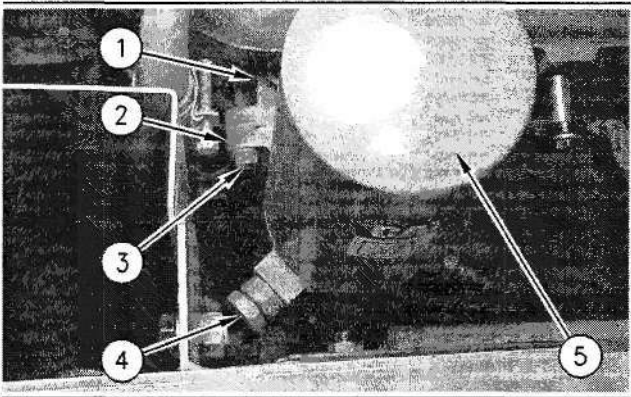


Illustration 49

Note: Drain the engine oil from the oil filter and the oil filter base in a suitable container for storage or disposal.

Note: The filter base comes in two sections: Section (1) is the base assembly and Section (2) is the bracket assembly. The following story illustrates the removal of bracket assembly (2) and base assembly (1).

2. Loosen drain valve (4) in order to drain the oil filter and the oil filter base.
- Note: Use Tooling (A) to remove oil filter (5), if necessary.
3. Remove three bolts (3) and the washers in order to remove bracket assembly (2).

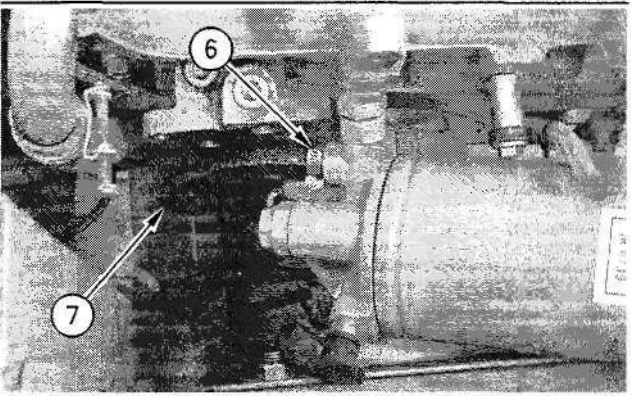


Illustration 50

4. Lay the filter on the side, as shown.
5. Loosen hose clamp (6) in order to remove drain line (7).
6. Remove oil filter (5) and bracket assembly (2) as a unit.

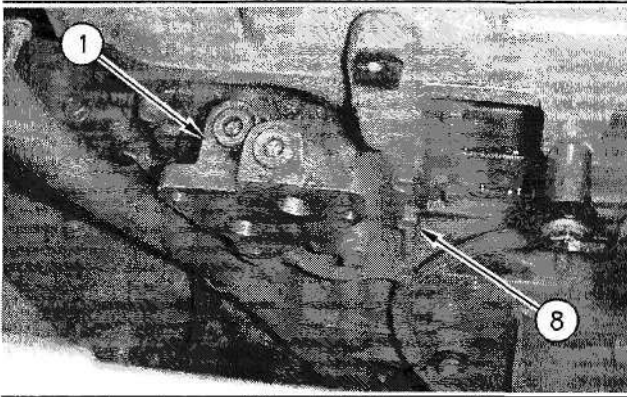


Illustration 51

7. Remove eight bolts (8) and the washers from engine oil filter base (1).
8. Remove engine oil filter base (1) from the engine.

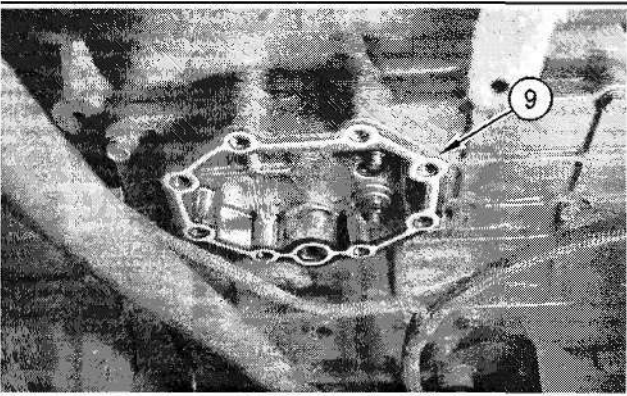


Illustration 52

9. Remove gasket (9) that is on the engine.
10. Check bracket assembly (2) and the engine oil filter base (1) for clogging and cracks. Replace damaged components with replacement parts.

Installation Procedure

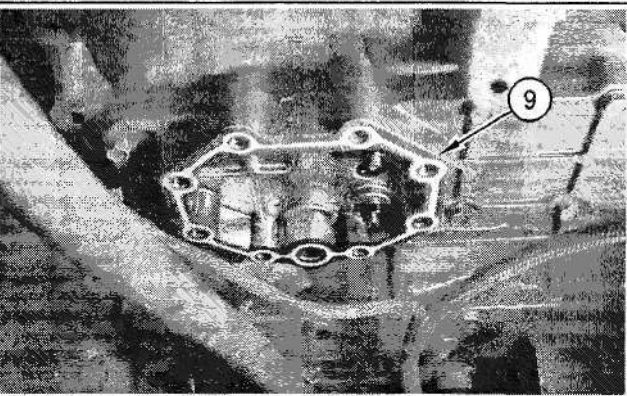


Illustration 53

1. Install gasket (9) on the engine.

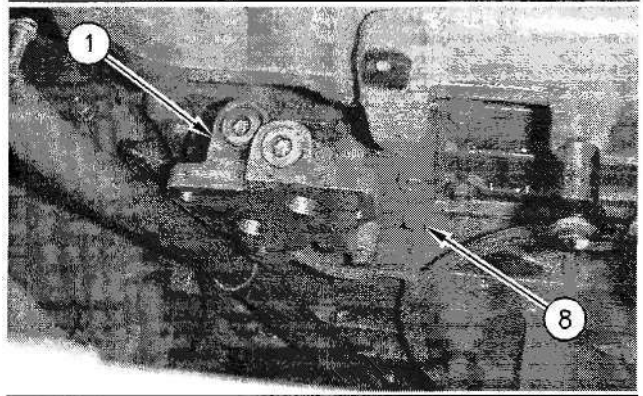


Illustration 54

2. Install engine oil filter base (1) on the engine.
3. Install the washers and eight bolts (8) in engine oil filter base (1).

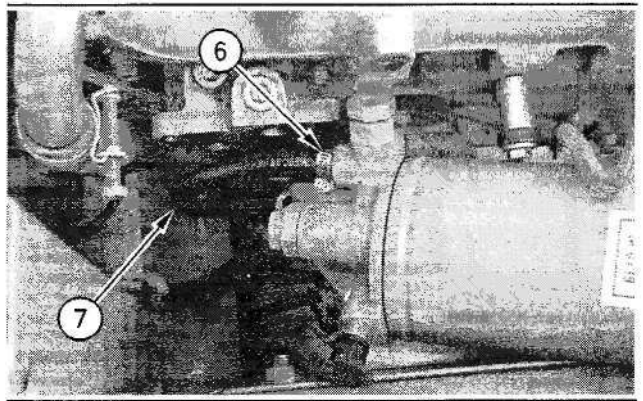


Illustration 55

4. Lay the filter on the side, as shown.
5. Install oil filter (5) and bracket assembly (2) as a unit.
6. Install drain line (7). Tighten hose clamp (6).

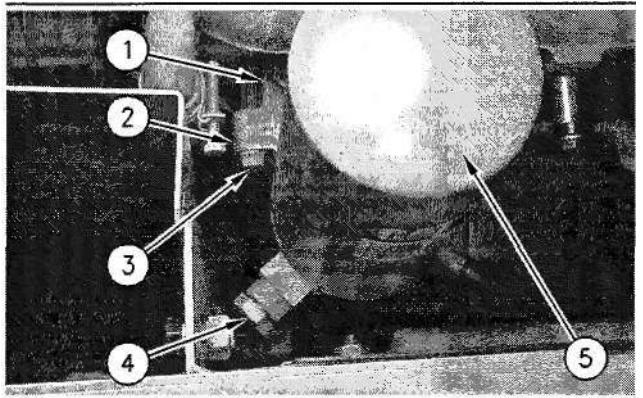


Illustration 56

7. Install the washers and three bolts (3) in order to install bracket assembly (2) and base assembly (1).
8. Close drain valve (4).
9. If filter (5) was removed, install filter (5).
10. Check the engine oil level. Refer to Operation and Maintenance Manual, "Engine Oil Level - Check".

Engine Oil Filter Base - Disassemble

SMCS Code: 1306-015; 1306

Disassembly Procedure

Table 3

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	2P-8250	Strap Wrench Assembly	1

Start By:

- a. Remove the engine oil filter and filter bases. Refer to Disassembly and Assembly, "Engine Oil Filter and Oil Filter Base - Remove" in this manual.

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

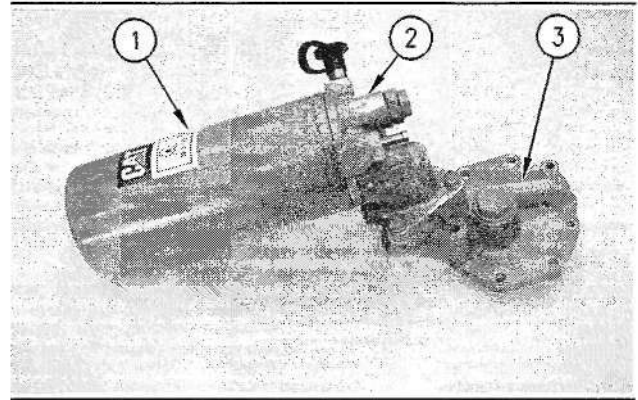


Illustration 57

1. Use Tooling (A) to remove oil filter (1).

Note: Drain the engine oil from the oil filter and the oil filter base in a suitable container for storage or disposal.

Note: The filter base comes in two sections: The first section is the base assembly (3) and the second section is the bracket assembly (2).

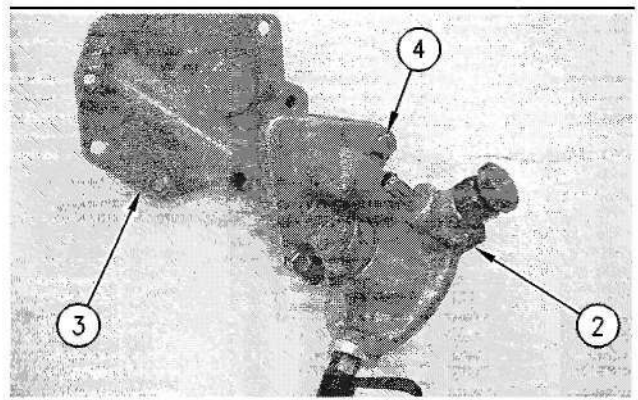


Illustration 58

2. Remove three bolts (4) and the washers in order to separate bracket assembly (2) from the base assembly (3).
3. Use the following procedure to disassemble the bracket assembly.

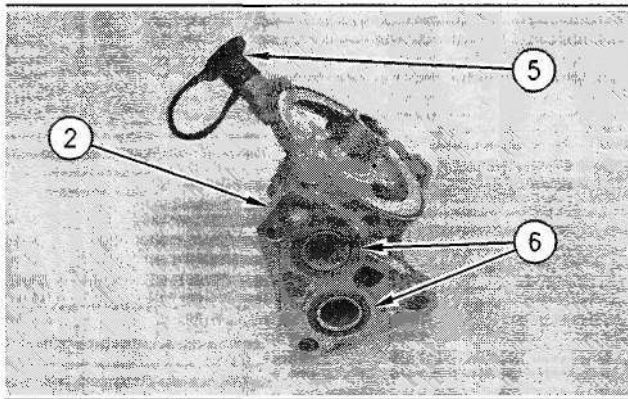


Illustration 59

- a. Remove two O-rings (6) from the bracket assembly (2).
- b. Remove cap (5) to the oil sampling valve.

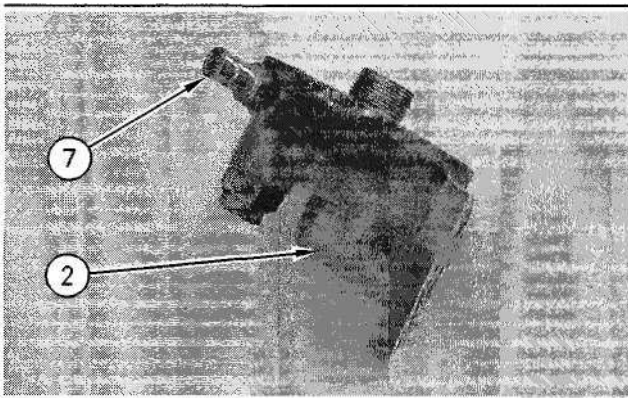


Illustration 60

- c. Remove oil sampling valve (7).

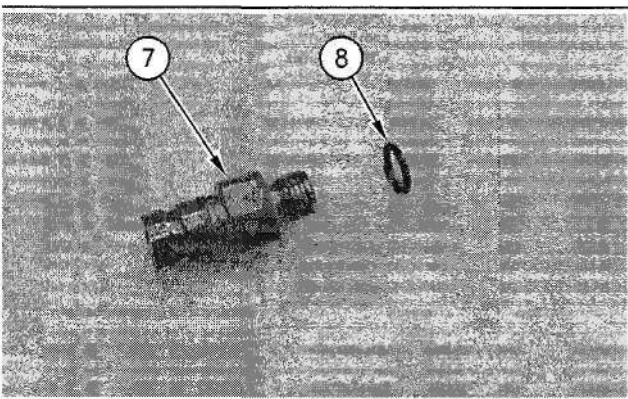


Illustration 61

- d. Remove O-ring seal (8) from the oil sampling valve (7).

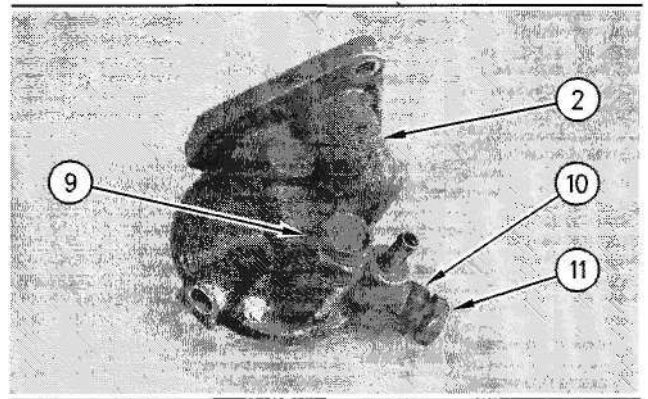


Illustration 62

- e. Remove relief valve (9).

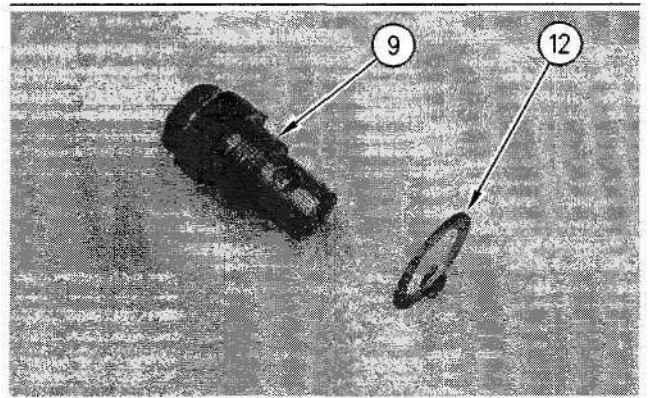


Illustration 63

- f. Remove seal washer (12) from relief valve (9).
- g. Loosen locknut (10) in order to remove drain valve (11).

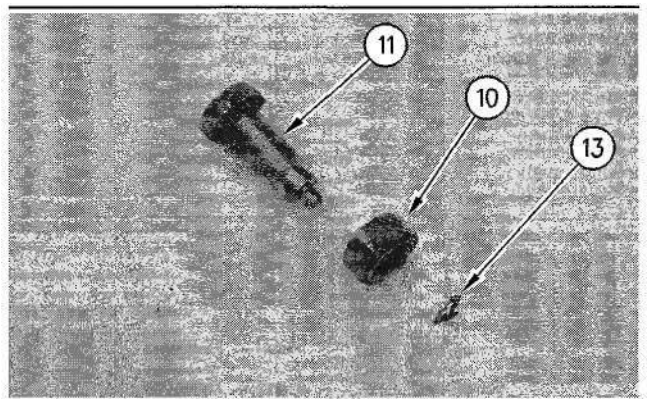


Illustration 64

- h. Remove seal washer (13) and locknut (10) from drain valve (11).

4. Use the following procedure to disassemble the oil filter base.

i01353311

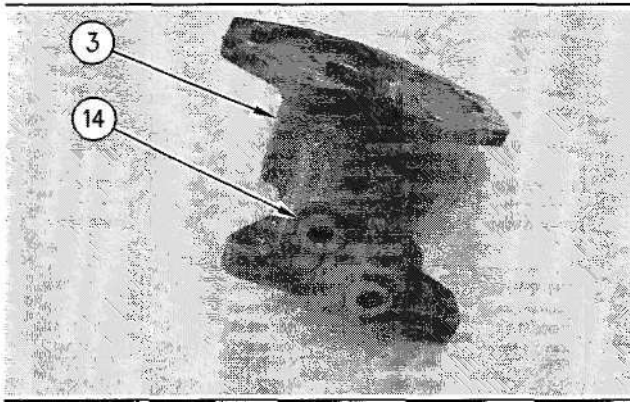


Illustration 65

- a. Remove two plugs (14) from the oil filter base (3).

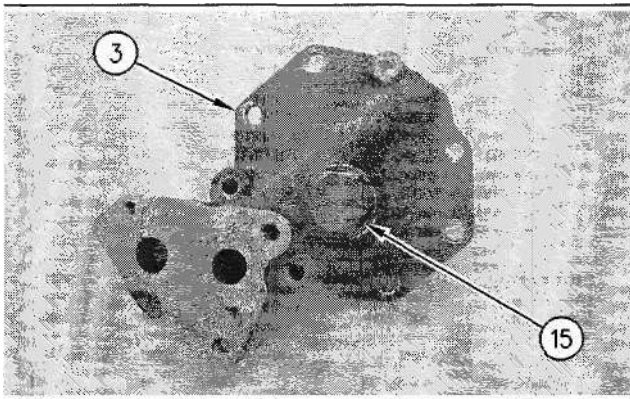


Illustration 66

- b. Remove plug (15) in order to disassemble the anti-drain back valve.

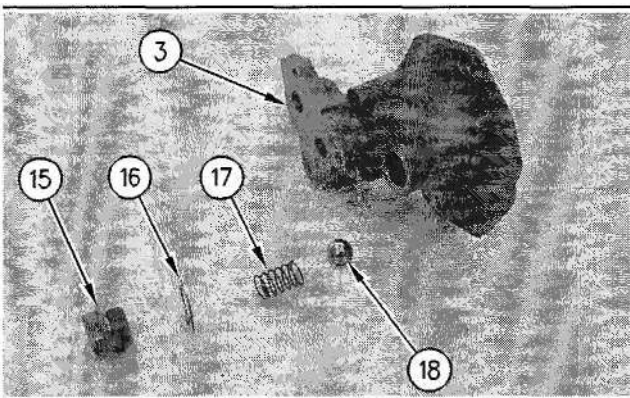


Illustration 67

- c. Remove ball (18) and spring (17) from filter base (3).
- d. Remove seal washer (16) from plug (15).

Engine Oil Filter Base - Assemble

SMCS Code: 1306-016; 1306

Assembly Procedure

Note: The filter base comes in two sections: The first section is the base assembly (3) and the second section is the bracket assembly (2).

1. Use the following procedure to assemble the oil filter base (3).

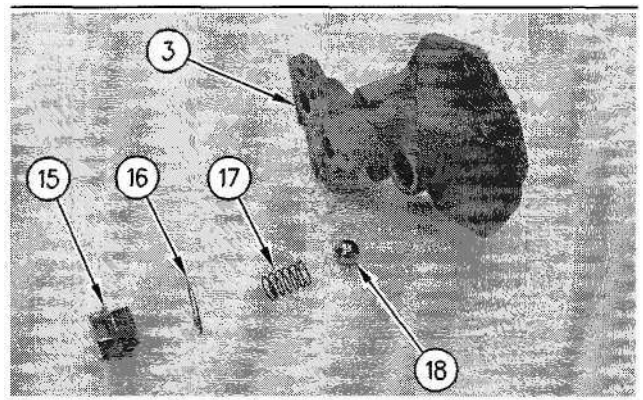


Illustration 68

- a. Install seal washer (16) to plug (15).
- b. Install ball (18) and spring (17) to filter base (3).
- c. Install plug (15).

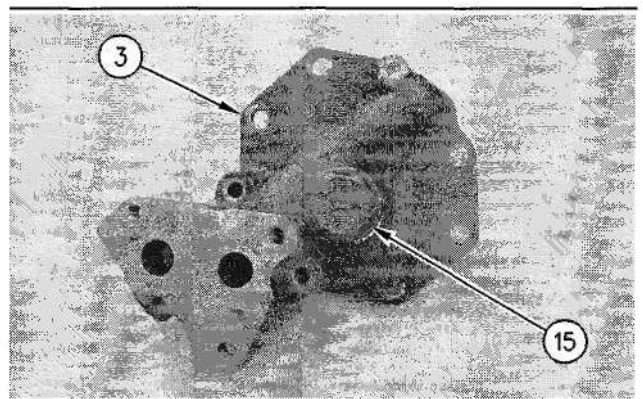


Illustration 69

- d. Install plug (15).

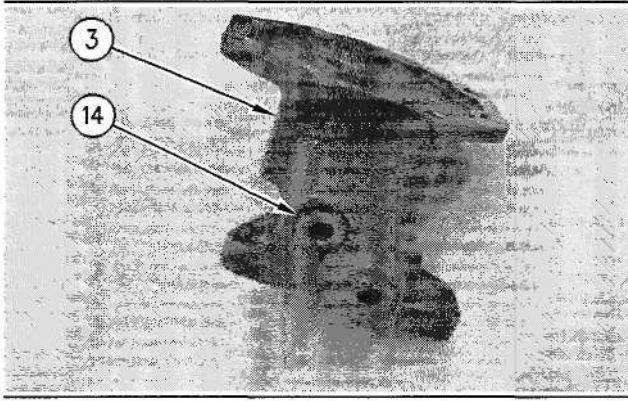


Illustration 70

e. Install two plugs (14) to the oil filter base (3).

2. Use the following procedure to assemble the bracket assembly.

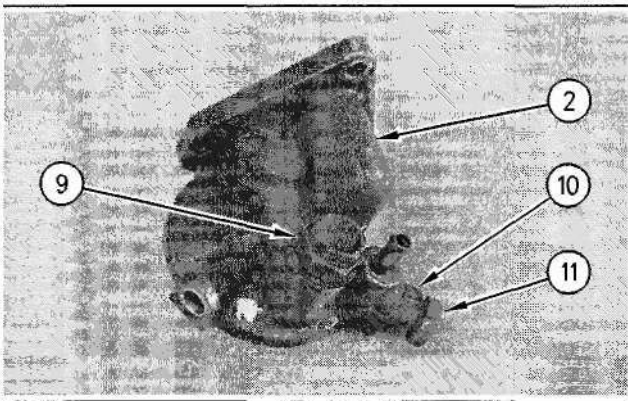


Illustration 71

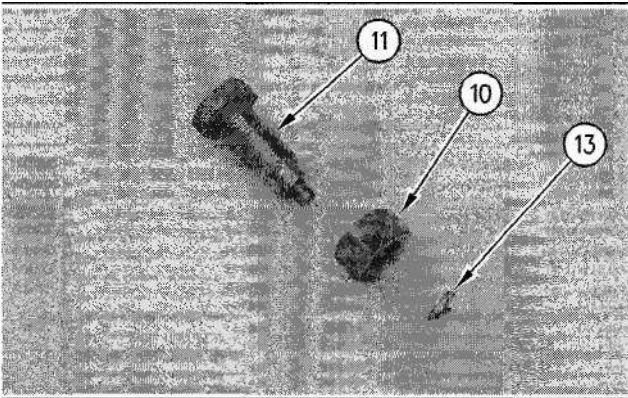


Illustration 72

- Install seal washer (13) and locknut (10) to drain valve (11).
- Install drain valve (11) to bracket assembly (2).
- Tighten locknut (10) in order to lock drain valve (11) into position.

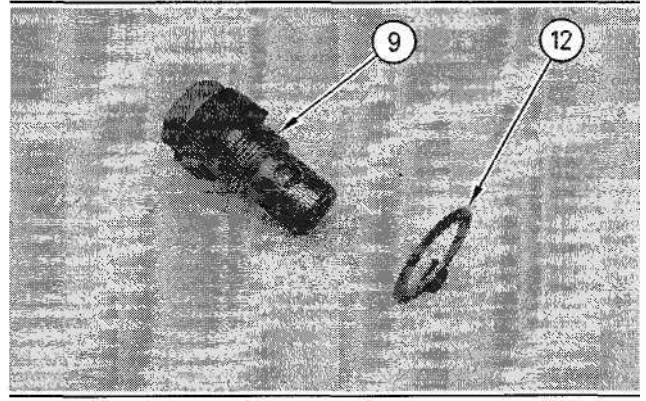


Illustration 73

d. Install seal washer (12) to relief valve (9).

e. Install relief valve (9).

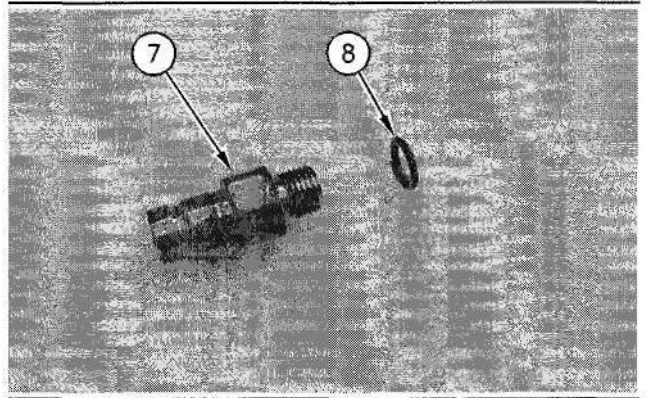


Illustration 74

f. Install O-ring seal (8) to the oil sampling valve (7).

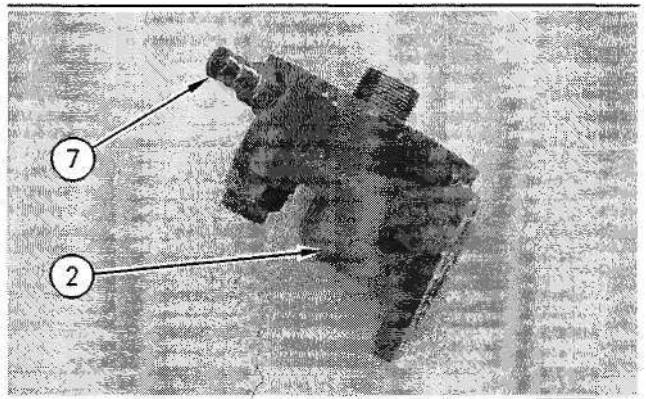


Illustration 75

g. Install oil sampling valve (7).

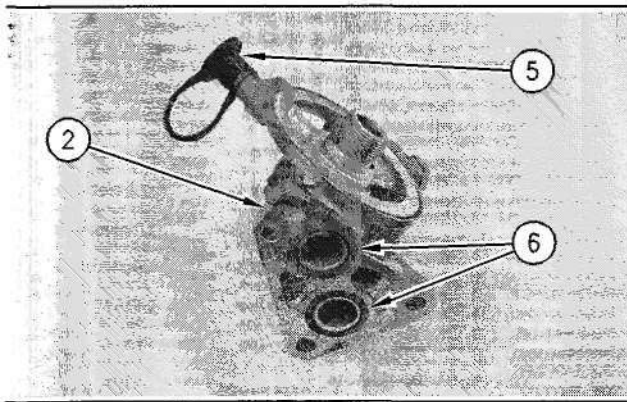


Illustration 76

- h. Install cap (5) to the oil sampling valve.
- i. Install two O-rings (6) to bracket assembly (2).

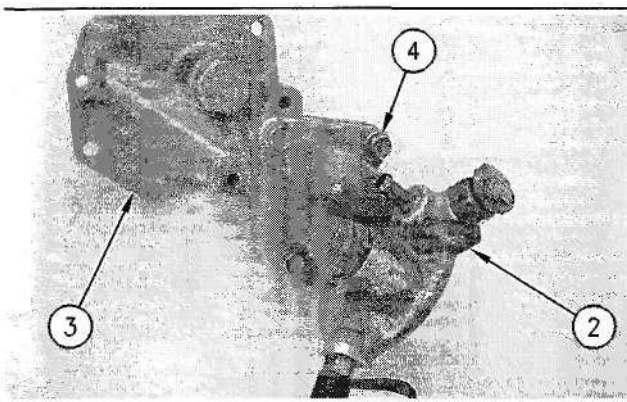


Illustration 77

- 3. Hold the bracket assembly (2) to the base assembly (3). Install three washers and three bolts (4).

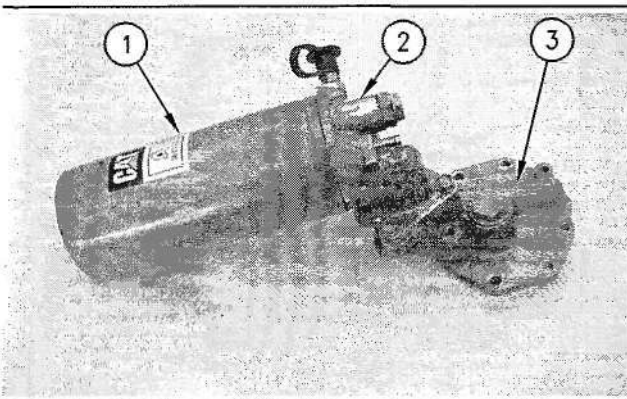


Illustration 78

- 4. Install oil filter (1) hand tight.

End By:

- a. Install the engine oil filter and filter bases. Refer to Disassembly and Assembly, "Engine Oil Filter and Oil Filter Base - Install" in this manual.

i01342037

Engine Oil Cooler - Remove and Install

SMCS Code: 1378-010

Removal Procedure

Start By:

- a. Remove the dipstick. Refer to Disassembly and Assembly, "Engine Oil Level Gauge (Dipstick) - Remove and Install".
- b. Remove the engine oil filter. Refer to Disassembly and Assembly, "Engine Oil Filter and Oil Filter Base - Remove".
- c. Remove the fuel injection pump. Refer to Disassembly and Assembly, "Fuel Injection Pump Housing and Governor - 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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

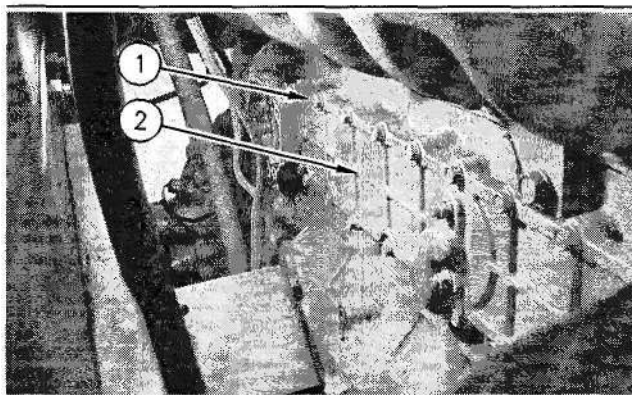


Illustration 79

1. Remove bolts (1) and the washers that secure the oil cooler (2) to the engine cylinder block.

Note: Some of the bolts are a different length. Pay attention to the location of the smaller bolts.

2. Remove engine oil cooler (2).

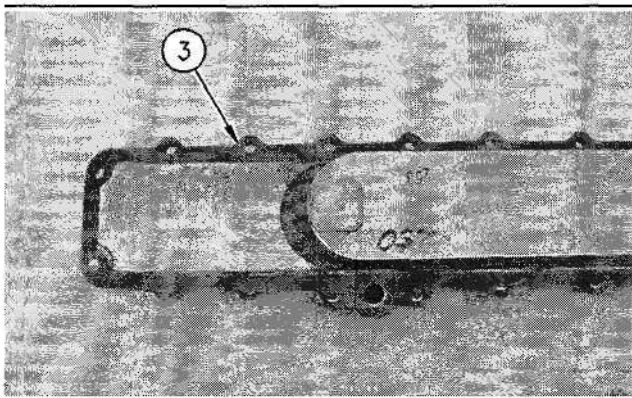


Illustration 80

3. Remove gasket (3) from the cover for the engine oil cooler. Replace gasket (3).

Note: Check the oil cooler cover for cracks. Replace the cover, if the cover is cracked.

4. Disassemble the engine oil cooler. Refer to Disassembly and Assembly, "Engine Oil Cooler - Disassemble " in the service manual.

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

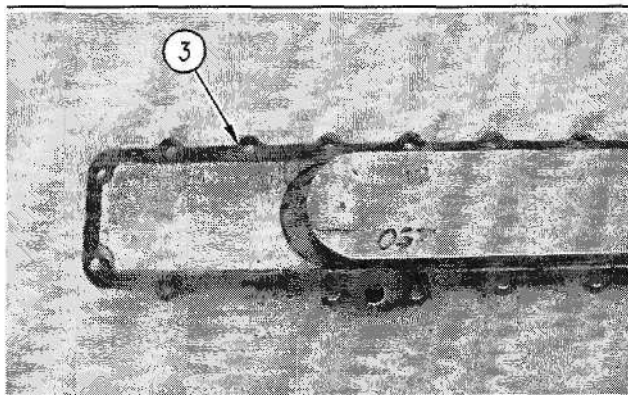


Illustration 81

1. Install a new gasket (3) to the cover for the engine oil cooler. Ensure that all mating surfaces are clean.

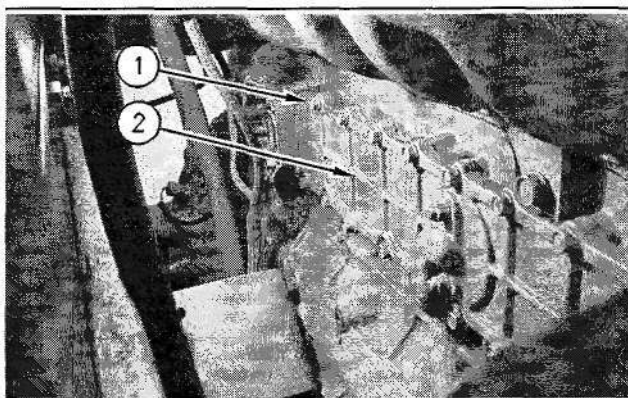


Illustration 82

2. Install engine oil cooler (2). Install bolts (1) and washers in order to secure the engine oil cooler to the engine cylinder block.

End By:

- a. Install the fuel injection pump. Refer to Disassembly and Assembly, "Fuel Injection Pump Housing and Governor - Install".
- b. Install the engine oil filter. Refer to Disassembly and Assembly, "Engine Oil Filter and Oil Filter Base - Install".
- c. Install the dipstick. Refer to Disassembly and Assembly, "Engine Oil Level Gauge (Dipstick) - Remove and Install".

Hydraulic Oil Cooler - Remove

SMCS Code: 1374-011

Removal Procedure

WARNING

At operating temperature, the hydraulic oil is hot and under pressure. Hot oils can cause burns.

To prevent possible personal injury, release the pressure in the implement hydraulic circuit (boom, stick, bucket, and swing), travel circuits, and the hydraulic oil tank at the filler cap before any hydraulic lines or components are disconnected or removed.

Remove the filler cap only when the engine is stopped and the filler cap is cool enough to touch.

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

NOTICE

Keep all parts clean from contaminants.

Contamination of the hydraulic system with foreign material will reduce the service life of the hydraulic system components.

To prevent contaminants from entering the hydraulic system, always plug or cap the lines, fittings, or hoses as they are disconnected. Cover any disassembled components and clean them properly before assembly.

Clean the hydraulic system properly after any major component exchange or especially after a component failure, to remove any contamination.

Note: A hydraulic oil sample should be obtained before any maintenance is performed in order to establish the system contaminant level. Refer to Fluid Analysis Laboratory Guide, SEBF3116, "Obtaining an Oil Sample for S.O.S Analysis". Refer to Operation and Maintenance Manual, "Sampling Interval and Location of Sampling Valve" for the correct location.

1. Release the pressure in the hydraulic system.

Reference: Refer to Disassembly and Assembly, "Hydraulic System Pressure - Release" in this manual.

2. Drain the hydraulic oil tank into a suitable container for storage or disposal. The capacity of the hydraulic oil tank is 120 L (32 US gal).

Reference: Refer to Operation and Maintenance, "Hydraulic System Oil - Change" in the service manual.

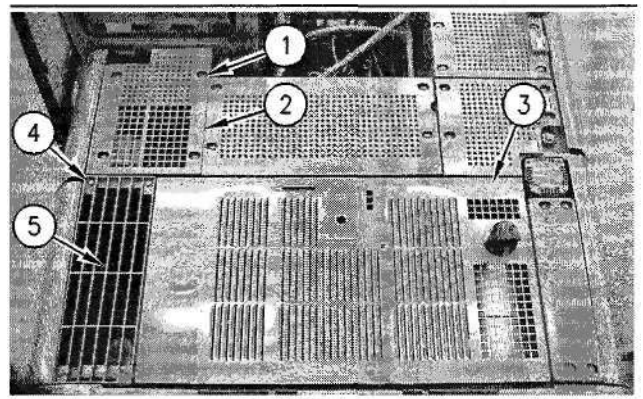


Illustration 83

3. Remove four bolts (1) and the washer. Remove cover (2).
4. Open engine hood (3).
5. Remove four bolts (4) and the washer. Remove cover (5).

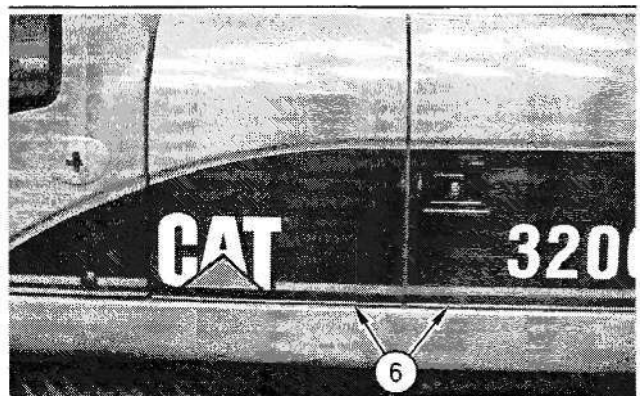


Illustration 84

6. Open two side doors (6).

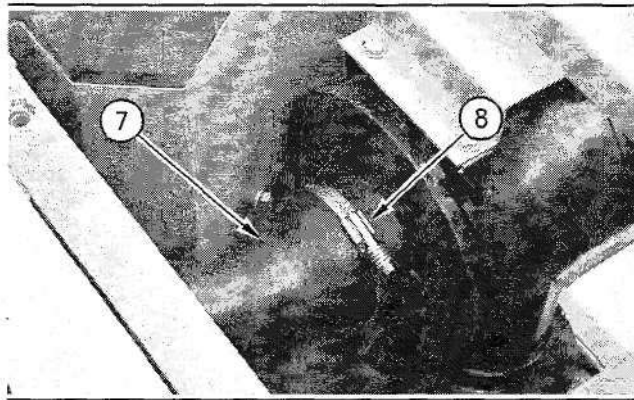


Illustration 85

7. Loosen hose clamp (8). Disconnect hose (7) from the air cleaner housing.

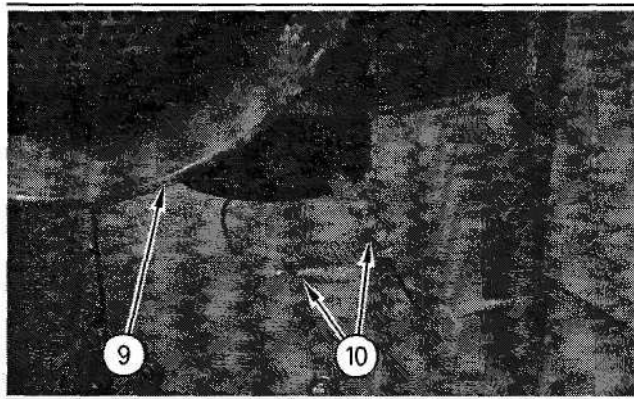


Illustration 86

8. Disconnect two electrical connectors (10) from air filter (9).

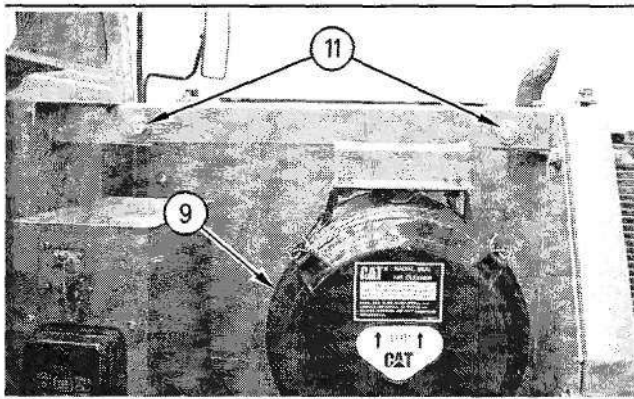


Illustration 87

9. Remove bolts (11) and the washers. Remove the air filter (9) and the support from the machine.

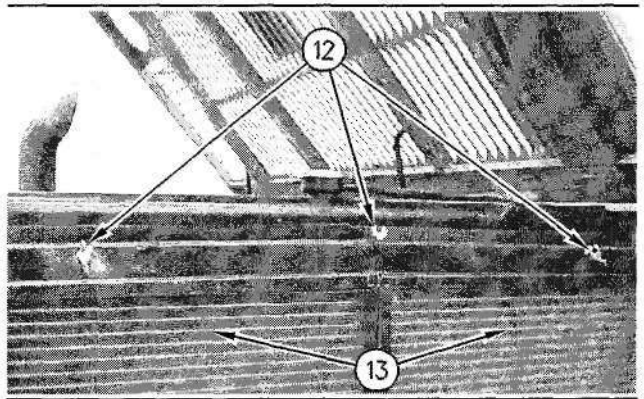


Illustration 88

10. Remove three screws (12). Remove two screens (13).

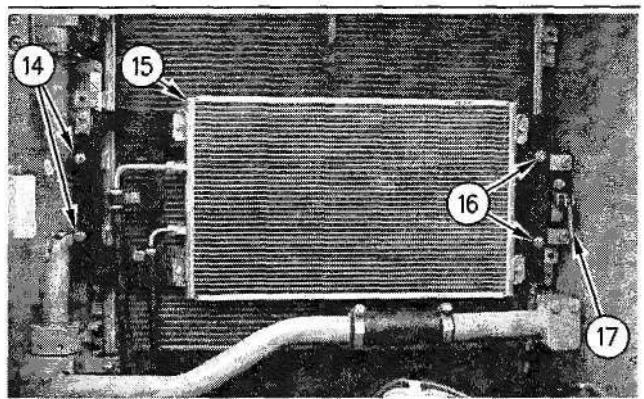


Illustration 89

11. Remove two bolts (14), two washers, and two nuts from the mounting bracket.

Note: Turn handle (17) in order to unlatch the oil cooler. Swing the oil cooler open for easier access to the mount bolts.

12. Remove two bolts (16) and washers from refrigerant condenser (15).

13. Reposition refrigerant condenser (15) to the side.

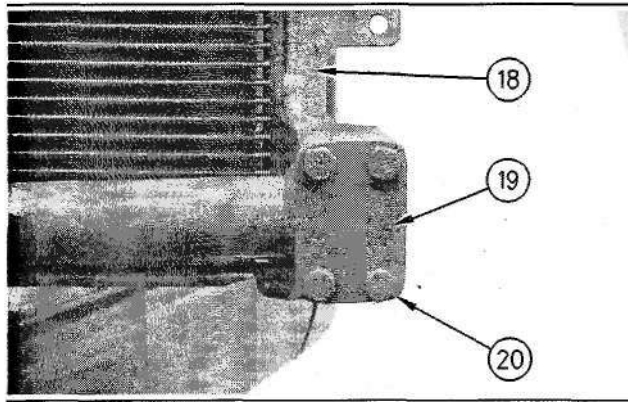


Illustration 90

14. Remove four bolts (20) and the washers. Disconnect tube (19) from oil cooler (18).

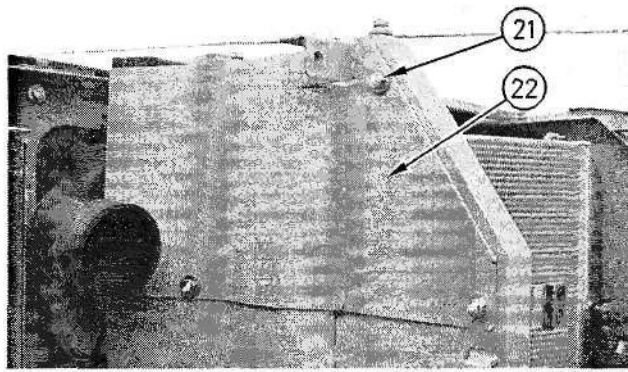


Illustration 91

15. Remove five bolts (21) and the washers. Remove panel (22).

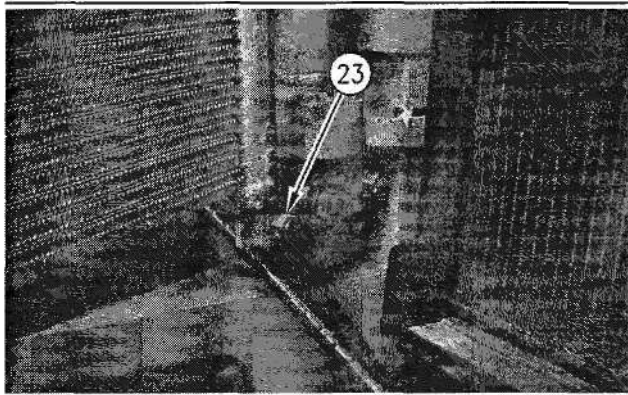


Illustration 92

16. Remove nut (23), the washer, and the bolt from the bottom of the oil cooler.

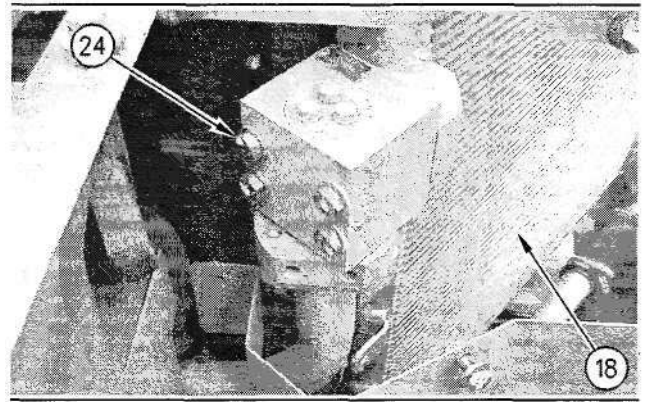


Illustration 93

17. Remove four bolts (24) and the washers from oil cooler (18). The weight of the oil cooler is 16 kg (35 lb).

Note: Use two person to remove the oil cooler.

18. Carefully remove oil cooler (18).

Hydraulic Oil Cooler - Install

SMCSCode: 1374-012

Installation Procedure

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

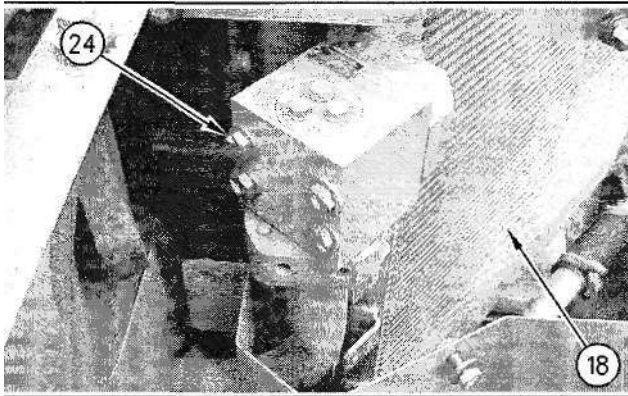
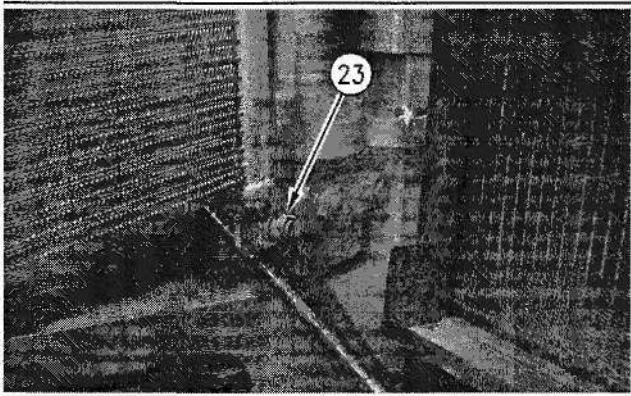


Illustration 94

Note: Use two persons to install the oil cooler.

1. Carefully install oil cooler (18). The weight of the oil cooler is 16 kg (35 lb).
2. Install the washers and four bolts (24) in the oil cooler.



3. Install the bolt, the washer, and nut (23) in the bottom of the oil cooler.

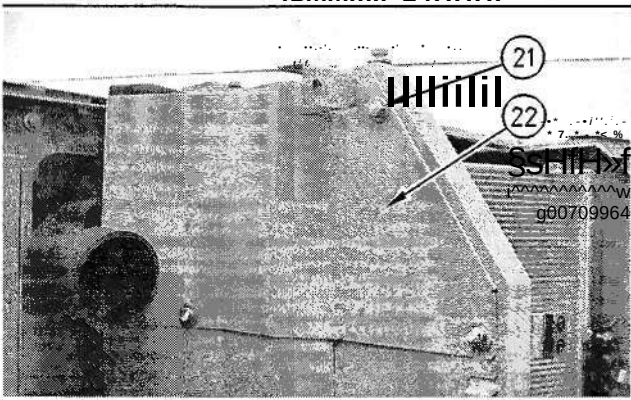


Illustration 96

4. Place panel (22) in position. Install the washers and five bolts (21).

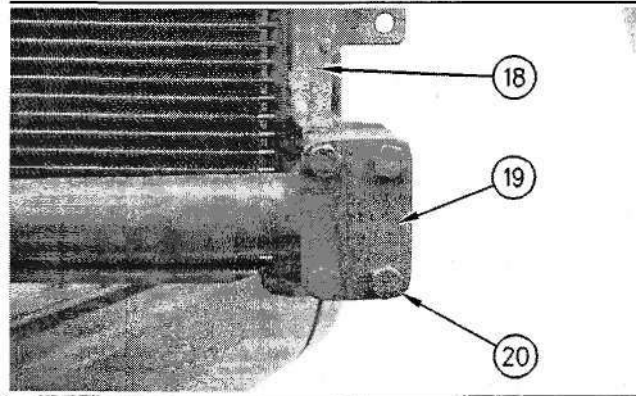


Illustration 97

5. Connect tube (19) to oil cooler (18). Install the washers and four bolts (20).

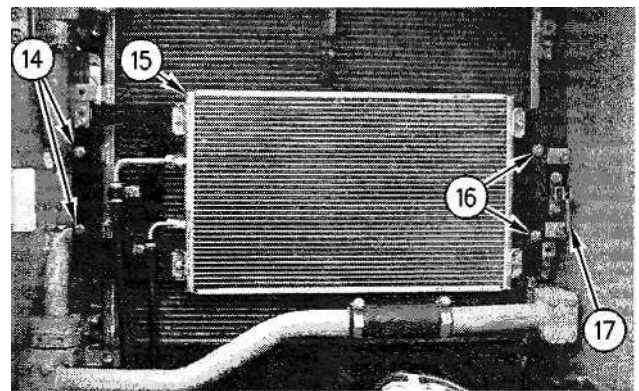


Illustration 98

6. Place refrigerant condenser (15) in position. Install the washers and two bolts (16).

Note: Make sure that handle (17) is latched.

7. Install two bolts (14), two washers, and two nuts on the mounting bracket.

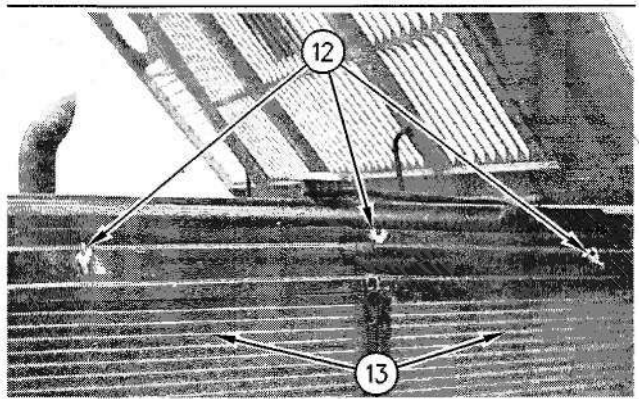


Illustration 99

8. Place two screens (12) in position. Install three screws (13).

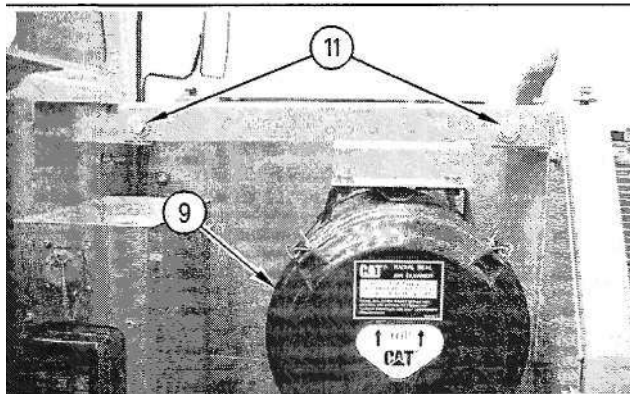


Illustration 100

9. Place the support and air filter (9) in position on the machine. Install the washers and bolts (11).

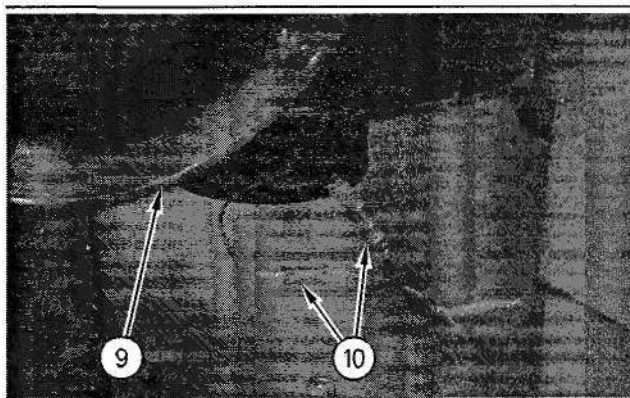


Illustration 101

10. Connect two electrical connectors (10) to air filter (9).

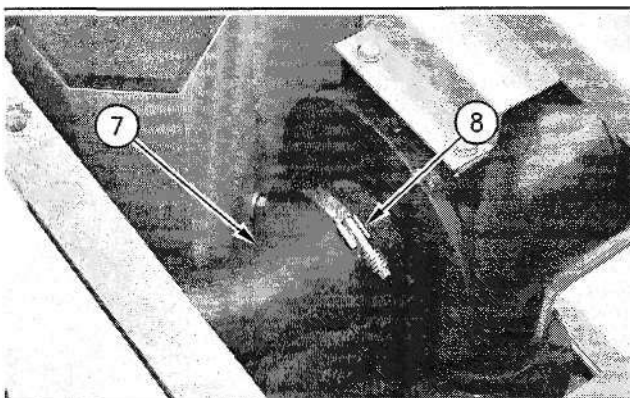


Illustration 102

11. Connect hose (7) to the air cleaner housing. Tighten hose clamp (8).

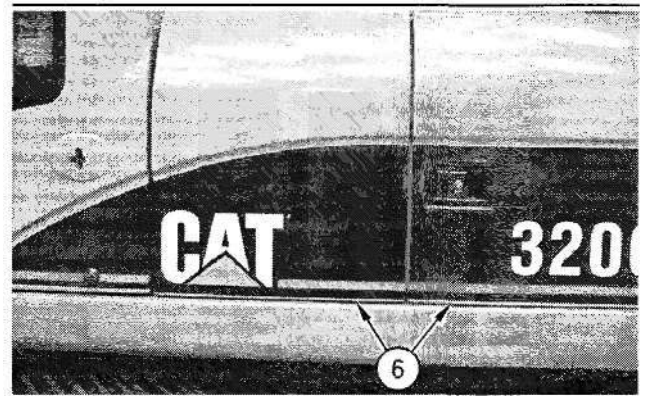


Illustration 103

12. Close side doors (6).

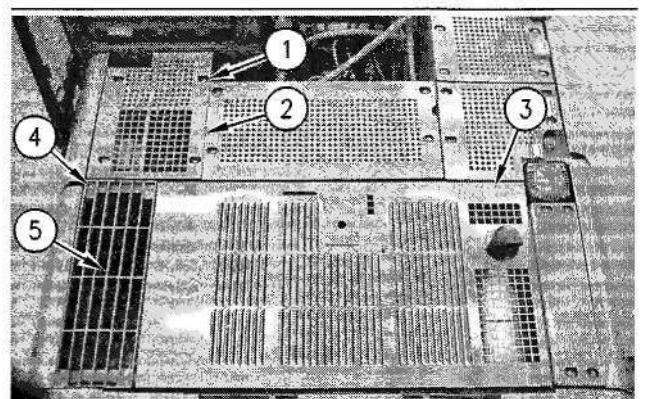


Illustration 104

13. Place cover (5) in position. Install the washers and four bolts (4).

14. Close engine hood (3).

15. Place cover (2) in position. Install the washers and four bolts (1).

16. Install high efficiency filters in place of the pilot filter, case drain filter, and the return filter.

Note: High efficiency filters should not be run for more than 250 hours before you change back to the standard filters.

17. Install the drain plug in the hydraulic oil tank. Fill the hydraulic oil tank with oil to the correct level.

Reference: Refer to the Operation and Maintenance Manual for the correct filling procedure and the correct oil level.

18. Obtain a hydraulic oil sample from the main S.O.S port.

Reference: Refer to Operation and Maintenance Manual, "Sampling Interval and Location of Sampling Valve" for the correct location.

19. If the S.O.S sample exceeds ISO 18/15, flush the hydraulic system.

Reference: Refer to Contamination Control Guidelines, SEBF8436, "Hydraulic System Flushing Procedure for 320C Hydraulic Excavators" for further information.

Air Cleaner - Remove and Install

SMCSCode: 1051-010; 1054-010

Removal Procedure

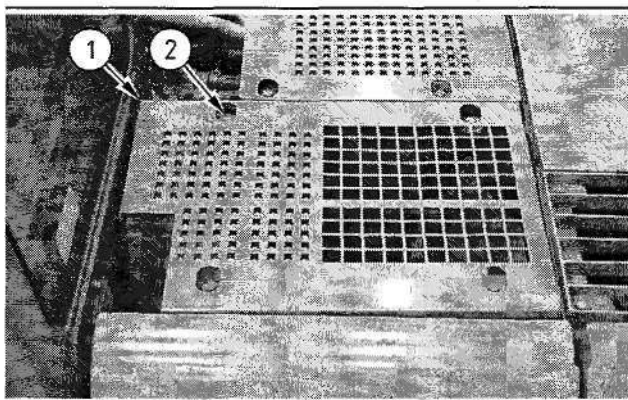


Illustration 105

1. Remove four bolts (2) and the washers in order to remove cover (1).

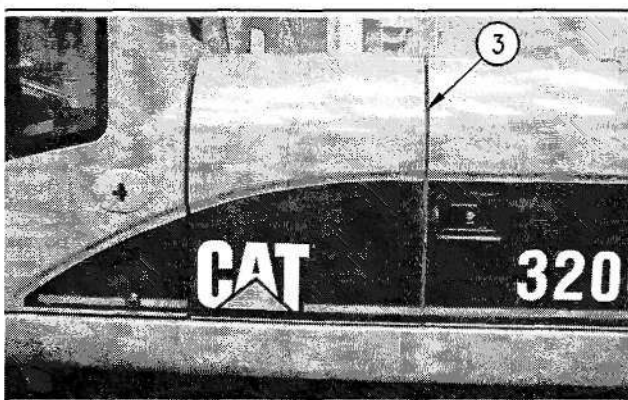


Illustration 106

2. Open the access door (3) on the front left side of the machine.

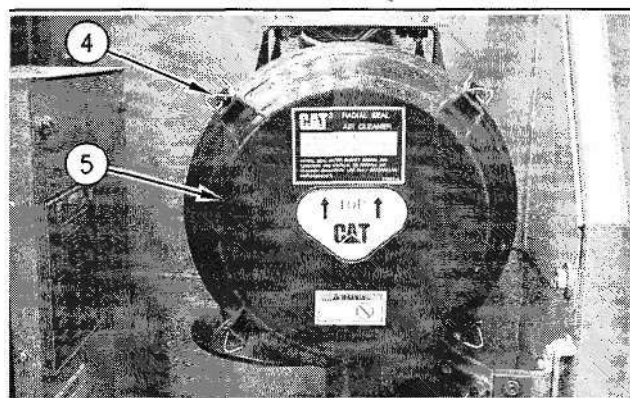


Illustration 107

3. Unlatch four clamps (4) and remove the air cleaner cover (5).

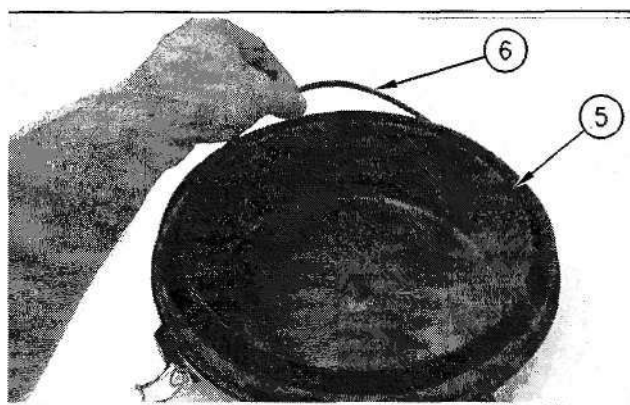


Illustration 108

4. Remove O-ring seal (6) from cover (5).

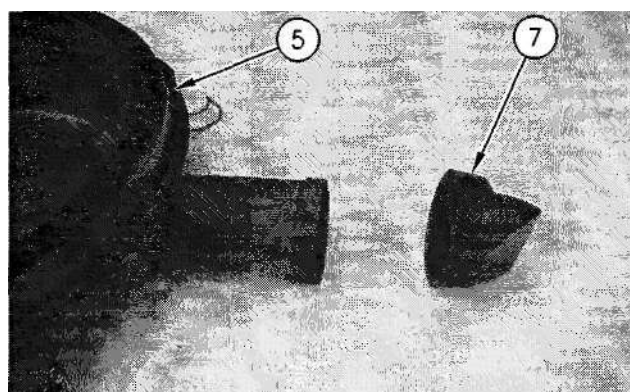


Illustration 109

5. Remove valve (7) from cover (5).

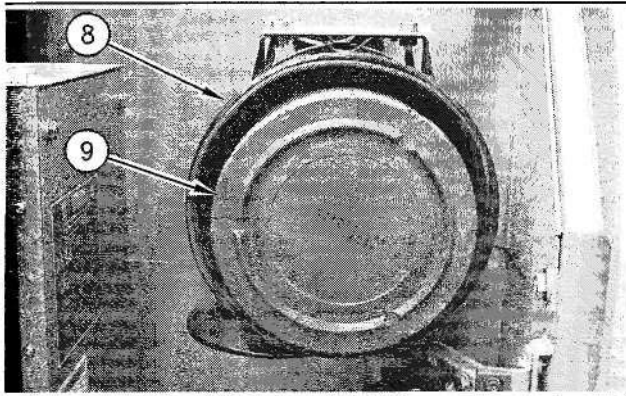


Illustration 110

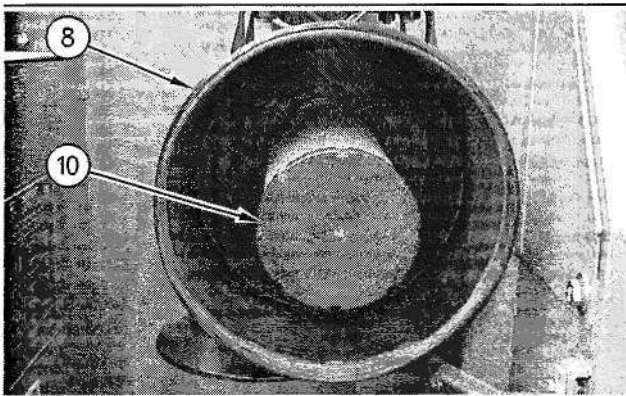


Illustration 111

6. Remove the primary filter element (9) and secondary filter element (10) from the air cleaner housing (8).

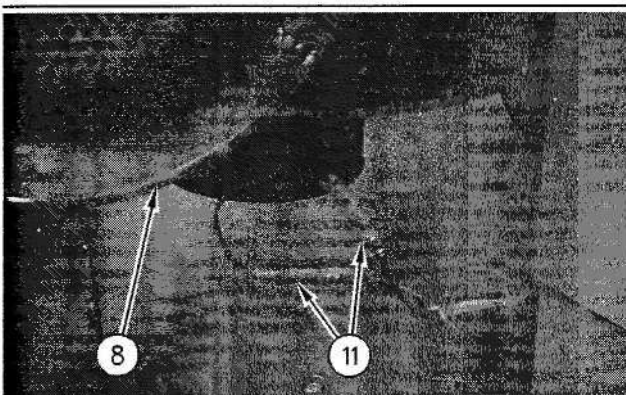


Illustration 112

7. Disconnect electrical connection (11) from the air cleaner housing (8).

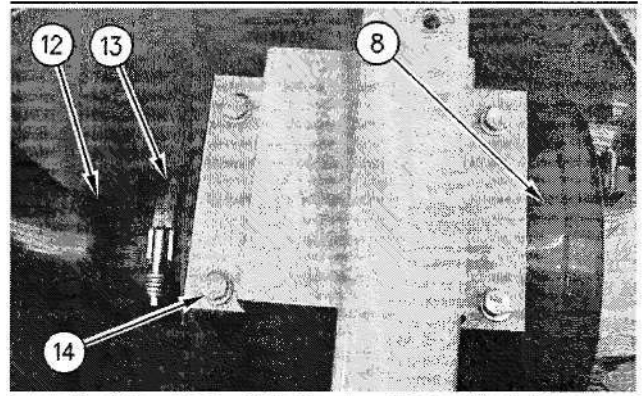


Illustration 113

8. Loosen hose clamp (13) and disconnect air inlet hose (12):
9. Remove four bolts (14) and washers that hold the air cleaner housing into position.
10. Remove air cleaner housing (8).

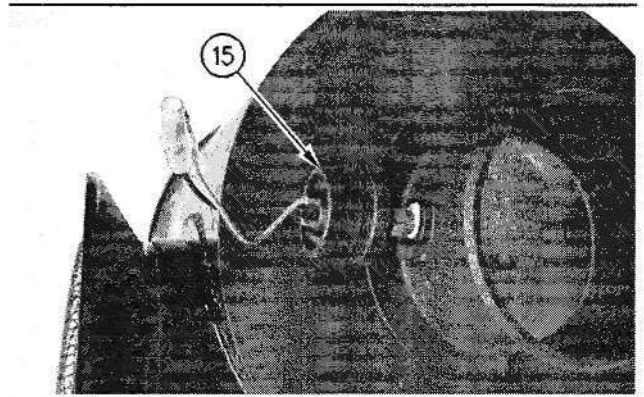


Illustration 114

11. Loosen fitting in order to remove indicator assembly (15).

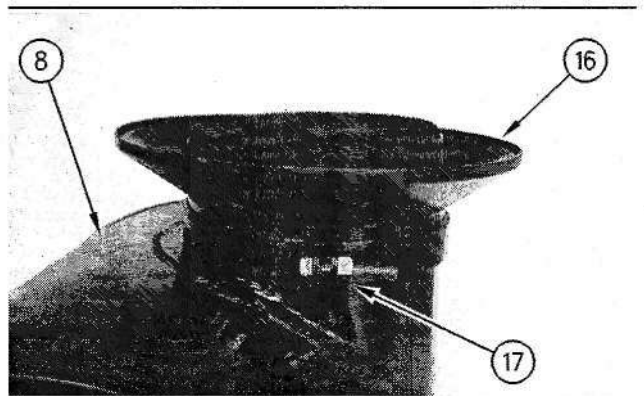


Illustration 115

12. Loosen nut (17) in order to remove hood assembly (16) from the air cleaner housing (8).

Installation Procedure

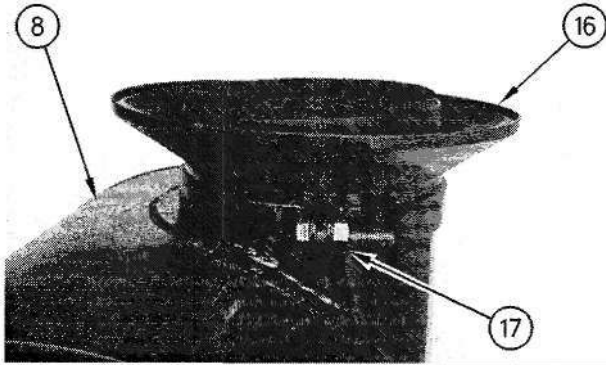


Illustration 116

1. Install hood assembly (16) to the air cleaner housing (8).
2. Tighten nut (17) in order to hold hood assembly (16) in position.

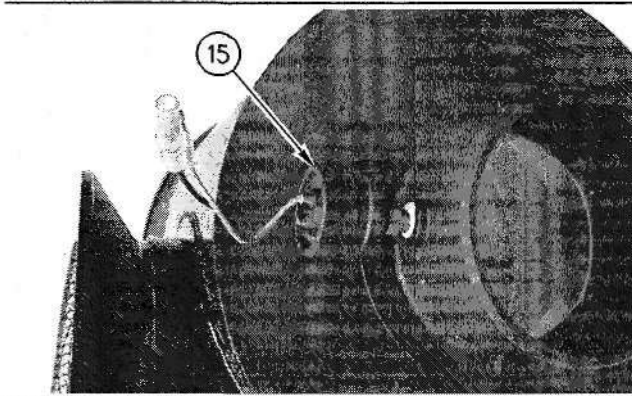


Illustration 117

3. Install indicator assembly (15).

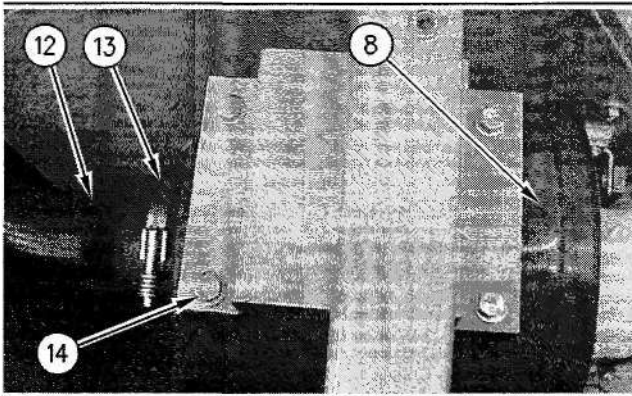


Illustration 118

4. Install the washers and four bolts (14) that hold the air cleaner housing into position.

5. Connect air inlet hose (12) to air cleaner housing (8) and tighten hose clamp (13).

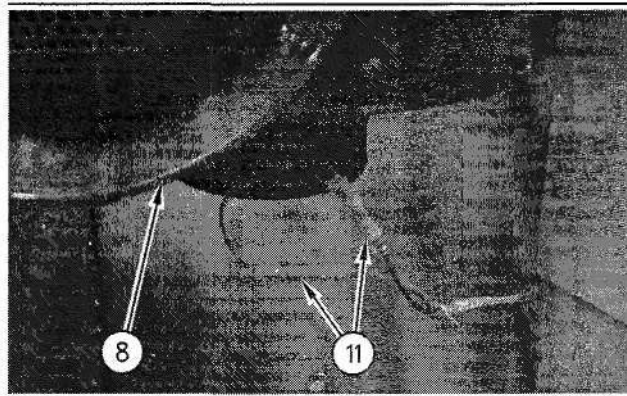


Illustration 119

6. Connect electrical connection (11) to the air cleaner housing (8).

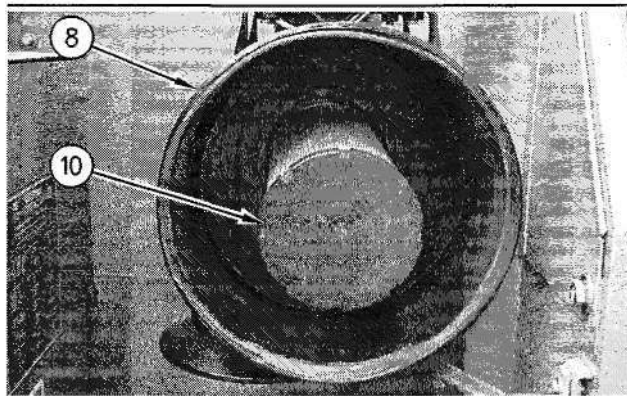


Illustration 120

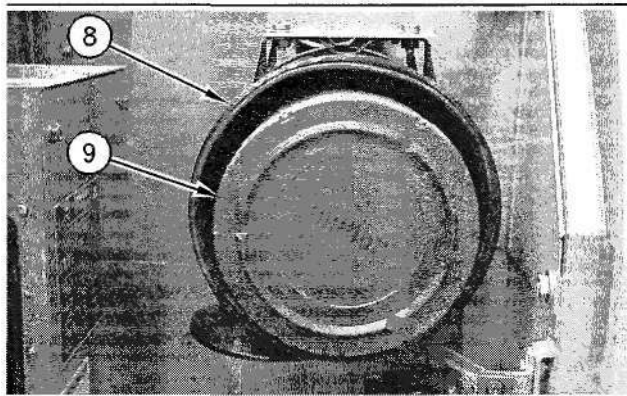


Illustration 121

7. Install secondary filter element (10) and the primary filter element (9) to the air cleaner housing (8).

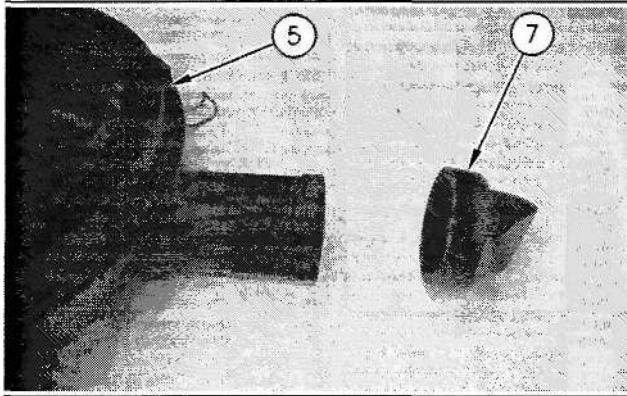


Illustration 122

8. Install valve (7) to cover (5).

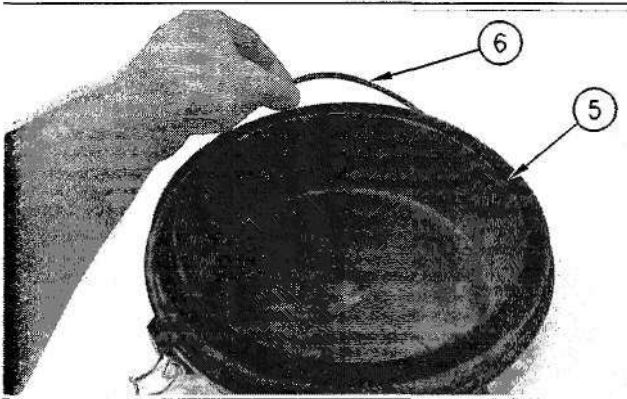


Illustration 123

9. Install O-ring seal (6) to cover (5).

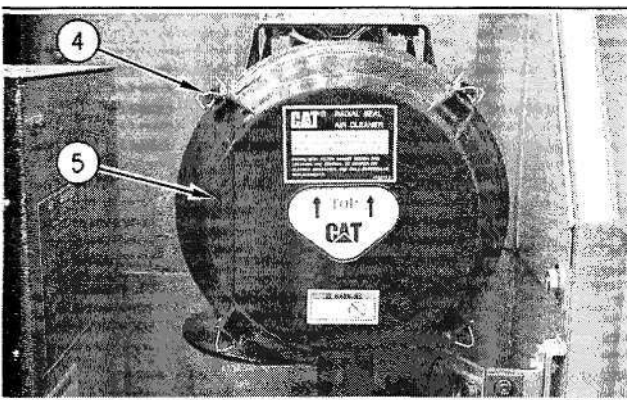


Illustration 124

10. Install the air cleaner cover (5) and latch four clamps (4).

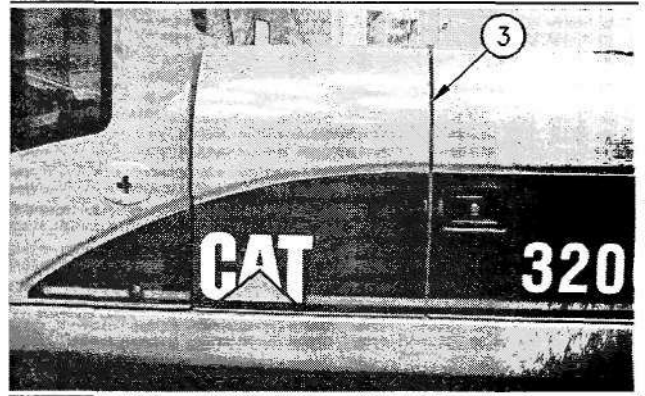


Illustration 125

11. Close the access door (3) on the front left side of the machine.

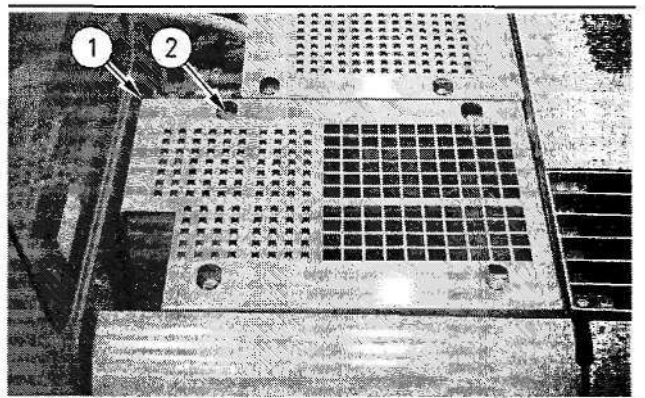


Illustration 126

12. Install cover (1) with four washers and bolts (2).

Air Inlet Manifold - Remove

SMCS Code: 1058-011-AI

Removal Procedure

Start By:

- Remove the fuel filter base. Refer to Disassembly and Assembly, "Fuel Filter Base - Remove and Install".
- Remove the fuel injection lines. Refer to Disassembly and Assembly, "Fuel Injection Lines - Remove and Install".
- Remove the air inlet heater. Refer to Disassembly and Assembly, "Air Inlet Heater - Remove and Install".

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

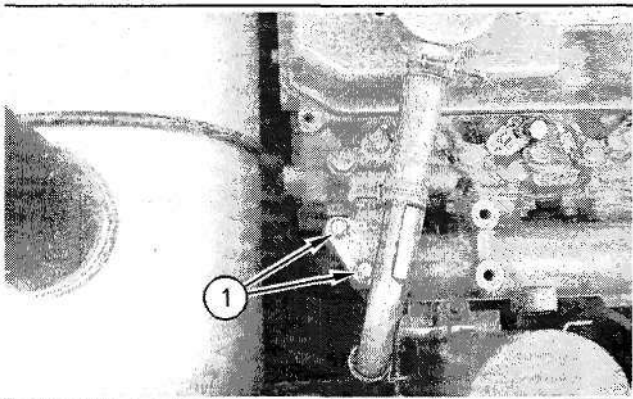


Illustration 127

1. Remove bolts (1) from the bracket for the crankcase breather.

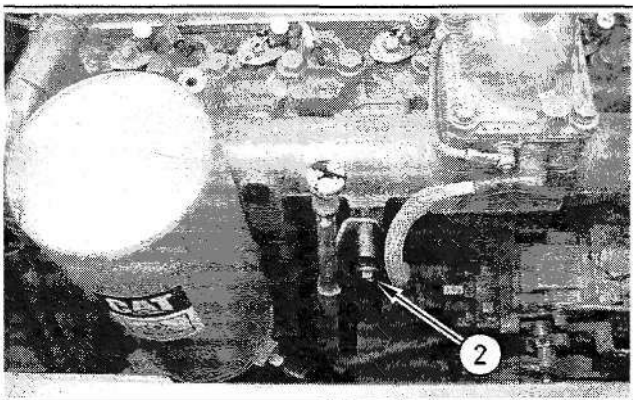


Illustration 128

2. Remove bolt (2), the washer, and the spacer from the dipstick tube.

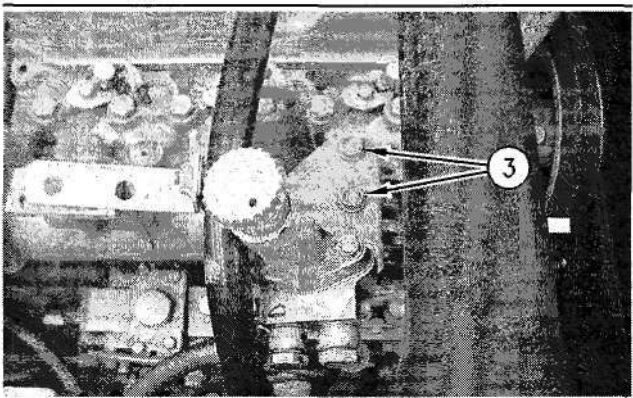


Illustration 129

3. Remove bolts (3) from the bracket for the fuel priming pump.

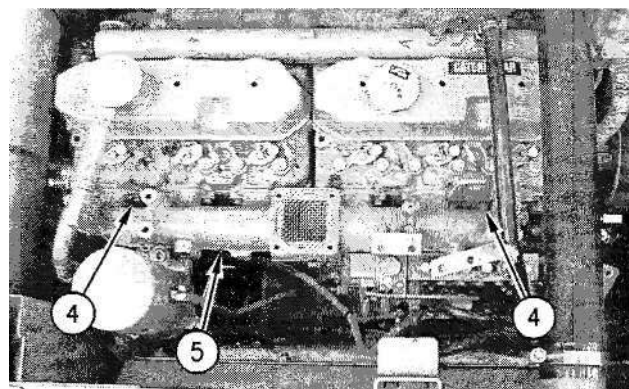


Illustration 130

4. Remove bolts (4) and the washers.

5. Remove air inlet manifold (5).

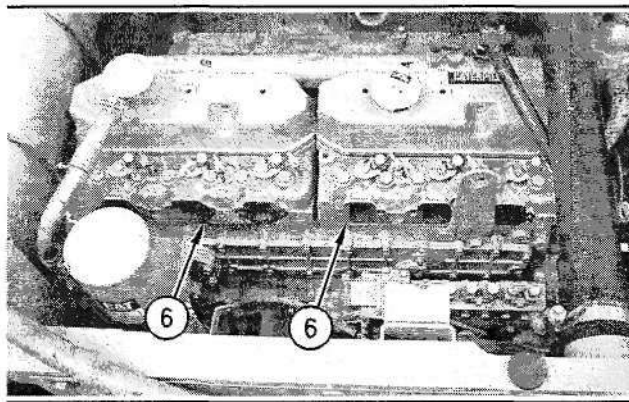


Illustration 131

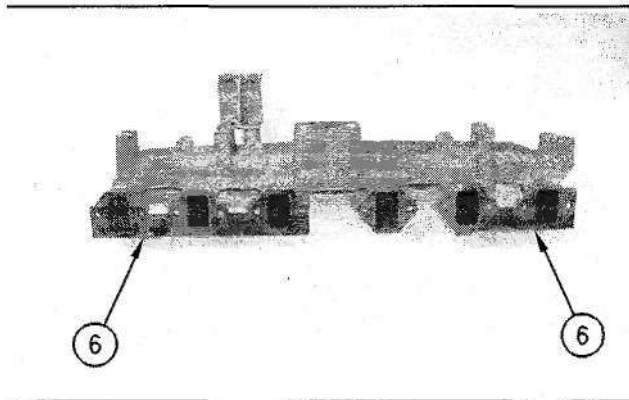


Illustration 132

6. Remove gaskets (6) from the mating surfaces of the cylinder head and the air inlet manifold.

Air Inlet Manifold - Install

SMCS Code: 1058-012-AI

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

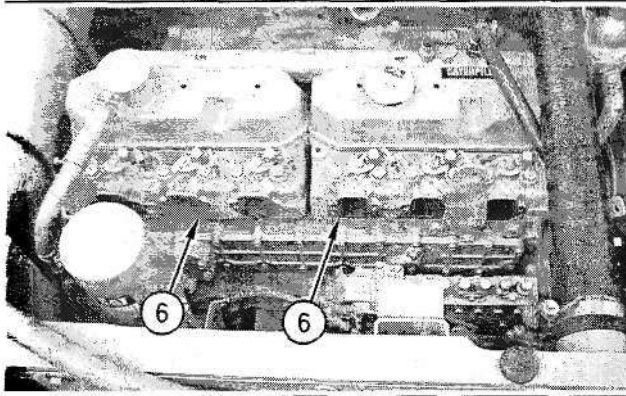


Illustration 133

1. Clean the surfaces of the cylinder head and the air inlet manifold that are in contact with each other. Make sure that the surfaces are clean and dry.
2. Install new gaskets (6) on the cylinder head.

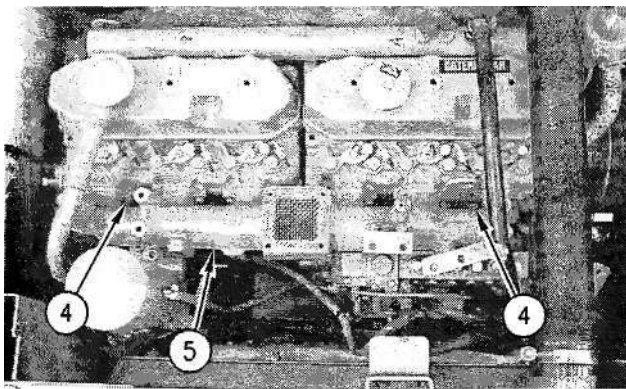


Illustration 134

3. Install air inlet manifold (5).
4. Install the washers and bolts (4).

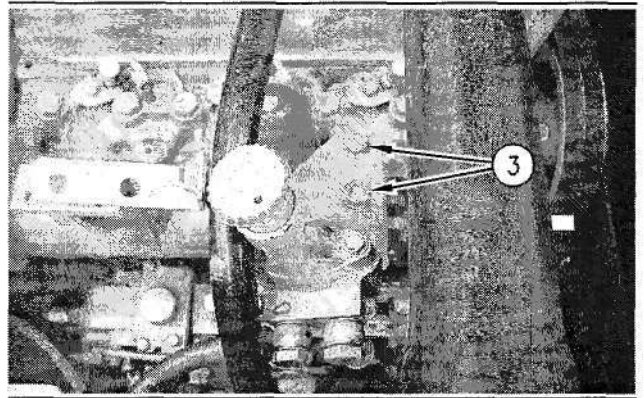


Illustration 135

5. Install bolts (3) in the bracket for the fuel priming pump.

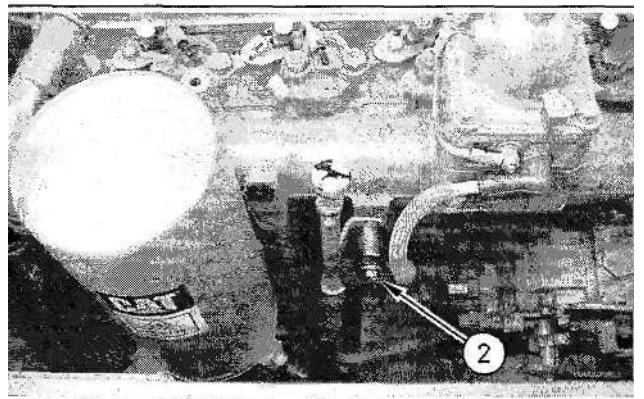


Illustration 136

6. Install the spacer, the washer, and bolt (2) in the dipstick tube.

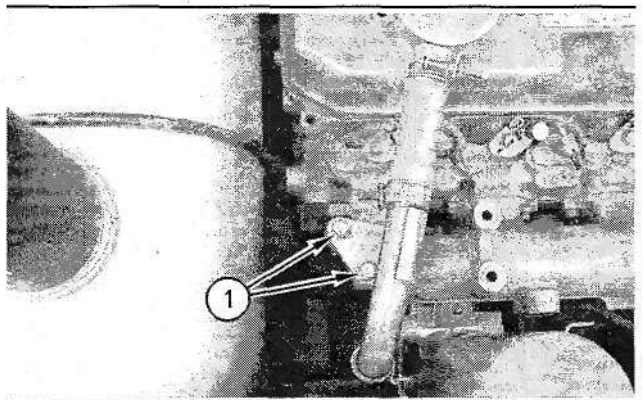


Illustration 137

7. Install bolts (1) in the bracket for the crankcase breather.

End By:

- a. Install the air inlet heater. Refer to Disassembly and Assembly, "Air Inlet Heater - Remove and Install".

- b. Install the fuel injection lines. Refer to Disassembly and Assembly, "Fuel Injection Lines - Remove and Install".
- c. Install the fuel filter base. Refer to Disassembly and Assembly, "Fuel Filter Base - Remove and Install".

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Air Inlet Heater - Remove and Install

SMCS Code: 1090-010

Removal Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Open the engine hood. Lock the engine hood in the OPEN position.

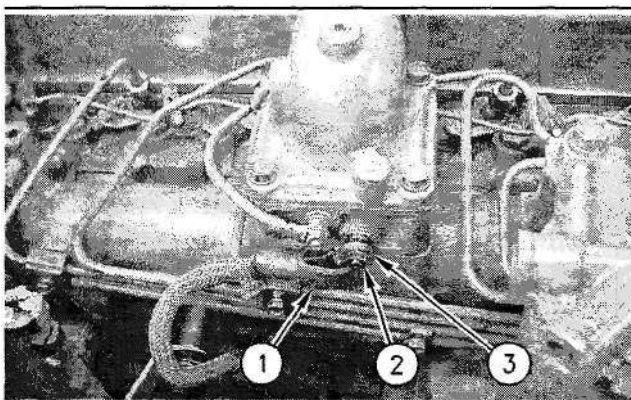


Illustration 138

yuu^ioac

2. Remove rubber boot (1) from the electrical connector.
3. Remove nut (2) in order to disconnect electrical wire (3) from the air inlet heater.

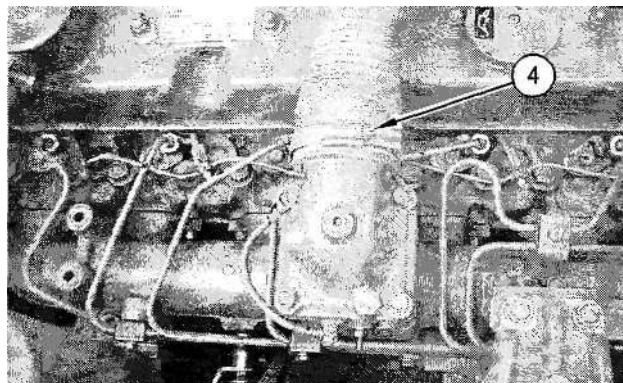


Illustration 139

4. Loosen hose clamp (4) in order to disconnect the air hose from the air inlet elbow.

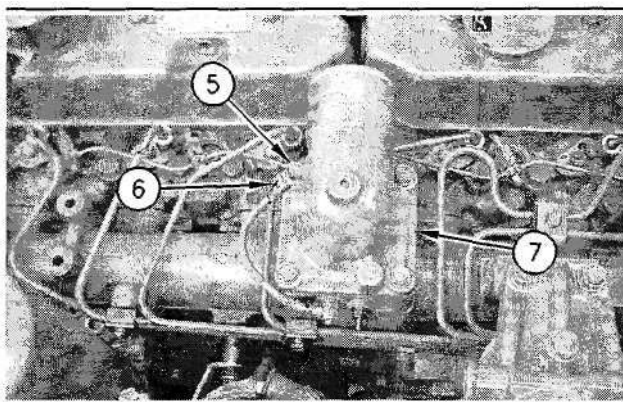


Illustration 140

5. Remove bolts (5) and the washers from the air inlet manifold.

Note: Ground wire (6) will be disconnected when the bolt is removed.

6. Remove air inlet elbow (7).

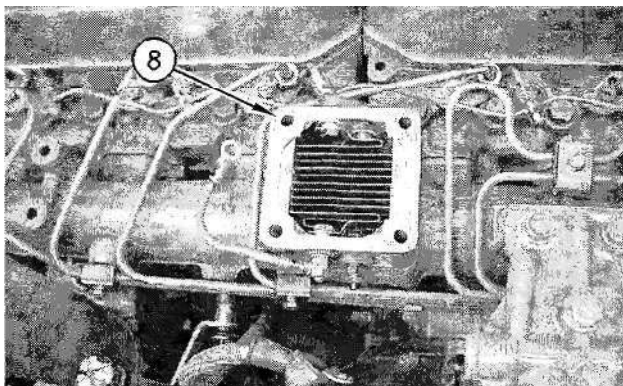


Illustration 141

7. Remove air inlet heater (8).

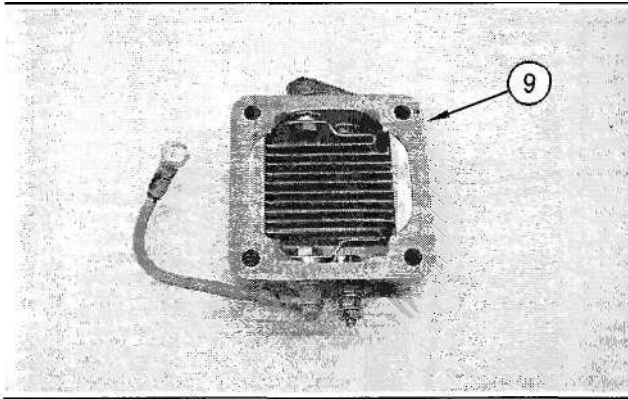


Illustration 142

g00721911

8. Remove gasket (9) from the air inlet heater.

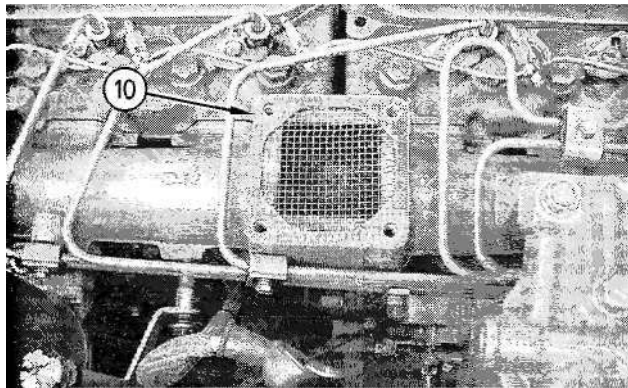


illustration 143

9. Remove wire mesh filter (10).

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: Gaskets and seals should always be replaced. A used gasket may not have the same sealing properties as a new gasket.

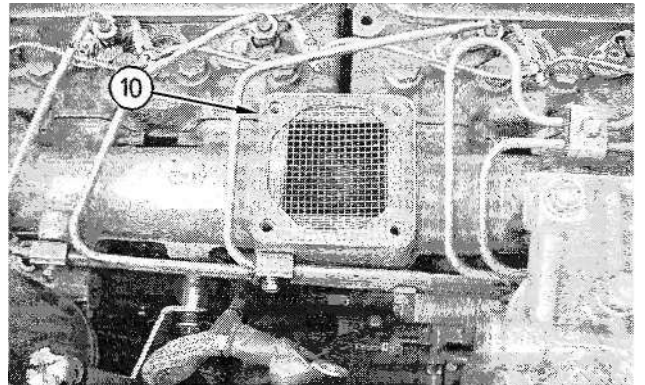


Illustration 144

1. Install wire mesh filter (10).

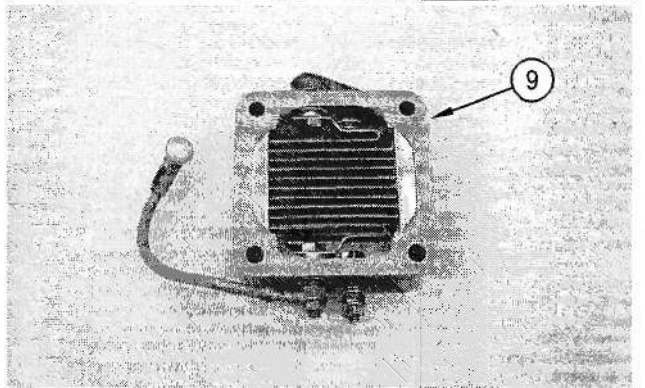


Illustration 145

g00721911

2. Install gasket (9) on the air inlet heater.

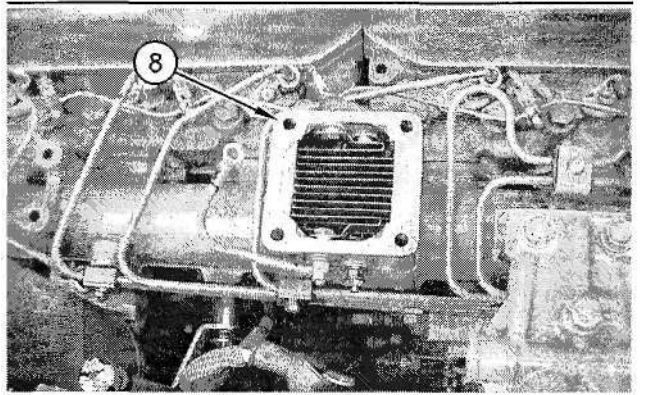


Illustration 146

3. Install air inlet heater (8).

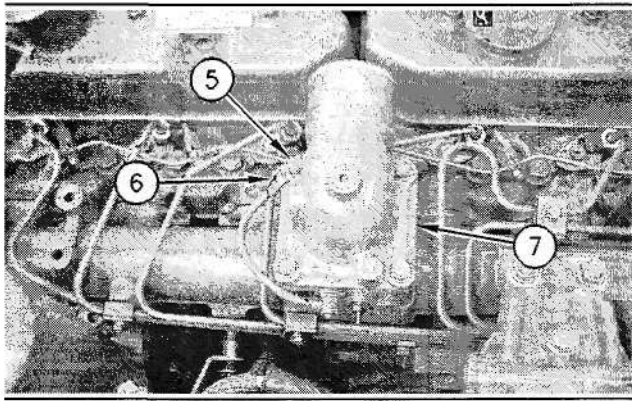


Illustration 147

4. Install air inlet elbow (7).

Note: Make sure that ground wire (6) is connected when the bolt is installed.

5. Install bolts (5) in the air inlet manifold.
6. Tighten bolts (5) to a torque of 28 ± 7 N·m (21 ± 5 lb ft).

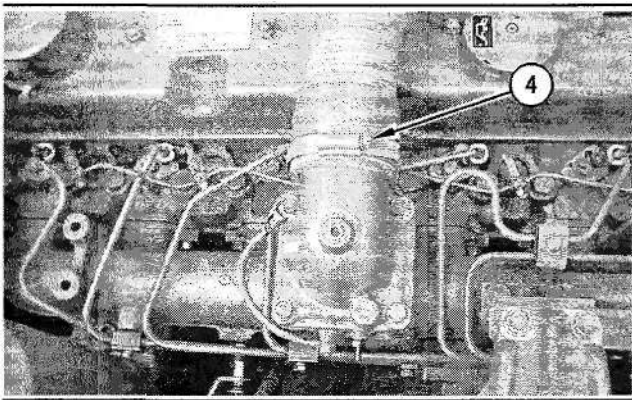


Illustration 148

7. Connect the air inlet hose to the air inlet elbow. Tighten hose clamp (4).

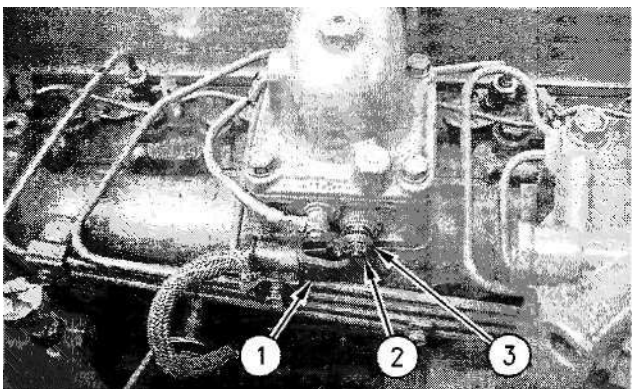


Illustration 149

8. Connect electrical wire (3) to the air inlet heater. Install nut (2).
9. Install rubber boot (1) on the electrical connector.
10. Close the engine hood.

i01368404

Muffler - Remove and Install

SMCSCode: 1062-010

Removal Procedure

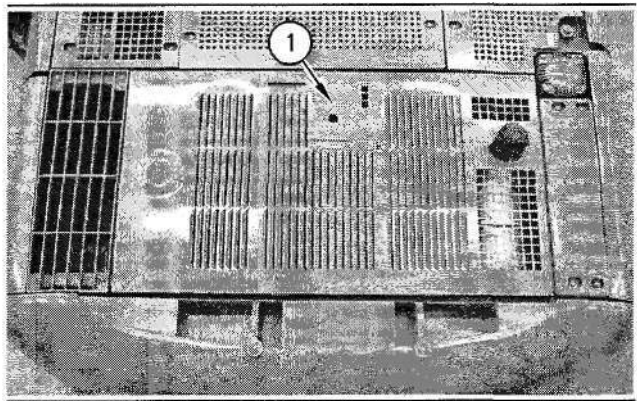


Illustration 150

1. Open hood (1).

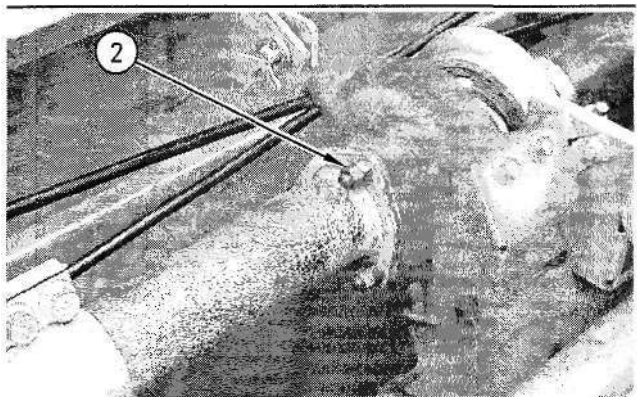
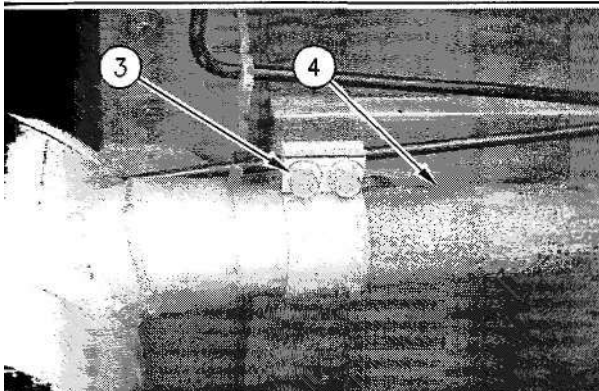


Illustration 151

2. Remove nuts (2).

Note: Nuts (2) are doubled on the turbocharger.



3. Loosen clamp (3). Slide clamp (3) onto pipe (4). Remove pipe (4), clamp (3), and the gasket that is between pipe (4) and the turbocharger.

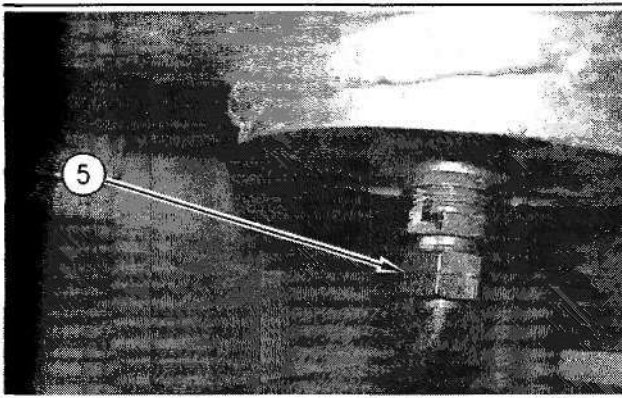


Illustration 153

4. Disconnect drain line (5) from the bottom of the muffler.

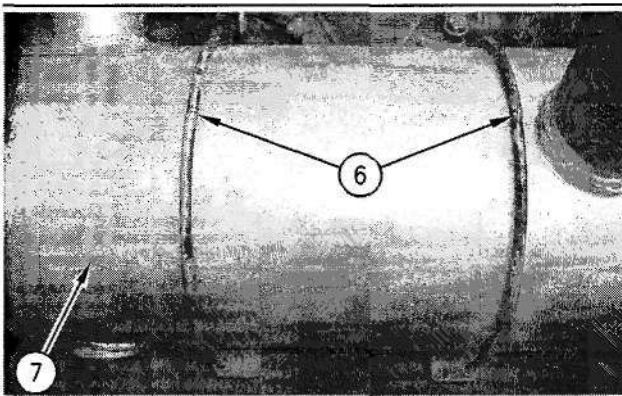


Illustration 154

5. Remove U-bolts (6). Remove muffler (7). The weight of the muffler is approximately 16 kg (35 lb).

Installation Procedure

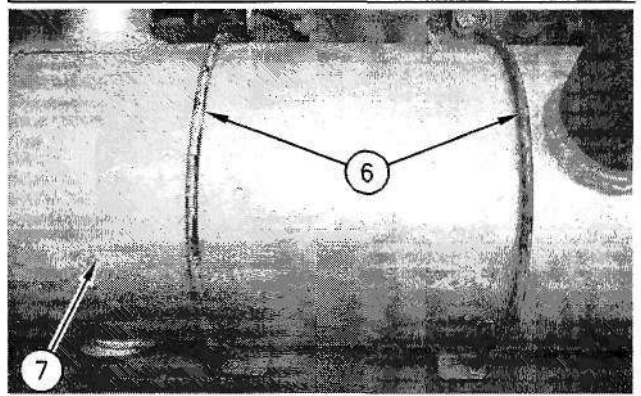


Illustration 155

1. Place muffler (7) in position on the brackets in the engine compartment. The weight of the muffler is approximately 16 kg (35 lb). Install U-bolts (6).

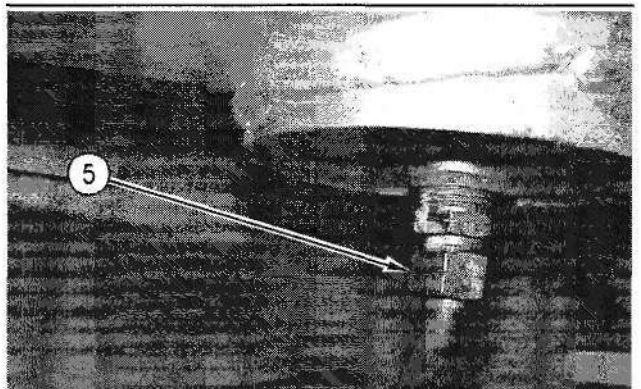


Illustration 156

g00721979

2. Connect drain line (5) to the bottom of the muffler.

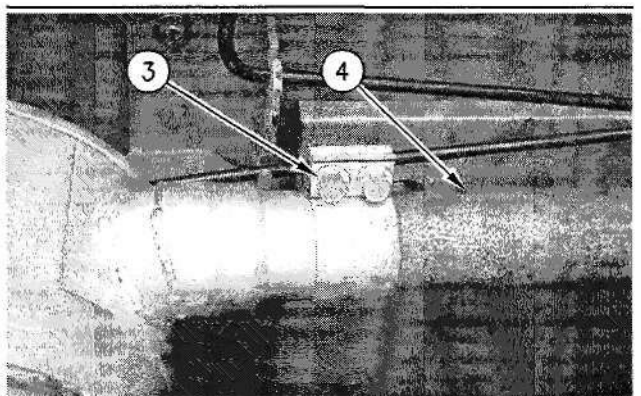


Illustration 157

3. Install a new gasket between pipe (4) and the turbocharger. Slide clamp (3) onto pipe (4). Install pipe (4) and clamp (3) on the turbocharger. Slide clamp (3) so that the clamp is half on pipe (4) and half on the muffler. Do not tighten clamp (3) at this time.

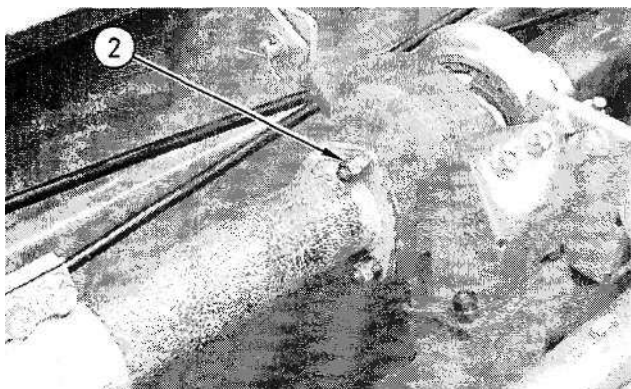


Illustration 158

4. Apply 4C-5599 Anti-Seize Compound to the threads of nuts (2). Install nuts (2).

Note: Nuts (2) are doubled on the turbocharger.

5. Make sure that clamp (3) is half on pipe (4) and half on the muffler. Tighten clamp (3).

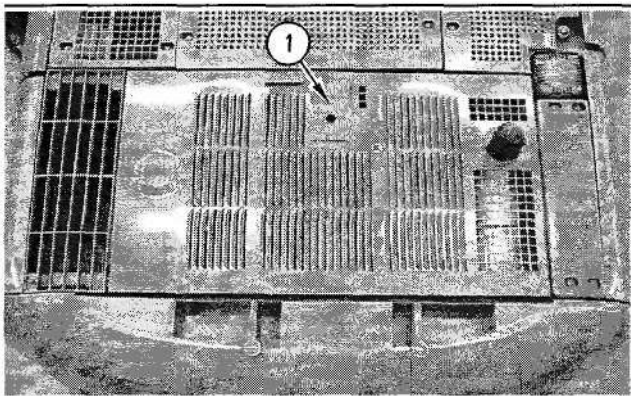


Illustration 159

6. Close hood (1).

i01342304

Exhaust Manifold - Remove and Install

SMCSCode: 1059-010

Removal Procedure

Start By:

- a. Remove the turbocharger. Refer to Disassembly and Assembly, "Turbocharger - Remove and Install" in this manual.

- b. Remove the V-Belts from the alternator. Refer to Disassembly and Assembly, "V-Belts - Remove and Install" in this manual.

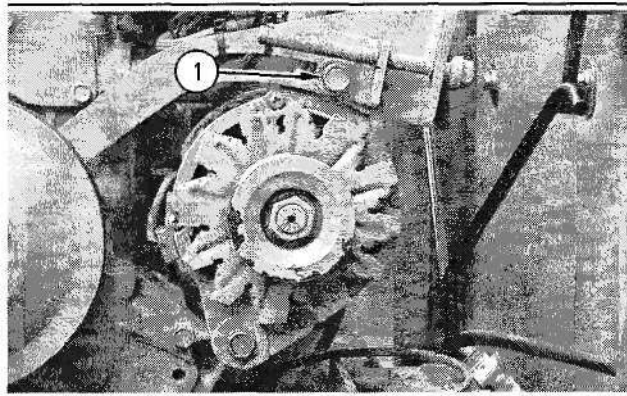


Illustration 160

The radiator is removed for photographic purposes.

Note: The alternator must be moved in order to remove the exhaust manifold.

1. Remove bolt (1) from the alternator. Position the alternator away from the exhaust manifold.

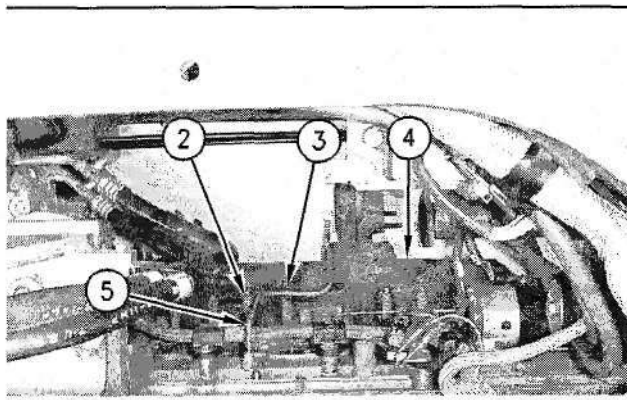


Illustration 161

2. Remove nut (3) and the washer. Remove oil line (5). Remove the spacers.
3. Remove nuts (2), the spacers, the sleeves, and the washers.
4. Remove exhaust manifold (4).

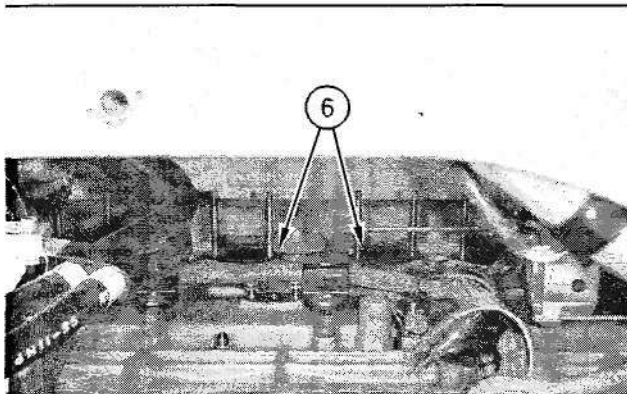


Illustration 162

5. Remove gasket (6).

Installation Procedure

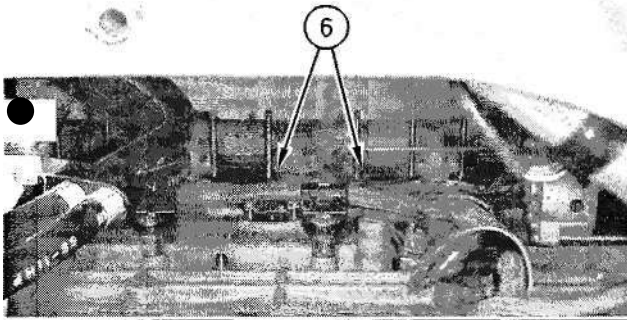


Illustration 163

1. Install new gasket (6) on the engine block.

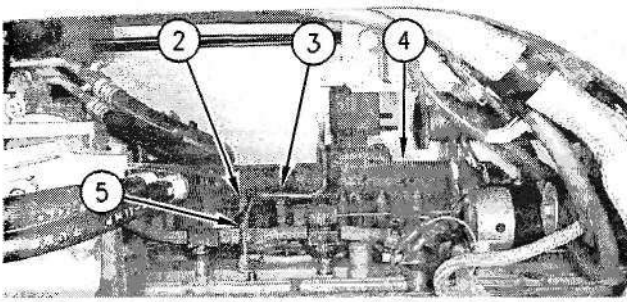


Illustration 164

2. Install exhaust manifold (4).
3. Install the washers, the sleeves, the spacers, and nuts (2).
4. Install the spacers. Install the clip and oil line (5). Install nut (3) and the washer.

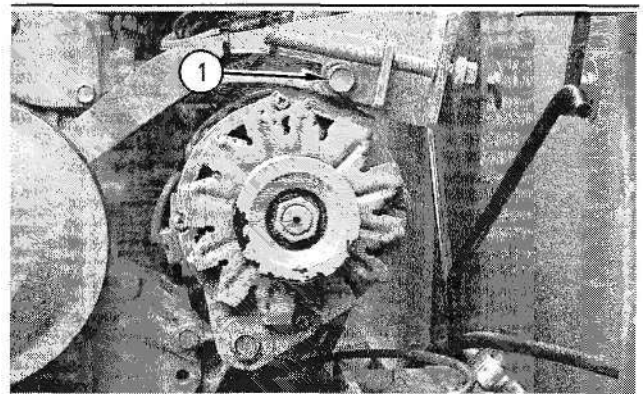


Illustration 165

g0072i959

The radiator is removed for photographic purposes.

5. Install bolt (1) in the alternator.

End By:

- a. Install the V-Belts on the alternator. Refer to Disassembly and Assembly, "V-Belts - Remove and Install" in this manual.
- b. Install the turbocharger. Refer to Disassembly and Assembly, "Turbocharger - Remove and Install" in this manual.

Turbocharger - Remove

SMCSCode: 1052-011

Removal Procedure

1. Open the engine hood. Lock the engine hood in the OPEN position.

Removal Procedure of the Turbocharger Cartridge

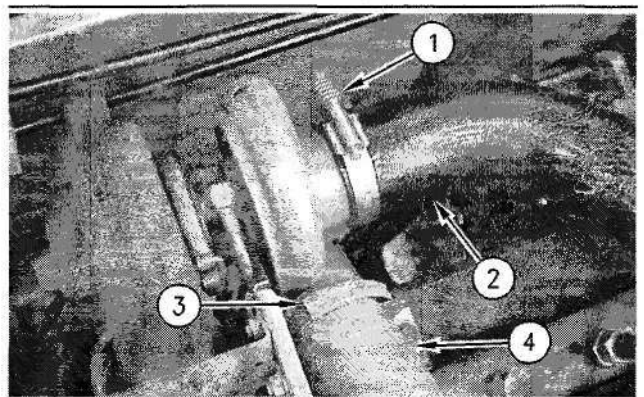


Illustration 166

- 1, Loosen hose clamp (1). Disconnect air line (2).

2. Loosen hose clamp (3). Disconnect air line (4).

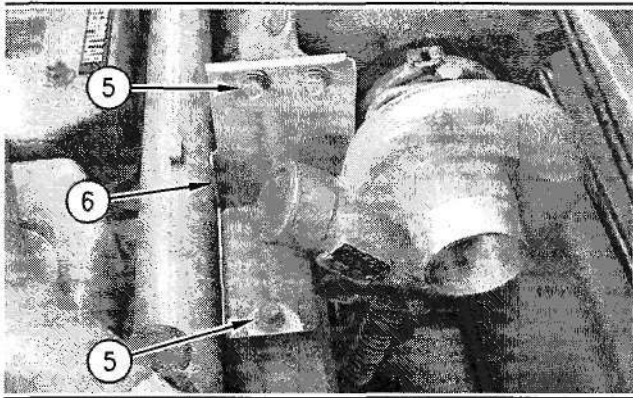


Illustration 167

3. Remove bolts (5) and the washers. Remove heat shield (6).

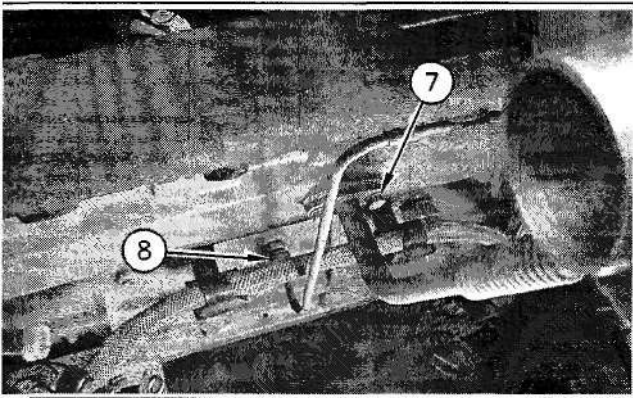


Illustration 168

4. Remove bolts (7) and the washers in order to disconnect the oil line.

5. Disconnect oil line (8).

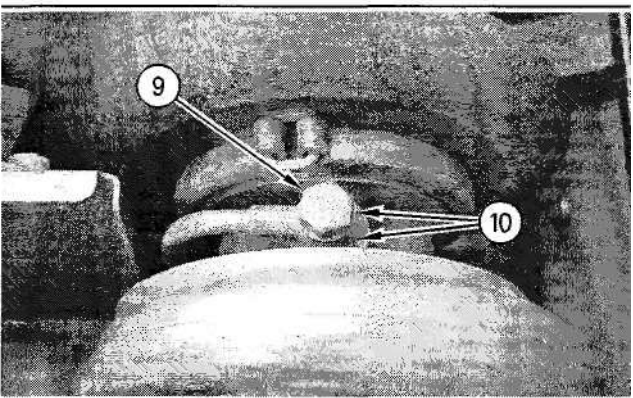


Illustration 169

6. Remove bolt (9) and washers (10) from the oil line.

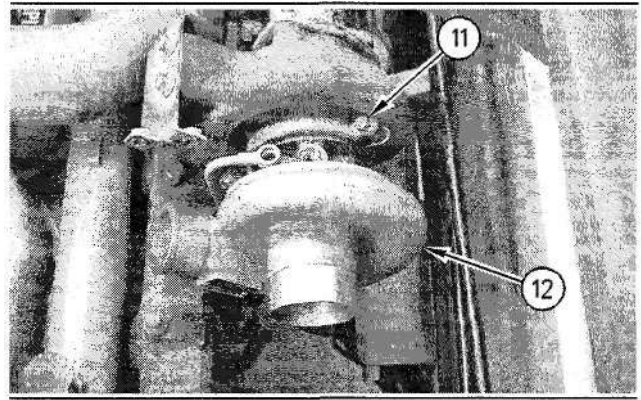


Illustration 170

7. Remove nut (11) and the bolt in order to remove the clamp.

8. Remove turbocharger cartridge (12).

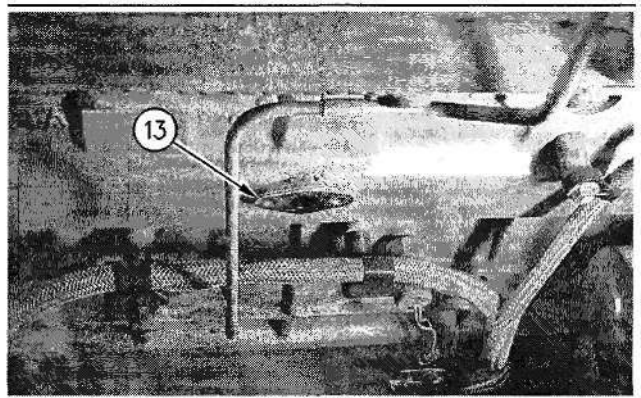


Illustration 171

9. Remove gasket (13) for the oil line.

Removal Procedure of the Turbocharger Housing

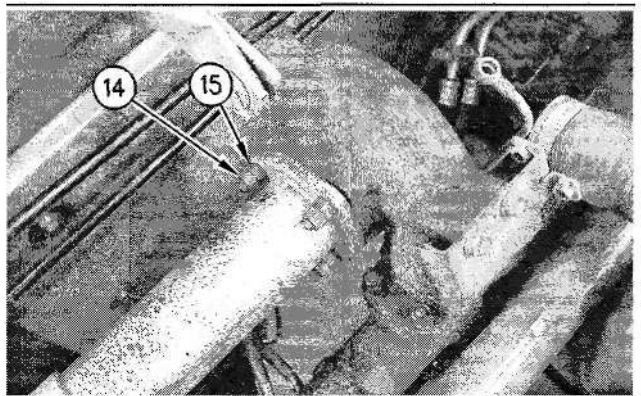


Illustration 172

1. Remove outer nuts (14). Remove inner nuts (15).

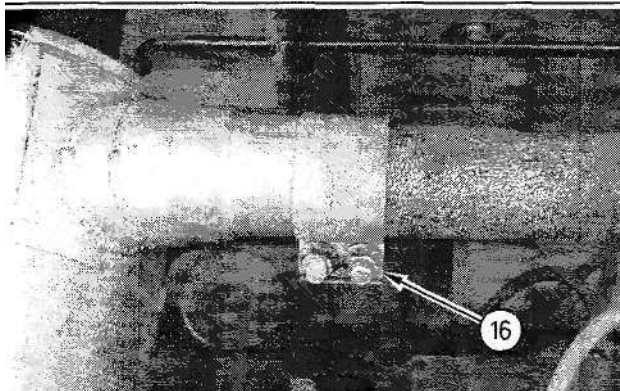


Illustration 173

2. Loosen exhaust clamp (16).

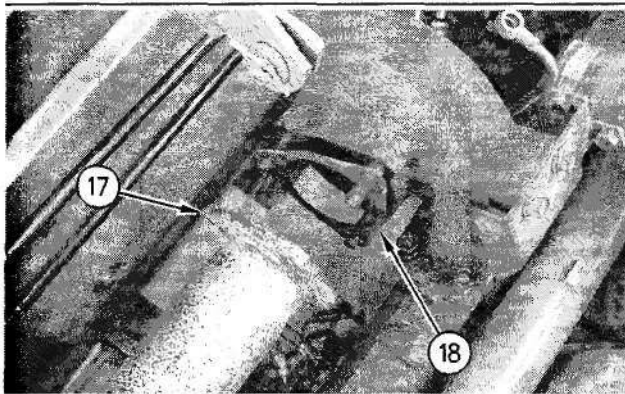


Illustration 174

3. Disconnect exhaust tube (17) from the turbocharger housing.
4. Remove gasket (18).

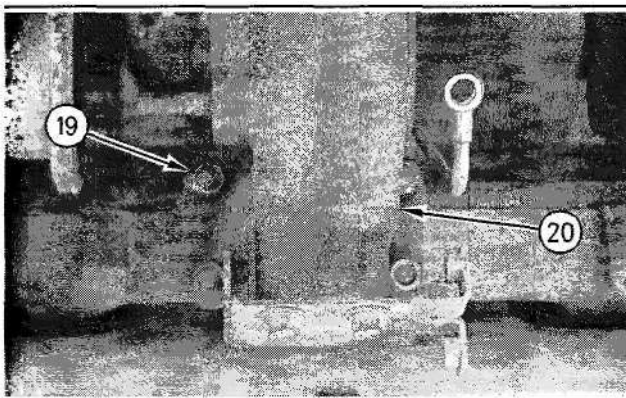


Illustration 175

Note: There are two nuts (19) on each stud.

5. Remove nuts (19). Remove turbocharger housing (20).
6. Remove the gasket (not shown) from the exhaust manifold.

Turbocharger - Install

SMCSCode: 1052-012

Installation Procedure

Installation Procedure of the Turbocharger Housing

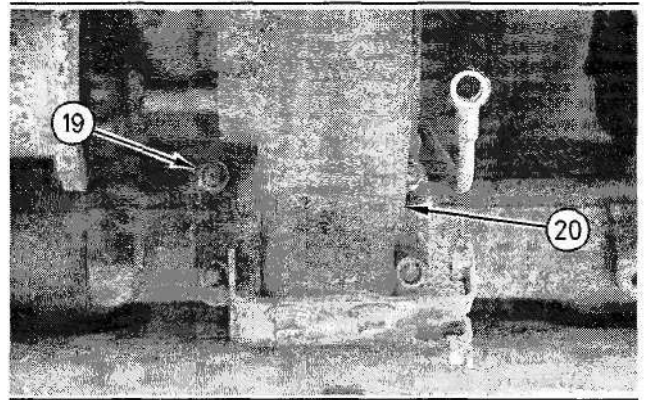


Illustration 176

1. Install the gasket (not shown) on the exhaust manifold.
2. Install turbocharger housing (20).
3. Apply 5P-3931 Anti-Seize Compound on the threads of the mounting studs. Install two nuts (19) on each stud. Tighten the nuts to a torque of 54 ± 5 N-m (39.8 ± 3.7 lb ft).

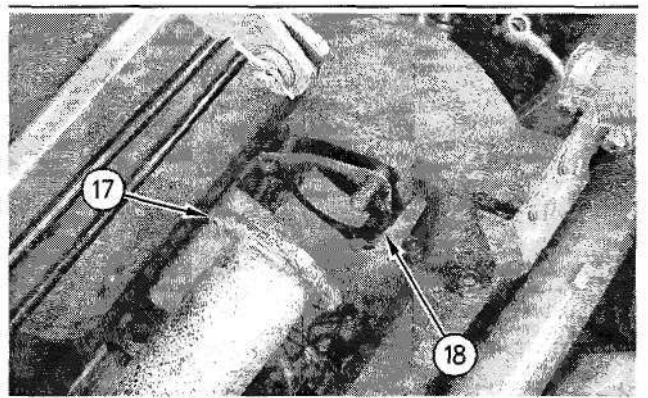


Illustration 177

4. Install gasket (18).
5. Connect exhaust tube (17) to the turbocharger housing.

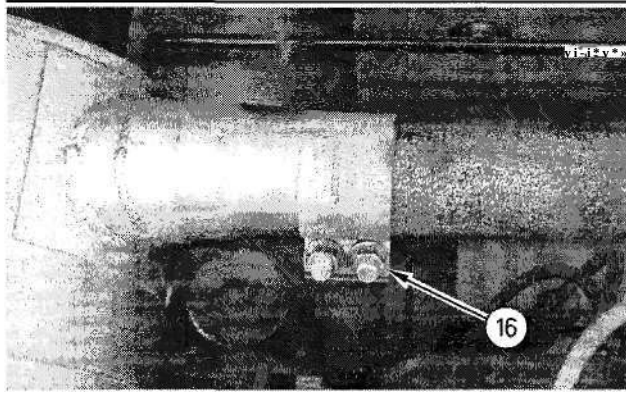


Illustration 179

7. Install inner nuts (15). Install outer nuts (14).

Installation Procedure of the Turbocharger Cartridge

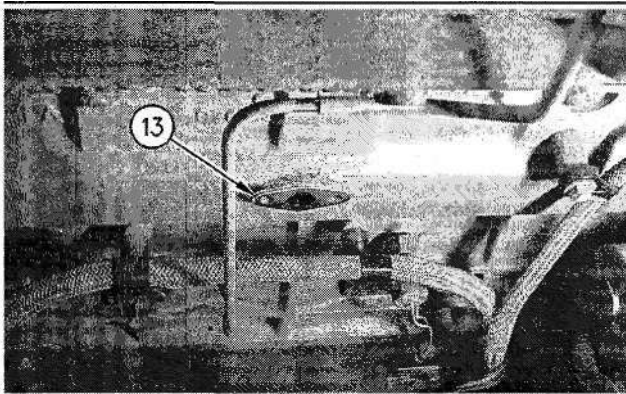


Illustration 180

1. Install gasket (13) for the oil line.

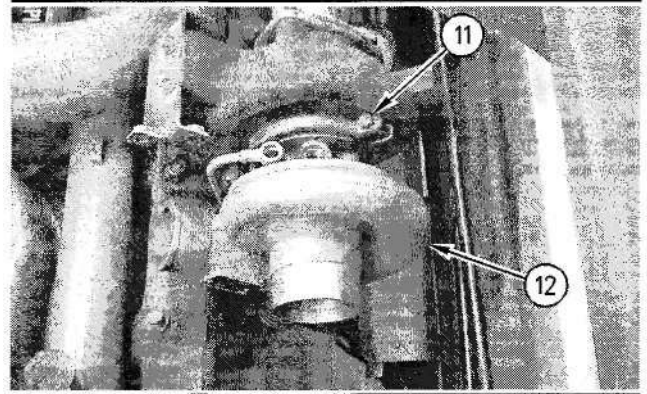


Illustration 181

2. Install turbocharger cartridge (12).
3. Install the bolt and nut (11) in order to install the clamp.

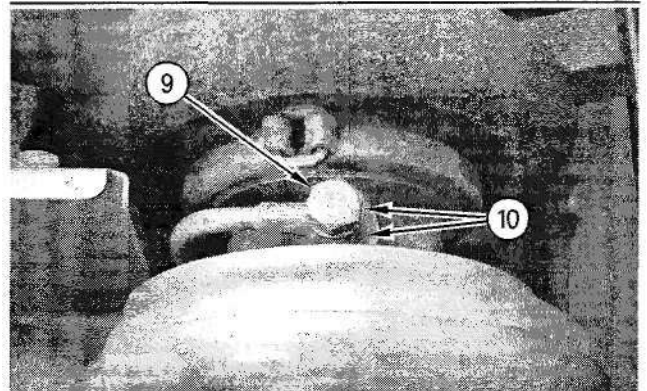


Illustration 182

4. Install washers (10) and bolt (9) in the oil line.

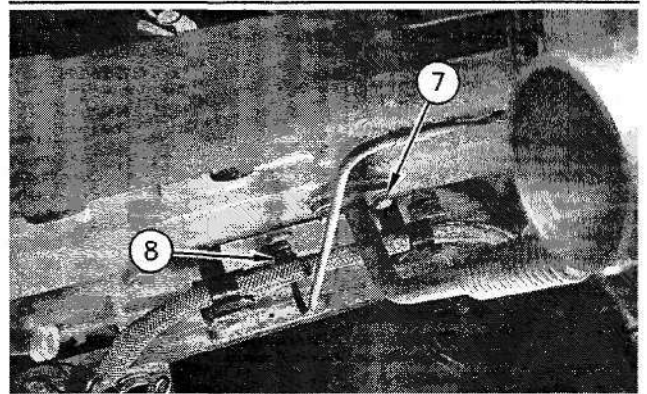


Illustration 183

5. Connect oil line (8).
6. Install the washers and bolts (7) in order to connect the oil line.

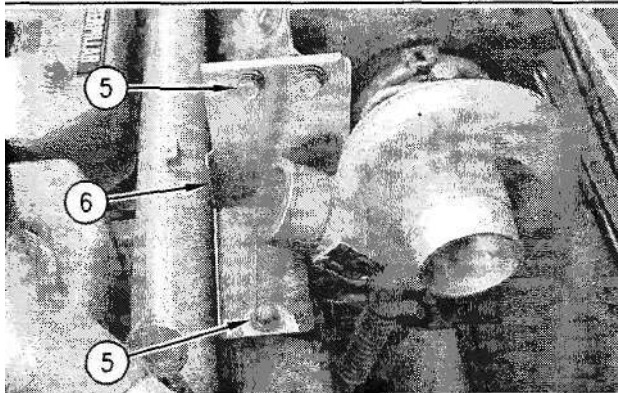


Illustration 184

7. Install heat shield (6). Install the washers and bolts (5).

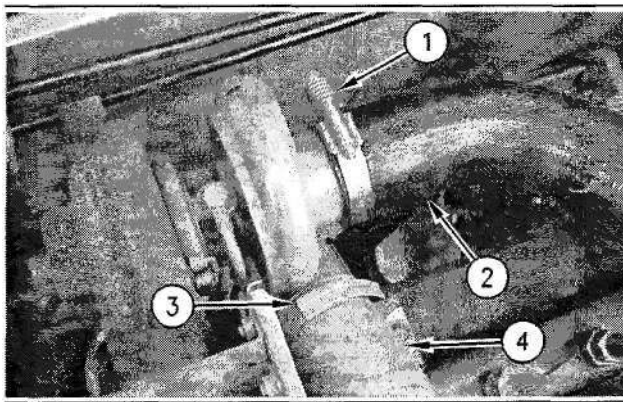


Illustration 185

8. Connect air line (4). Tighten hose clamp (3).
9. Connect air line (2). Tighten hose clamp (1).
10. Close the engine hood.

Water Temperature Regulator - Remove and Install

SMCSCode: 1355-010

Removal Procedure

WARNING

At operating temperature, the engine coolant is hot and under pressure.

Steam can cause personal injury.

Check the coolant level only after the engine has been stopped and the filler cap is cool enough to touch with the bare hand.

Remove the filler cap slowly to relieve pressure.

Cooling system conditioner contains alkali. Avoid contact with skin and eyes to prevent personal injury.

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

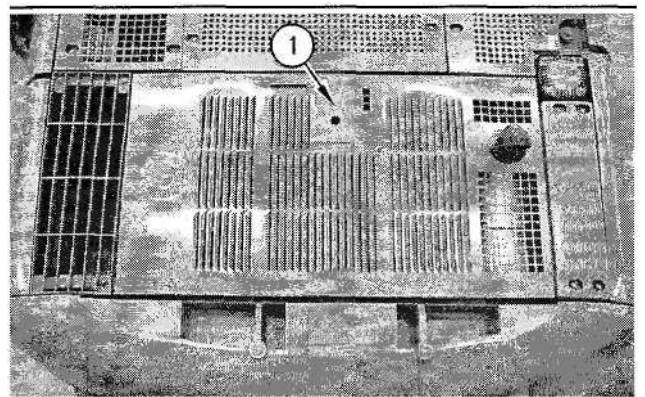
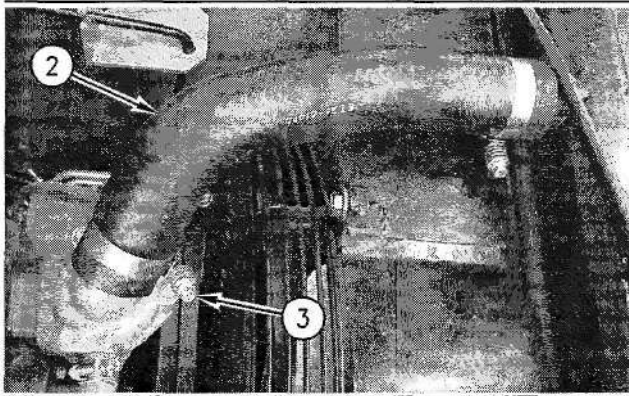


Illustration 186

1. Open hood (1).

2. Drain the engine coolant to a level below the water temperature regulator. Drain the engine coolant into a suitable container for storage or disposal.



3. Loosen hose clamp (3). Disconnect upper radiator hose (2).

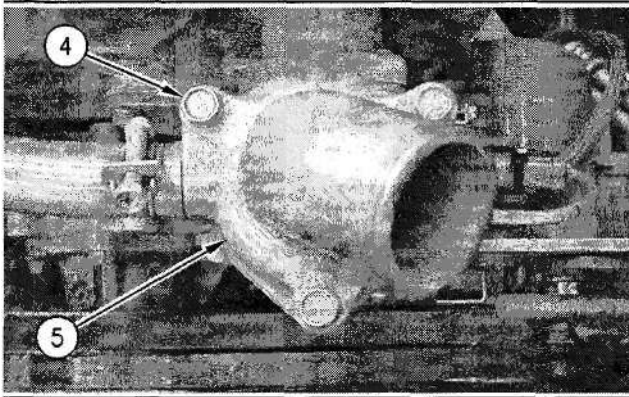


Illustration 188

4. Remove three bolts (4) and the washers. Remove cover assembly (5).

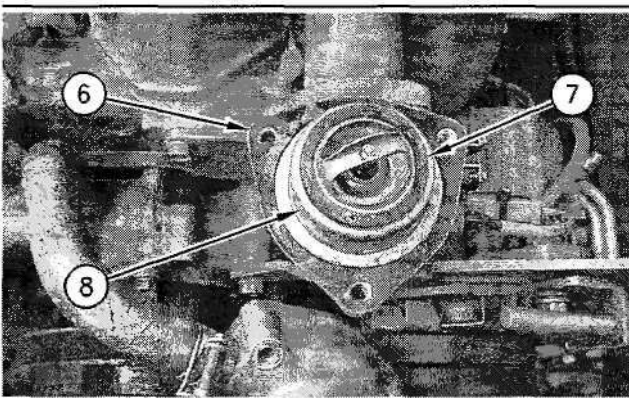


Illustration 189

5. Remove gasket (7). Remove water temperature regulator (8).

6. Remove gasket (6).

7. Use the following procedure to test the water temperature regulator:

- a. Put the water temperature regulator in a pan of water. Heat the water in order to test the water temperature regulator for thermostatic action.

Note: Stir the water in the pan in order to maintain an even temperature during the test.

- b. When the valve of the water temperature regulator lifts more than 10 mm (0.4 inch), measure the temperature of the water.

Note: The opening temperature for the water temperature regulator is $71^{\circ} \pm 2^{\circ}\text{C}$ ($160^{\circ} \pm 4^{\circ}\text{F}$).

- c. If the valve fails to function correctly, replace the water temperature regulator.

Installation Procedure

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Clean all of the mounting surfaces for gaskets.

NOTICE

If the water temperature regulator is installed incorrectly, it will cause the engine to overheat.

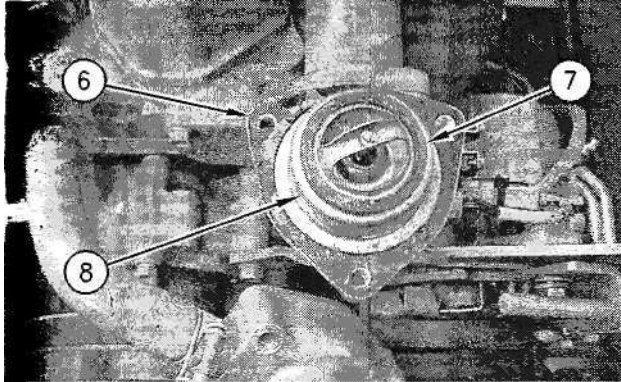


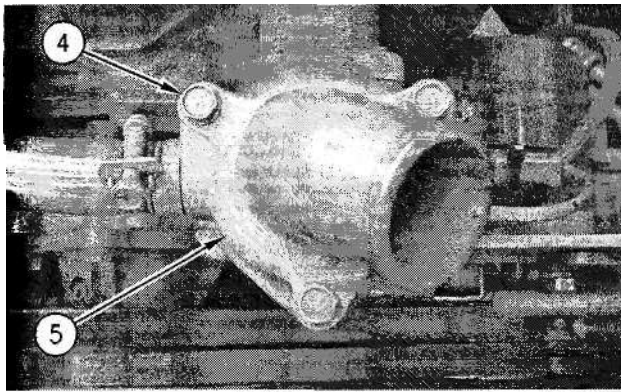
Illustration 190

gOO/10743

2. Install water temperature regulator (8).

Note: O-rings, gaskets, and seals should always be replaced.

3. Install a new gasket (6). Install a new gasket (7).



4. Install cover assembly (5). Install the washers and bolts (4).

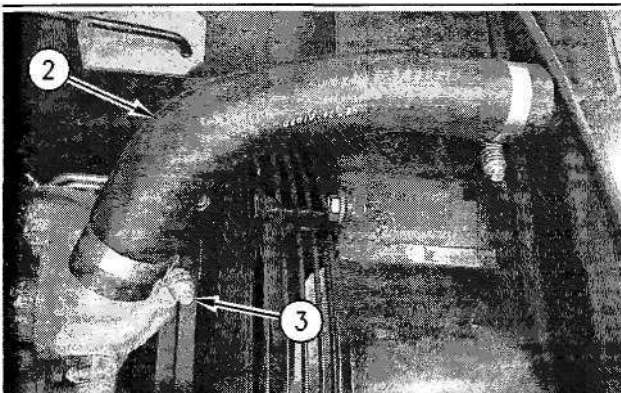


Illustration 192

5. Connect upper radiator hose (2). Tighten hose clamp (3).

6. Fill the radiator with coolant to the correct level. Refer to Operation and Maintenance Manual for further information.

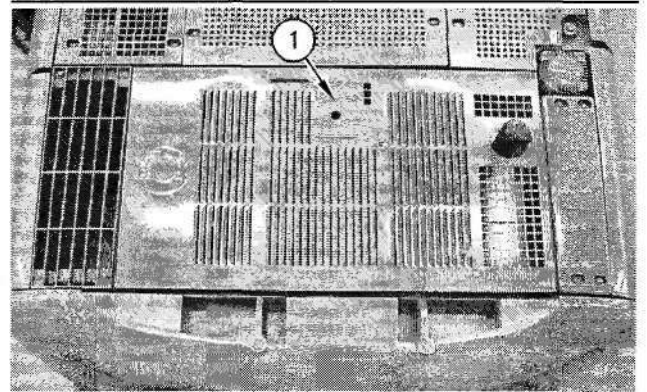


Illustration 193

7. Close hood (1).

Fuel Injection Lines - Remove and Install

SMCSCode: 1252-010

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

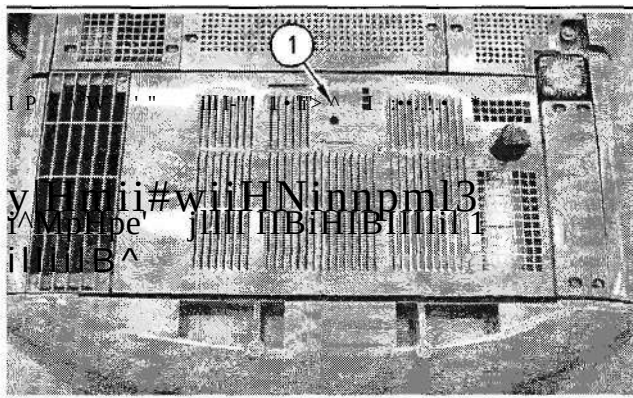


Illustration 194

1. Open hood (1). Lock the engine hood in the OPEN Position.

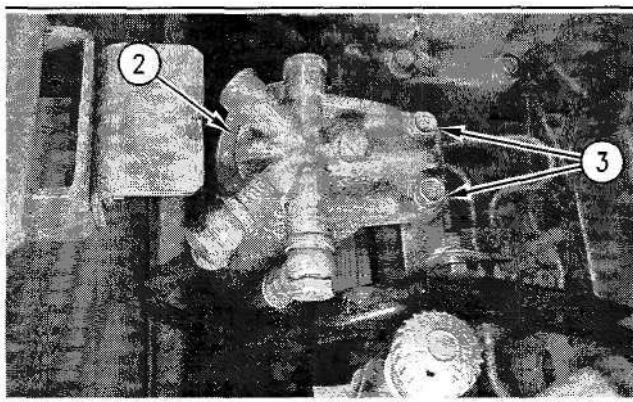


Illustration 195

2. Remove two bolts (3) and the washers.
3. Position the fuel filter and base (2) out of the way.

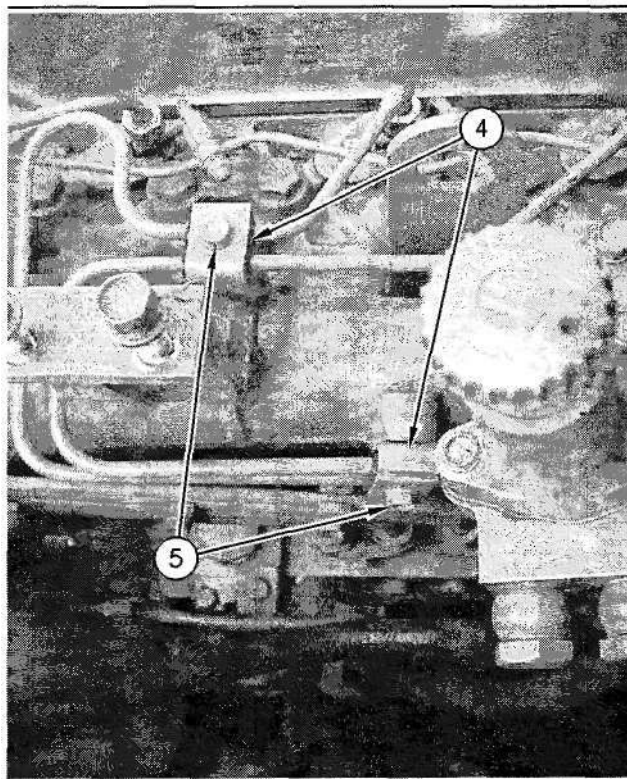


Illustration 196

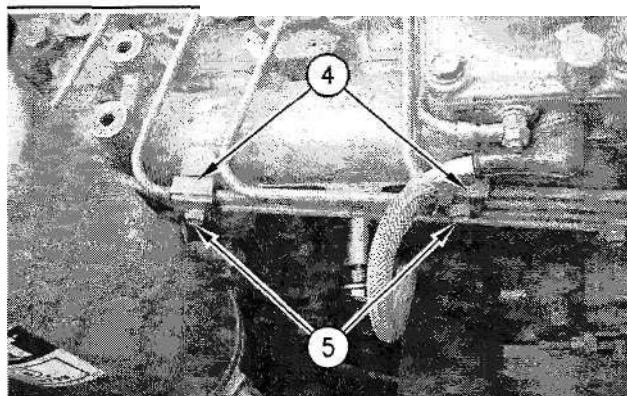


Illustration 197

4. Remove the bolts (5), the washers, and the clamps (4), which secure the fuel lines to the inlet manifold.

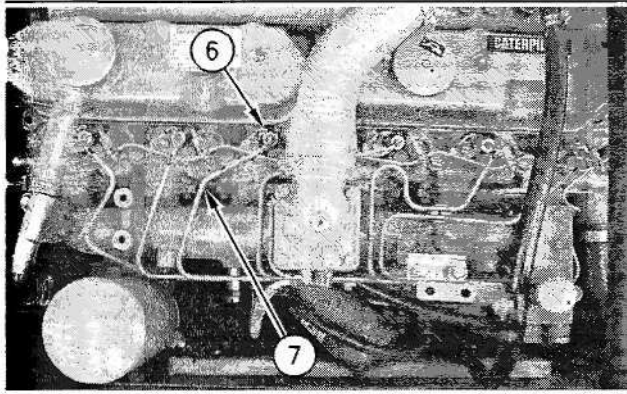


Illustration 198

5. Disconnect the fuel injection lines (7) from the fuel injection nozzles (6).

Note: Cap all openings or plug all openings immediately in order to prevent contamination of the fuel system.

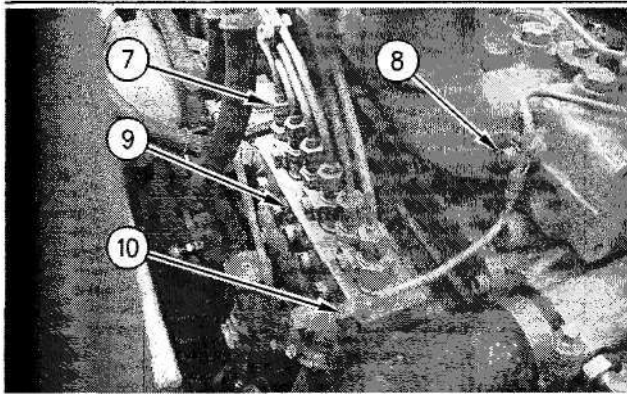


Illustration 199

6. Disconnect the end of the fuel injection lines (7) from the fuel injection pump (9).
 7. Remove the fuel injection lines (7) from the engine.
 8. Remove one bolt (8) and the washer from the clamp that secures the fuel return line to the intake manifold.
- Note:** The clamp will remain with the fuel return line, when the fuel return line is removed from the engine.
9. Disconnect fitting (10).

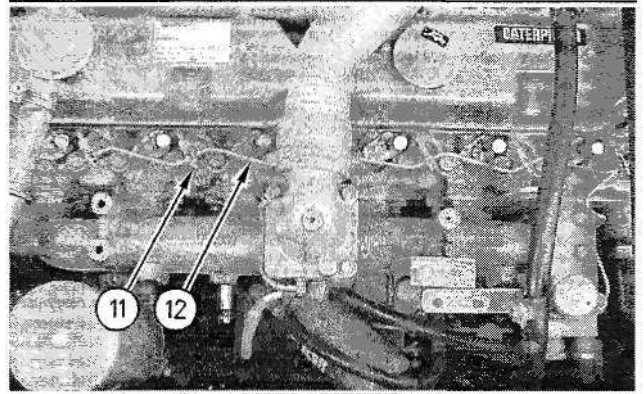


Illustration 200

10. Loosen the acorn nuts (11), which secure the fuel return line to the fuel injection nozzles.
11. Remove fuel return line (12) from the engine.

Note: Cap all openings or plug all openings immediately in order to prevent contamination of the fuel system.

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

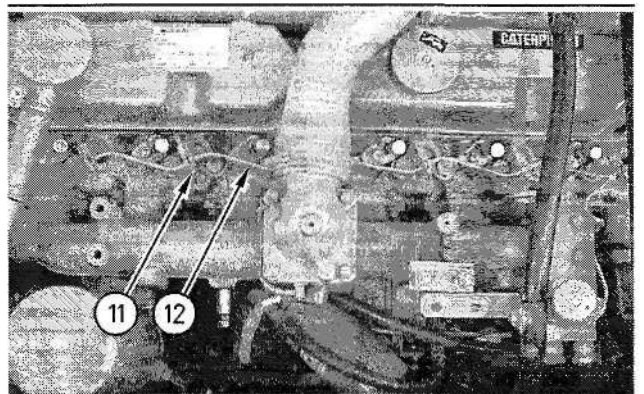


Illustration 201

1. Place the fuel return line (12) in position on the engine.
2. Install the fuel return line (12) to the fuel injection nozzles. Secure the fuel return line to the fuel injection nozzle with acorn nuts (11).

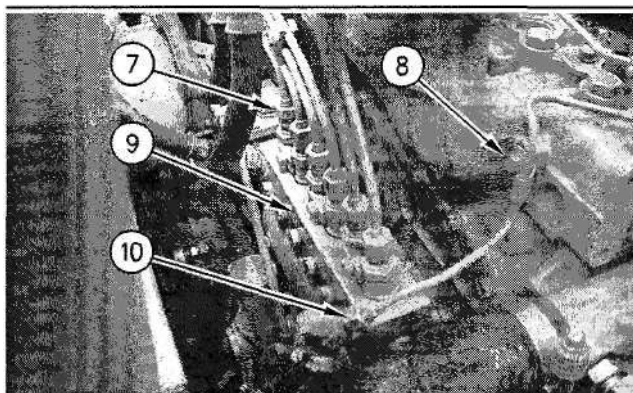


Illustration 202

3. Connect fitting (10) of the fuel return line to the fuel injection pump.
4. Install the washer and bolt (8) through the clamp in order to secure the fuel return line to the inlet manifold.
5. Place the fuel injection lines (7) on the engine.
6. Connect the fuel injection lines (7) to the fuel injection pump (9).

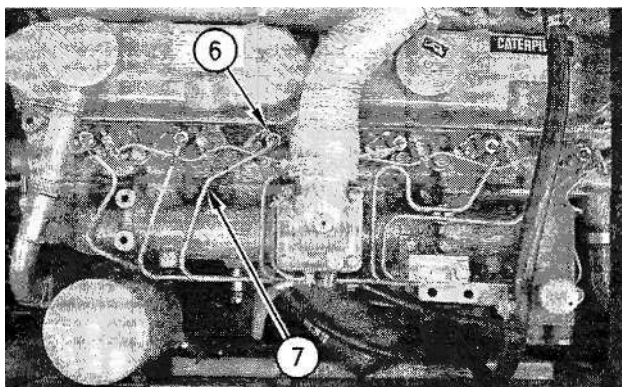


Illustration 203

7. Connect the fuel injection lines (7) to the fuel injection nozzles (6).

Note: The fuel lines (7) should be connected at the fuel injection nozzle (6) and at the fuel injection pump (9) before tightening the nuts for the fuel injection line.

8. Tighten the nuts for the fuel injection line to a torque of 25 N-m (18 lb ft).

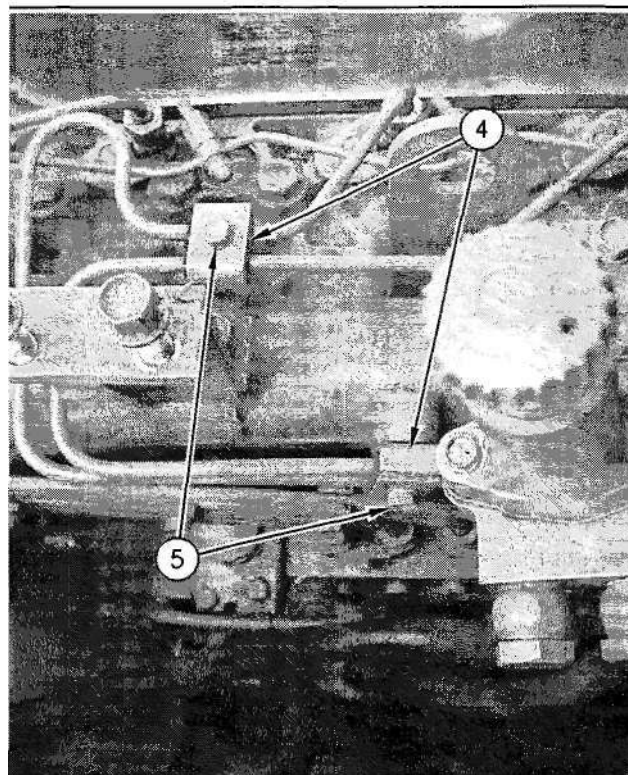


Illustration 204

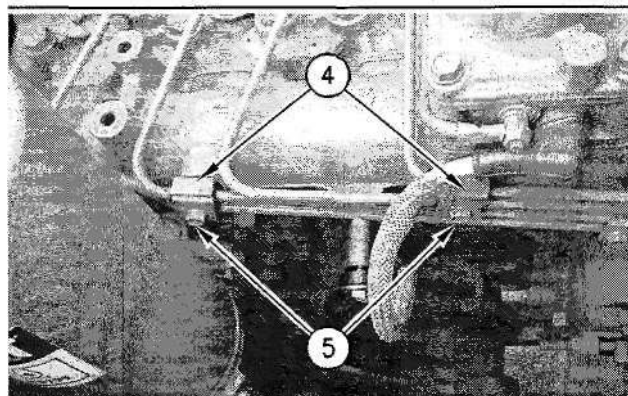


Illustration 205

9. Install the clamps (4), the washers, and the bolts (5), which secure the fuel lines to the inlet manifold.

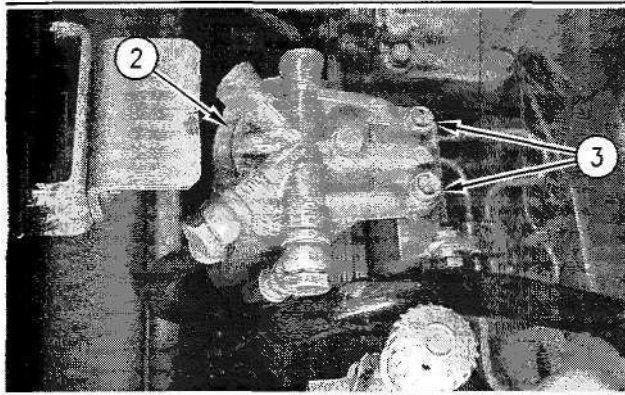


Illustration 206

10. Position the fuel filter on the mounting bracket and install the washers and two bolts (3).

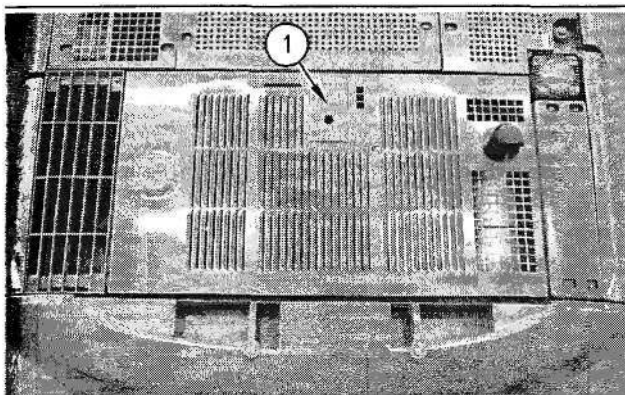


Illustration 207

11. Close hood (1).

Fuel Injection Pump - Remove

SMCSCode: 1251-011

Removal Procedure

Start By:

- a. Remove the fuel filter and the fuel filter base. Refer to Disassembly and Assembly, "Fuel Filter (Primary) and Fuel Filter Base - Remove and Install".
- b. Remove the fuel injection lines. Refer to Disassembly and Assembly, "Fuel Injection Lines - Remove and Install".
- c. Remove the dipstick. Refer to Disassembly and Assembly, "Engine Oil Level Gauge (Dipstick) - 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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Remove the top fan guard.

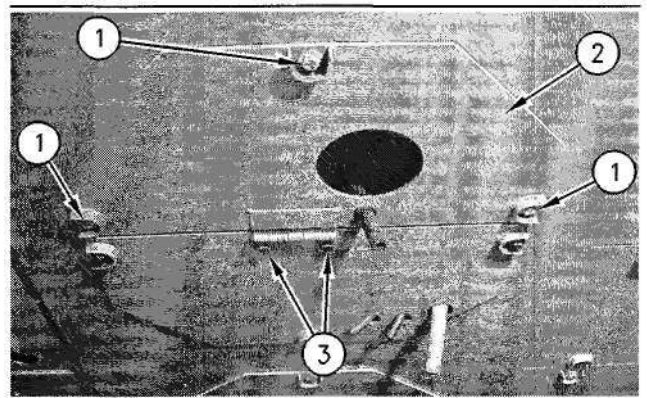


Illustration 208

2. Remove two bolts (3) and the washers from the hinge.
3. Remove three bolts (1) and the washers in order to remove access panel (2).

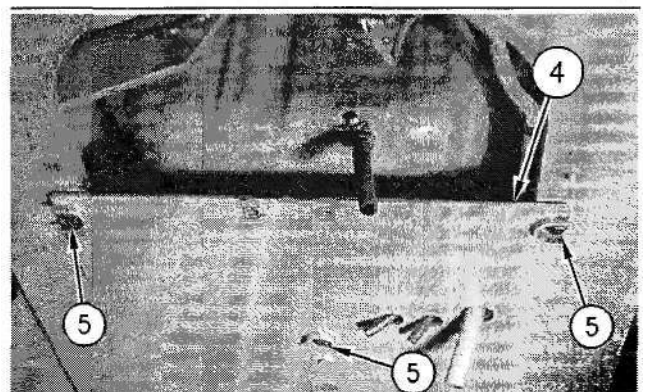


Illustration 209

g00712442

4. Remove three bolts (5) and the washers in order to remove access panel (4).

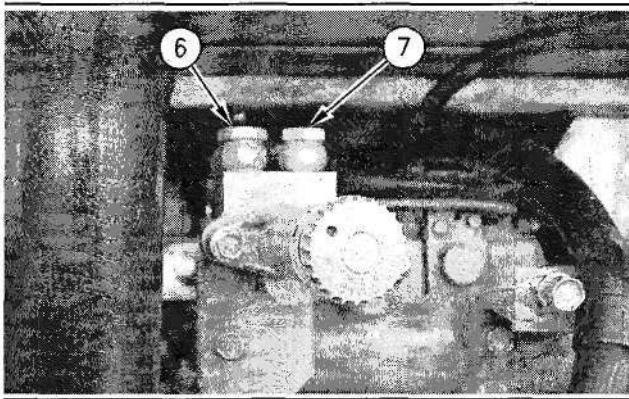


Illustration 210

5. Disconnect hose assembly (7) from the fuel priming pump.
6. Disconnect hose assembly (6) from the fuel priming pump.

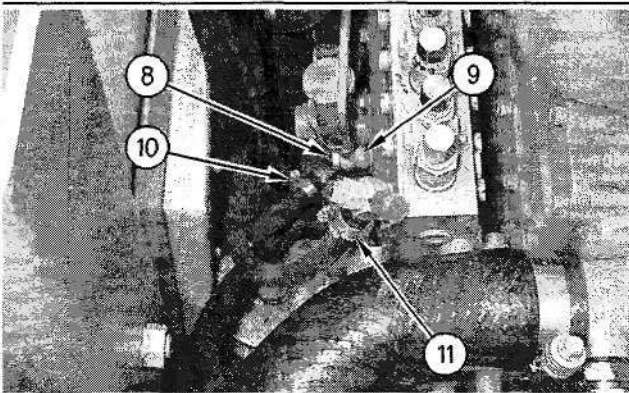


Illustration 211

900711804

7. Remove bolt (8) in order to remove oil line (9).
8. Loosen hose clamp (10) and disconnect the hose.
9. Loosen hose clamp (11) and disconnect the hose.

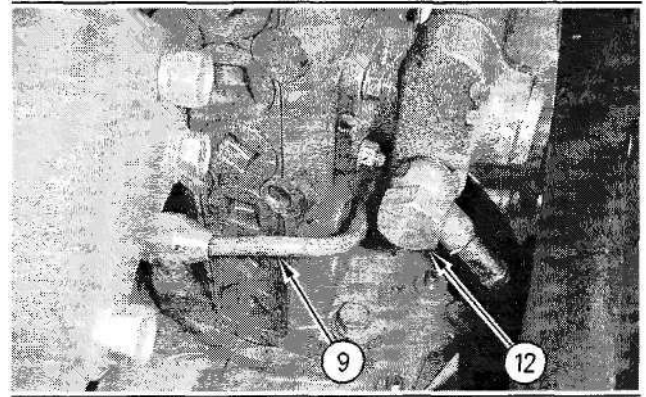
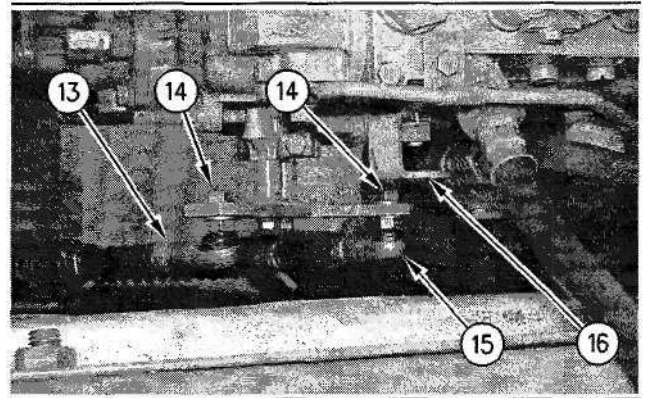


Illustration 212

Bottom view of the engine

10. Remove oil line (9) from the nipple (not shown).
11. Loosen banjo bolt (12) and turn the fitting toward the fuel injection pump. This will make the pump removal easier.



12. Remove two nuts (14) and the washers from the governor linkage (13) and (15) from fuel injection pump (16).

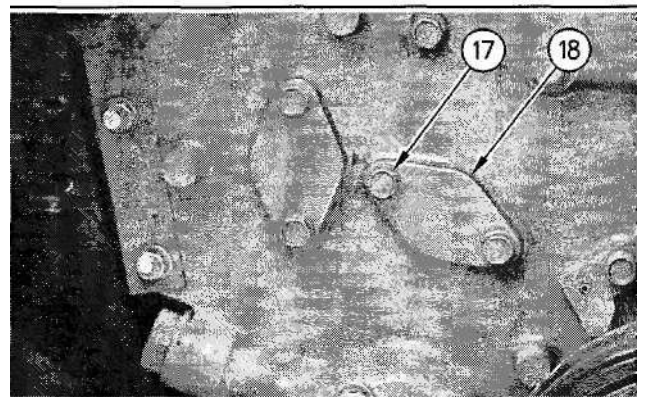


Illustration 214

The radiator is removed for photographic purposes.

13. Remove bolts (17) and washers that secure the cover (18) to the engine front housing.

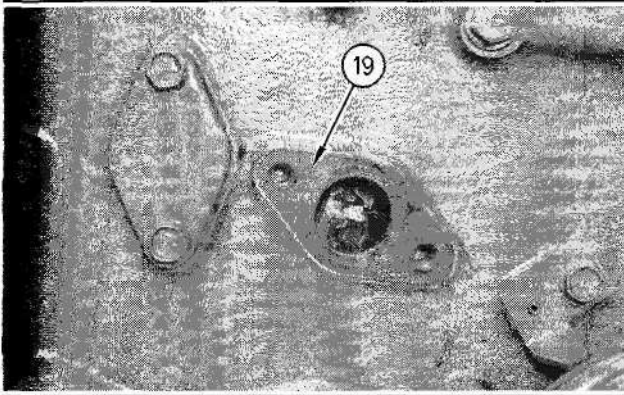


Illustration 215

The radiator is removed for photographic purposes.

14. Remove gasket (19).
15. Mark the gears for later installation.

Note: Put caps or plugs on all openings immediately in order to prevent contamination.

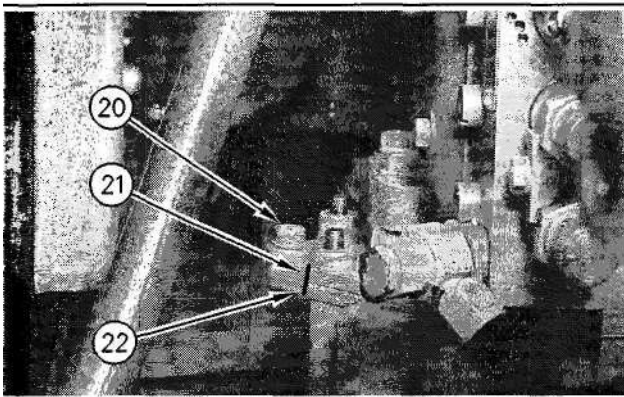


Illustration 216

16. Place a mark on the pump mounting flange (22) and on the fuel injection pump flange (21).
17. Remove two bolts (20) and the washers on the back side of the fuel injection pump.

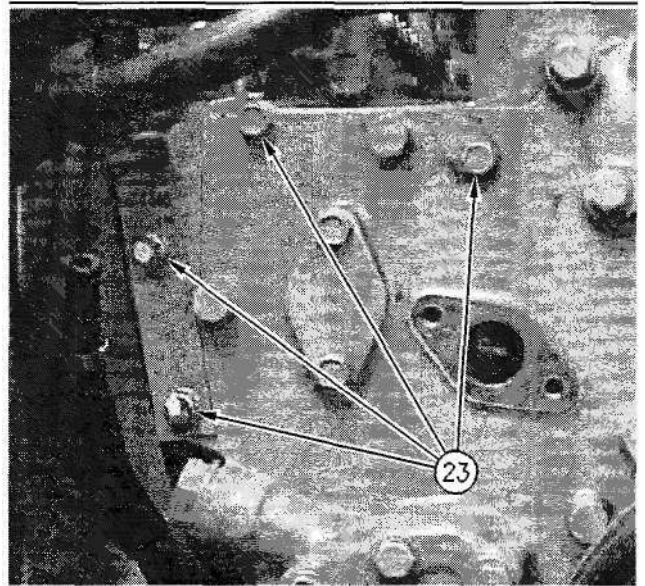


Illustration 217

18. Remove four bolts (23) and the washers that secure the fuel injection pump to the front housing.

19. Remove the fuel injection pump (16). The gear and the mounting flange will remain with the fuel injection pump.

Note: The fuel injection pump must be mounted to the engine in order to loosen the nut for the drive gear.

Note: Do not rotate the engine after the fuel injection pump is removed.

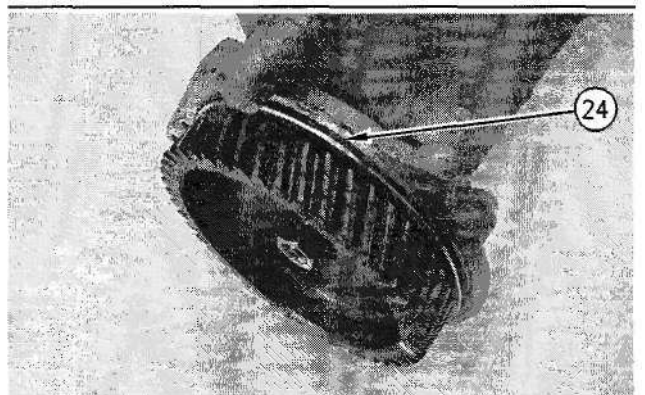


Illustration 218

20. Remove O-ring seal (24) from the mounting flange of the fuel injection pump.

i01342315

Fuel Injection Pump - Install

SMCSCode: 1251-012

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. If the nut for the drive gear was removed, tighten the nut for the drive gear to a torque of 90.5 ± 7.5 N-m (66.5 ± 5.5 lb ft).

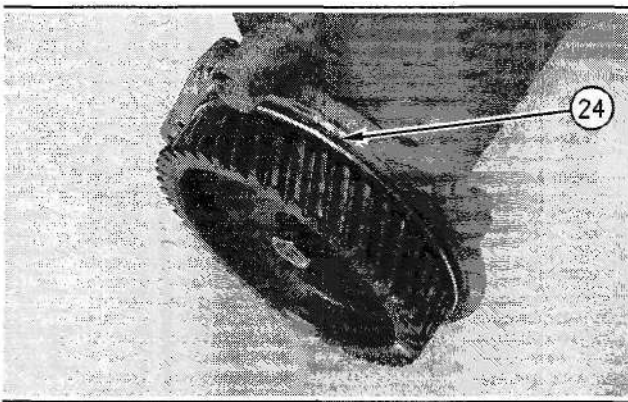


Illustration 219

2. Install new O-ring seal (24) on the mounting flange of the fuel injection pump.

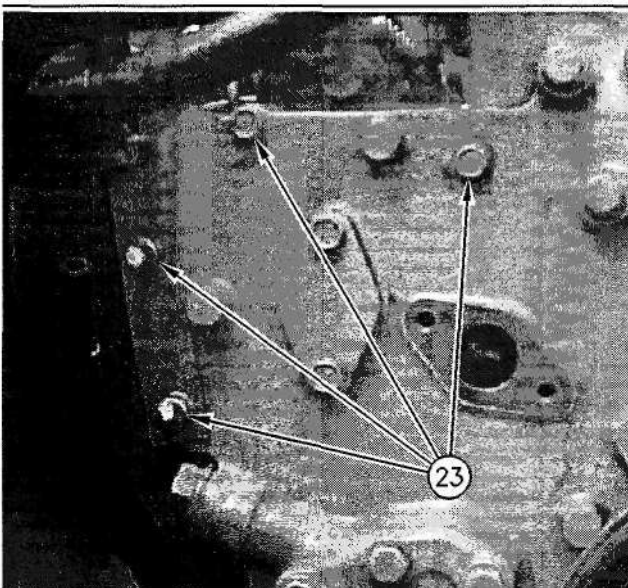


Illustration 220

3. Install the fuel injection pump.

4. Install the washers and four bolts (23) that secure the fuel injection pump to the front housing.

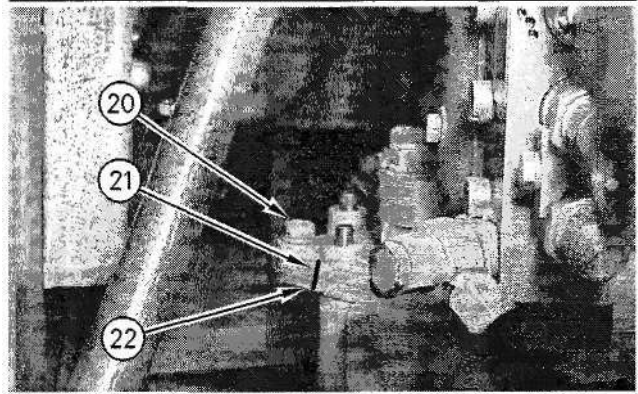


Illustration 221

5. Ensure that the mark on pump mounting flange (22) and the mark on fuel injection pump flange (21) are aligned.

Ensure that the timing mark on the fuel injection pump gear is aligned with the timing mark on the idler gear. Refer to Testing and Adjusting Module, "Fuel System" for more information on fuel injection pump timing.

6. Install the washers and two bolts (20) on the back side of the fuel injection pump.

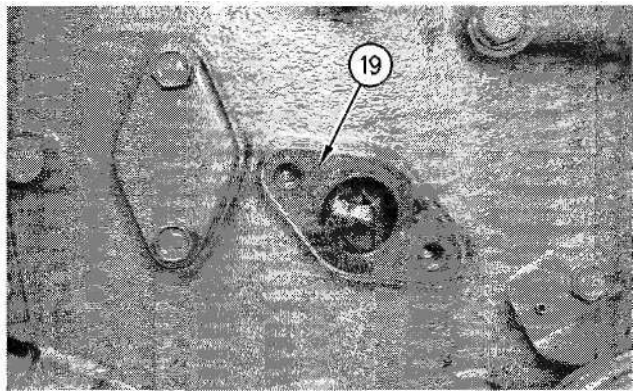


Illustration 222

The radiator is removed for photographic purposes.

7. Install gasket (19).

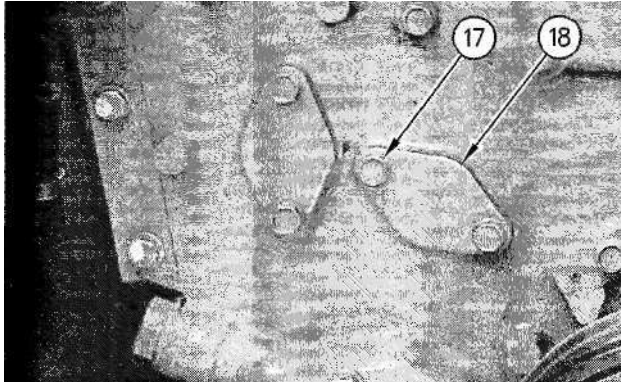


Illustration 223

The radiator is removed for photographic purposes.

8. Install the washers and bolts (17) that secure cover (18) to the engine front housing.

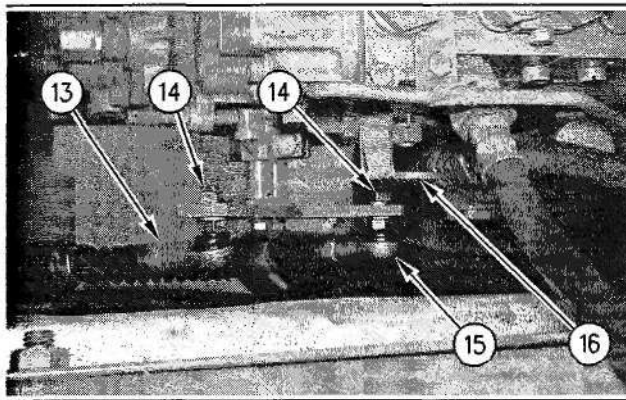


Illustration 224

9. Install the washers and two nuts (14) on governor linkages (13) and (15).

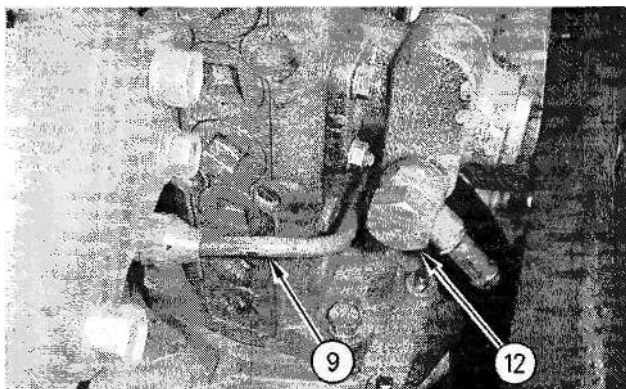


Illustration 225

Bottom view of the engine

10. Reposition the fuel fitting. Tighten banjo bolt (12).

11. Connect oil line (9) to the nipple (not shown).

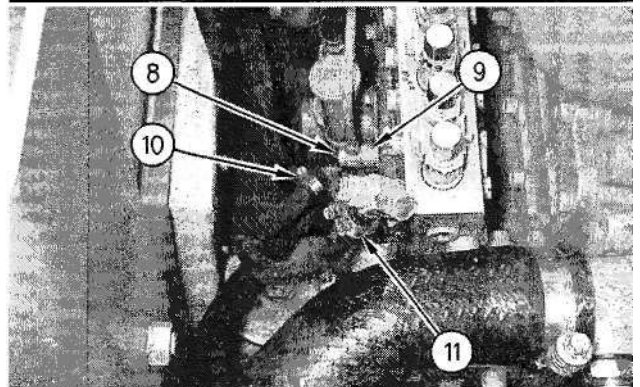


Illustration 226

12. Connect the hose. Tighten hose clamp (11).

13. Connect the hose. Tighten hose clamp (10).

14. Install bolt (8) in order to connect oil line (9).

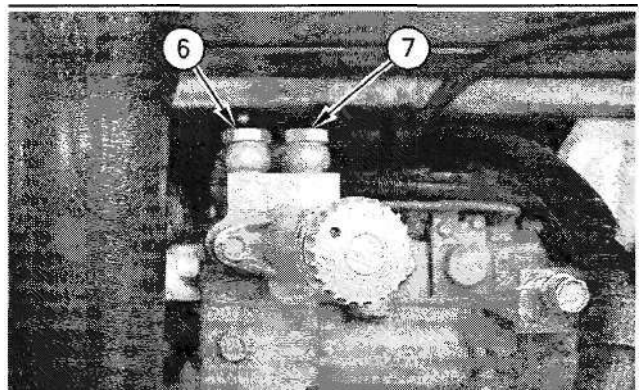


Illustration 227

15. Connect hose assembly (6) to the fuel priming pump.

16. Connect hose assembly (7) to the fuel priming pump.

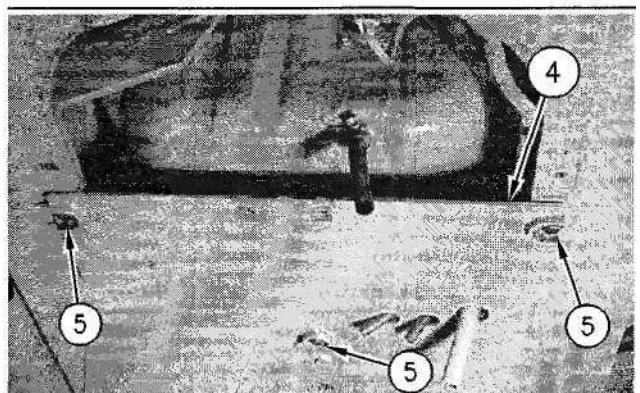


Illustration 228

17. Install access panel (4). Install the washers and bolts (5).

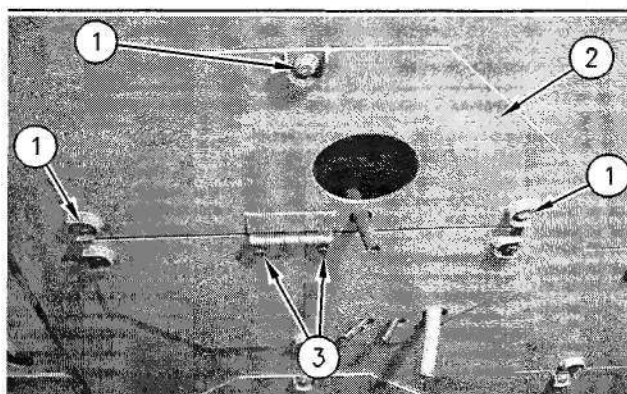


Illustration 229

18. Install access panel (2). Install the washers and bolts (1).

19. Install the washers and bolts (3) in the hinge.

20. Install the top fan guard.

End By:

- a. Install the fuel filter and the fuel filter base. Refer to Disassembly and Assembly, "Fuel Filter (Primary) and Fuel Filter Base - Remove and Install".
- b. Install the fuel injection lines. Refer to Disassembly and Assembly, "Fuel Injection Lines - Remove and Install".
- c. Install the dipstick. Refer to Disassembly and Assembly, "Engine Oil Level Gauge (Dipstick) - Remove and Install".

Fuel Injection Nozzles - Remove

SMCSCode: 1254-011

Removal Procedure

Table 4

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	1U-7600	Slide Hammer Puller	1
	9U-6278	Adapter	1

Start By:

- a. Remove the fuel injection lines. Refer to Disassembly and Assembly, "Fuel Injection Lines - Remove and Install".

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

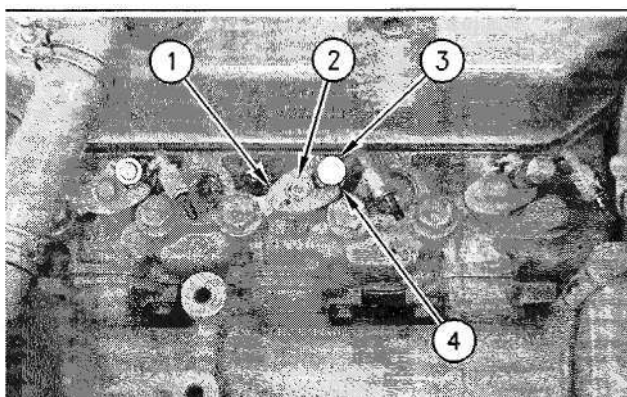


Illustration 230

1. Remove bolt (2) and the washer that secures clamp (1) to the cylinder head assembly.
2. Remove clamp (1) that secures fuel injection nozzle (4) in position in the cylinder head assembly.

Note: Mark the clamp for later installation.

3. Remove cap (3).

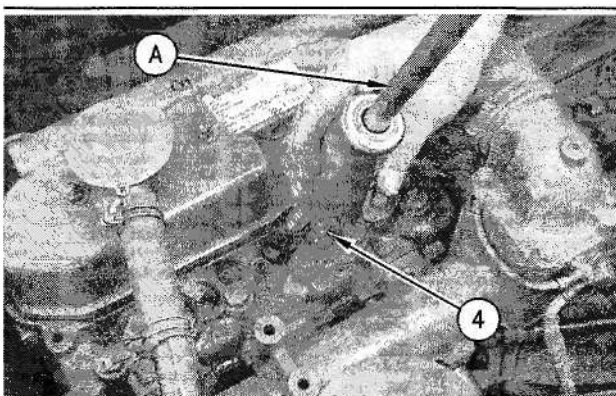


Illustration 231

4. Install Tooling (A) to fuel injection nozzle (4).

Note: Tooling (A) is installed at the connection for the fuel injection lines.

SL Carefully remove fuel injection nozzle (4).

Note: Align the centerline of Tooling (A) with the extended centerline of fuel injection nozzle (4). This procedure will help prevent distortion of the fuel injection nozzle which can cause the fuel injection nozzle to bend or break.

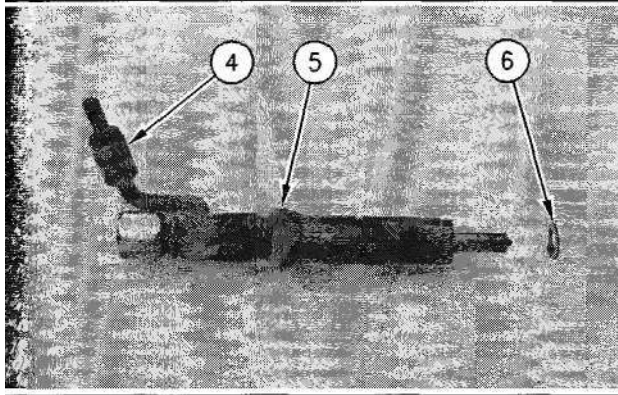


Illustration 232

6. Remove seat washer (6) and rubber seal (5) from fuel injection nozzle (4).

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Fuel Injection Nozzles - Install

SMCSCode: 1254-012

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

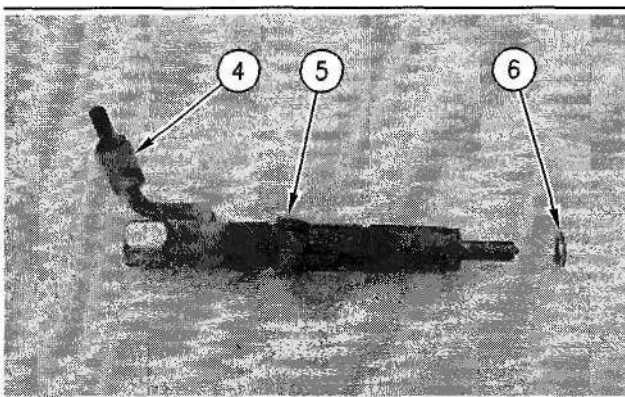


Illustration 233

1. Install new rubber seal (5).
2. Install new seat washer (6).

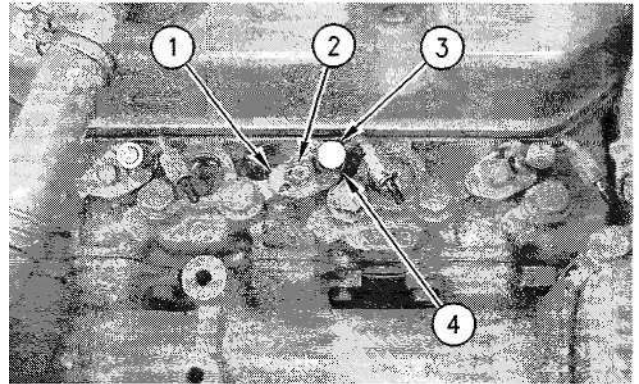


Illustration 234

3. Install fuel injection nozzle (4).
4. Install clamp (1), the washer, and bolt (2) that secures fuel injection nozzle (4) to the cylinder head assembly.
5. Tighten bolt (2), that secures the fuel injection nozzle, to a torque of 22 N-m (16 lb ft).

End By:

- a. Install the fuel injection lines. Refer to Disassembly and Assembly, "Fuel Injection Lines - Remove and Install".

i01342340

Valve Mechanism Cover - Remove and Install

SMCSCode: 1107-010

Removal Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

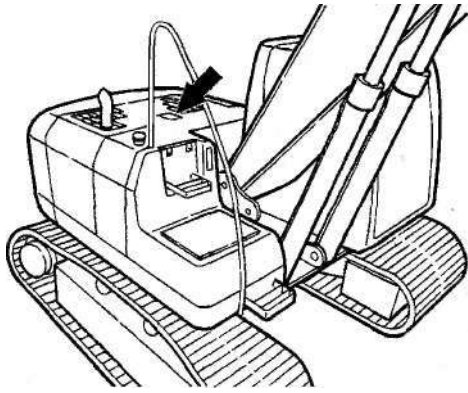


Illustration 235

1. Open the engine hood.

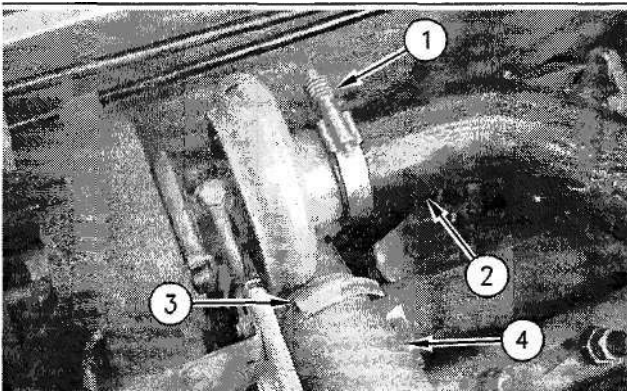


Illustration 236

goo/10484

2. Loosen hose clamp (1). Disconnect air line (2).
3. Loosen hose clamp (3). Disconnect air line (4).

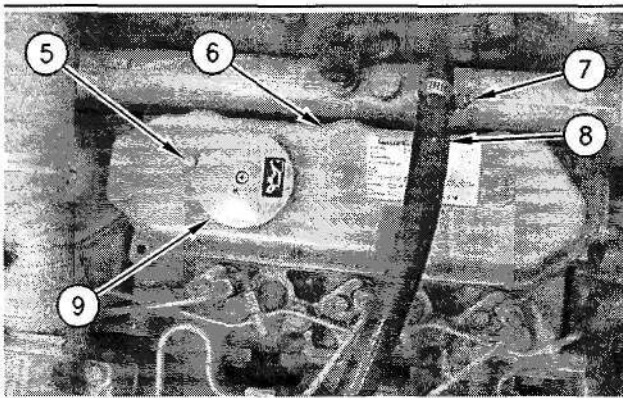


Illustration 237

4. Loosen hose clamp (7) and disconnect hose (8) from the water manifold.
5. Remove filler cap (9).

6. Remove three acorn nuts (5) and washers in order to remove valve mechanism cover (6).

7. Remove valve mechanism cover (6).

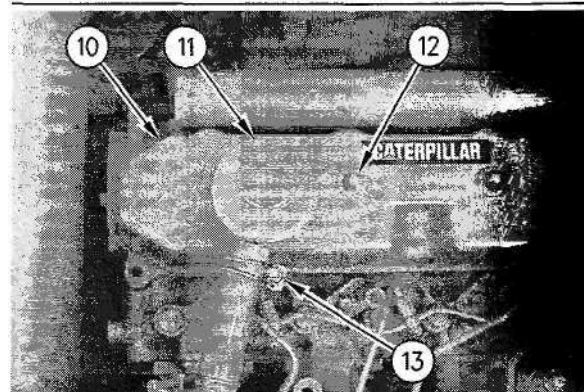


Illustration 238

8. Loosen hose clamp (13) and remove breather (11).
9. Remove three acorn nuts (12) and the washers in order to remove valve mechanism cover (10).
10. Remove valve mechanism cover (10).

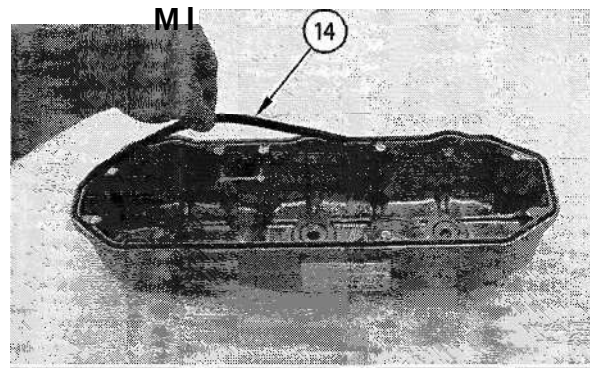


Illustration 239

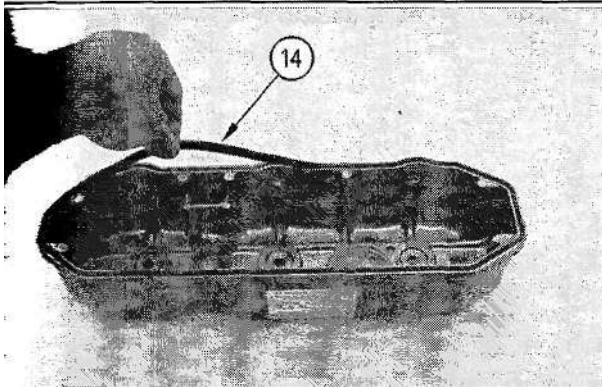
11. Remove O-ring seal (14) from valve mechanism cover (6) and (10).

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.



tion 240

1. Install gaskets (14) onto valve mechanism covers (6) and (10).

Note: O-rings, gaskets, and seals should always be replaced. A used O-ring may not have the same sealing properties as a new O-ring. Use 1U-6396 O-Ring Assembly Compound during the assembly procedure.

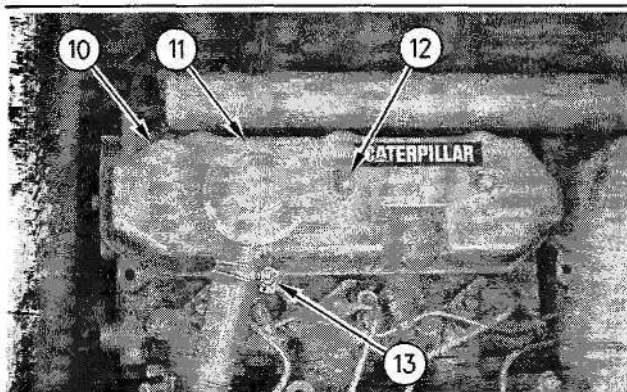


Illustration 241

2. install valve mechanism cover (10). Install the washers and three acorn nuts (12).
3. Torque the acorn nuts (12) to 4 ± 1 N-m (35 ± 9 lb in).
4. Install breather (11). Tighten hose clamp (13).

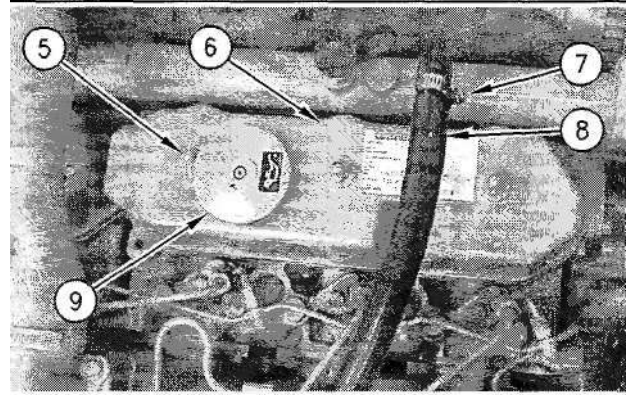


Illustration 242

5. Install valve mechanism cover (6). Install the washers and three acorn nuts (5).
6. Torque three acorn nuts (5) to 4 ± 1 N-m (35 ± 9 lb in).
7. Install filler cap (9).
8. Connect hose (8) to the water manifold. Tighten hose clamp (7).

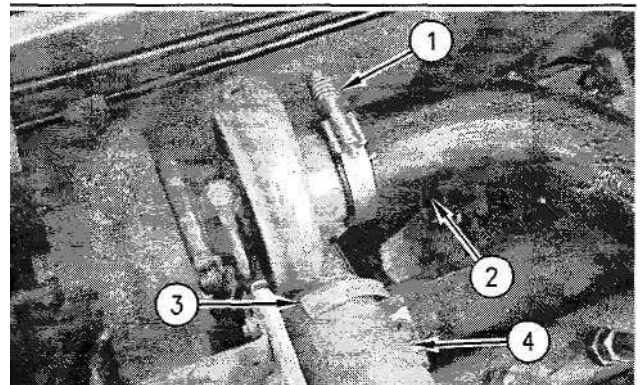


Illustration 243

g00710484

9. Connect air line (4). Tighten hose clamp (3).
10. Connect air line (2). Tighten hose clamp (1).

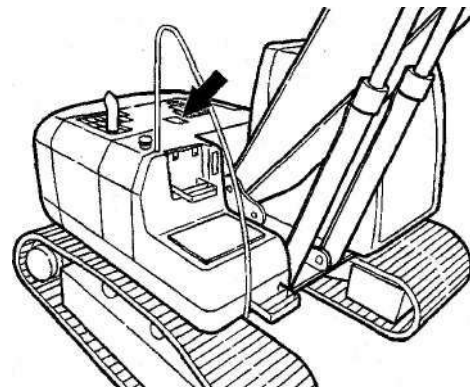


Illustration 244

11. Close the engine hood.

Rocker Shaft and Push Rod - Remove

SMCSCode: 1102-011; 1208-011

Removal Procedure

Start By:

- a. Remove the valve mechanism cover. Refer to Disassembly and Assembly, "Valve Mechanism Cover - Remove and Install".

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

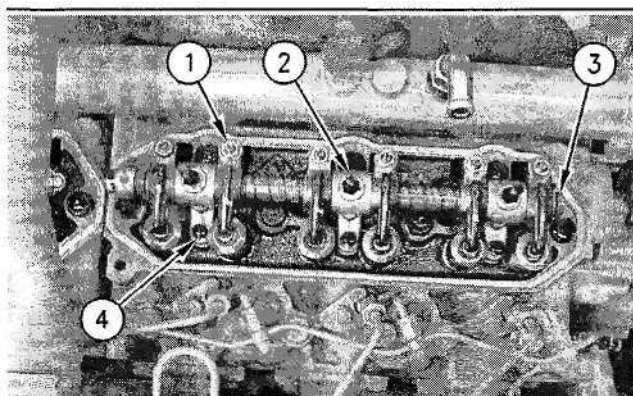


Illustration 245

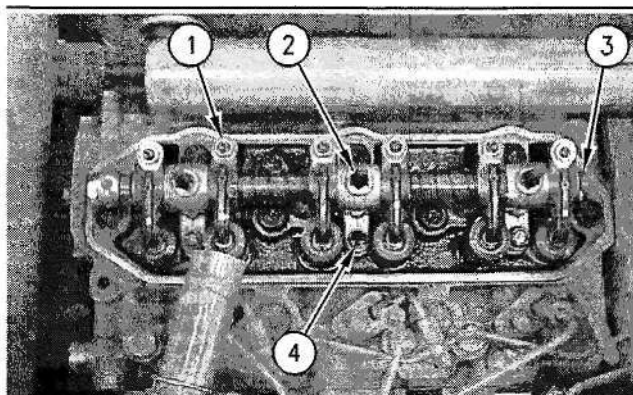
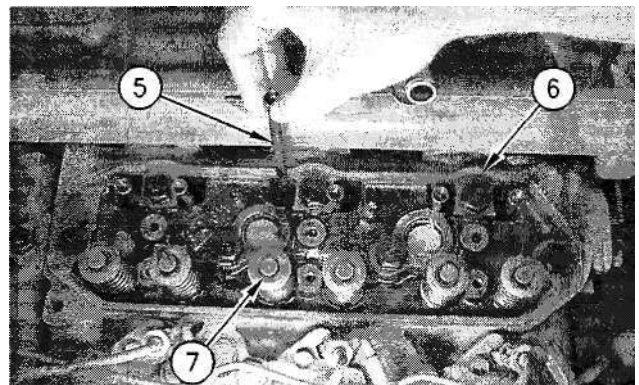


Illustration 246

1. Loosen adjusting screws (1) on each rocker arm about one rotation.

2. Loosen six short bolts (4) and the washers on the rocker shaft brackets.
3. Loosen six long bolts (2) for the rocker shaft bracket.
4. Remove six long bolts (2) from the rocker shaft brackets.
5. Remove six short bolts (4) and the washers from the rocker shaft brackets.
6. Remove the rocker shaft assembly (3) from the cylinder head.

Note: Check the contact surface of the adjusting screw for wear from the pushrods and check for threads that are stripped.



7. Put identification marks on pushrods (5) in order to identify the location of the pushrods in the engine.
 8. Remove six pushrods (5) from each head assembly (6).
- Note:** Check pushrods for worn ends and check for distortion. If necessary, replace any pushrods that are worn or distorted.
9. Remove valve caps (7) from each valve stem. This will prevent the valve cap from becoming lost.
- Note:** Check the contact surface of the valve caps for wear and check for oil passages that are clogged.

i01342327

Rocker Shaft and Push Rod -
Install

SMCSCode: 1102-012; 1208-012

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

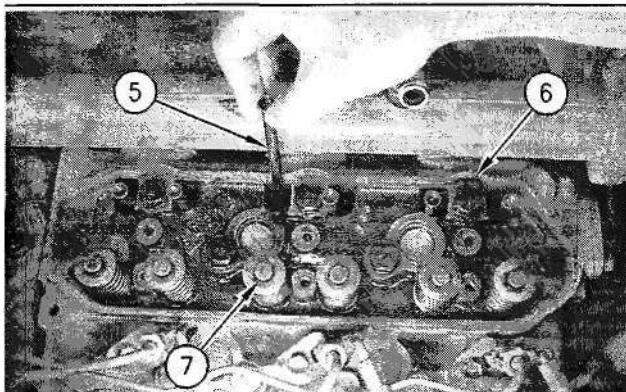


Illustration 248

1. Install valve caps (7) on the end of the valve stem.
2. Install pushrods (5) in the cylinder head assembly (6).

Note: Ensure that the pushrods are installed in the original location. Also ensure that the pushrods are seated in the valve lifters correctly.

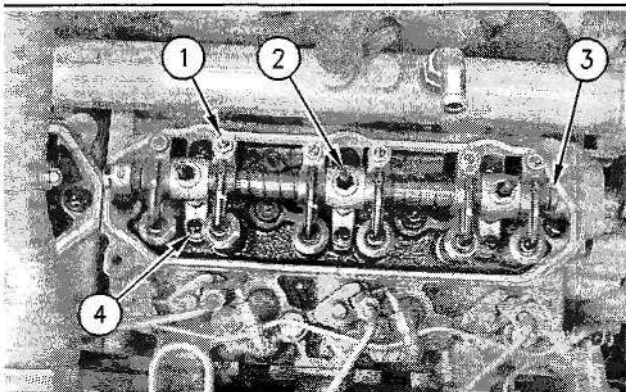


Illustration 249

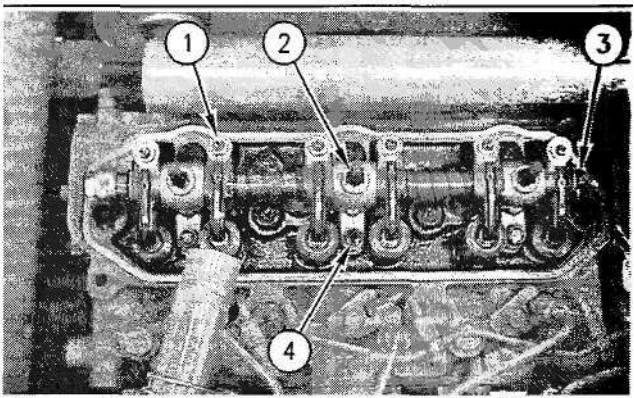


Illustration 250

3. Place the rocker shaft assembly (3) in position on the cylinder head.
4. Install six long bolts (2) for the rocker shaft bracket and tighten the bolts to a torque of 15 ± 5 N-m(11 ± 4 lb ft).
5. Install six short bolts (4) and the washers. Tighten the short bolts to a torque of 15 ± 5 N-m (11 ± 4 lb ft).
6. Adjust the inlet valve lash and the exhaust valve lash to 0.25 mm (0.010 inch). Refer to Testing and Adjusting, "Air Inlet and Exhaust System" for more information on setting the valve lash. Tighten adjusting screws (1).

End By:

- a. Install the valve mechanism cover. Refer to Disassembly and Assembly, "Valve Mechanism Cover - Remove and Install".

Cylinder Head - Remove

SMCSCode: 1100-011

Removal Procedure

Table 5

Required Toots			
Tool	Part Number	Part Description	Qty
(A)	138-7573	Link Bracket	2

Start By:

- a. Remove the engine hood. Refer to Disassembly and Assembly, "Hood - Remove and Install".

- b. Remove the exhaust manifold. Refer to Disassembly and Assembly, "Exhaust Manifold - Remove and Install".
- c. Remove the rocker shaft and pushrods. Refer to Disassembly and Assembly, "Rocker Shaft and Pushrod - Remove".
- d. Remove the air inlet manifold. Refer to Disassembly and Assembly, "Air Inlet Manifold - Remove".
- e. Remove the water outlet manifold. Refer to Disassembly and Assembly, "Water Outlet Manifold - 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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

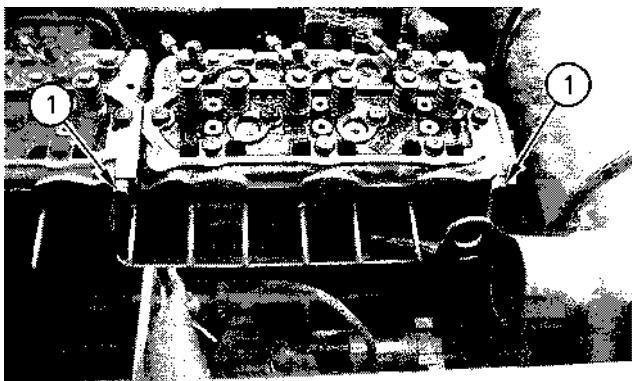


Illustration 251

1. Remove bolts (1) and the washers in order to remove the oil line.

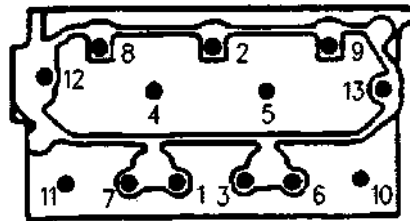


Illustration 252

Torque sequence for the cylinder head bolts (3066 Engine)

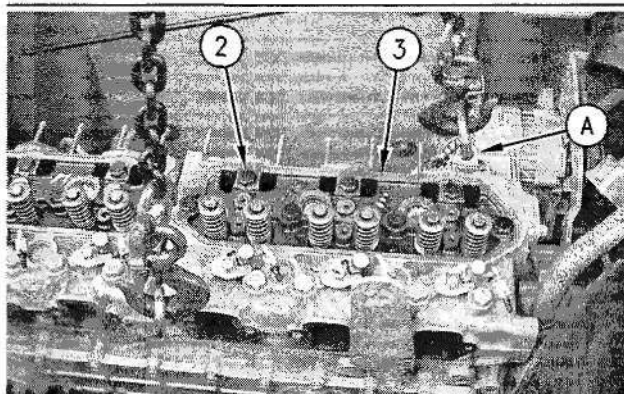


Illustration 253

2. Gradually remove cylinder head bolts (2) from the cylinder head. Remove the bolts in reverse order of the torque sequence.

Note: Do not use a pry bar to separate the cylinder head from the engine block.

3. Fasten Tooling (A) and a hoist to cylinder head (3).
4. Remove cylinder head (3) from the cylinder block. The weight of the cylinder head assembly is 32 kg (70 lb).

Note: Place the cylinder head on a surface that will not damage the face of the cylinder head.

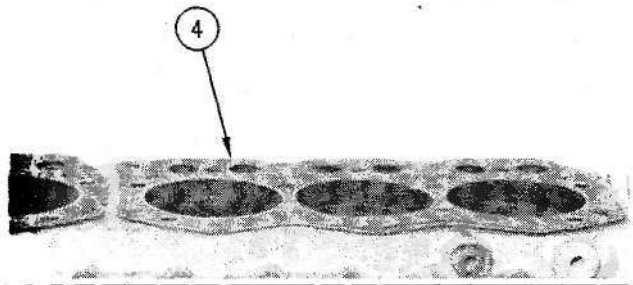


Illustration 254
Typical example

Note: When the gasket is removed from the cylinder block, be careful not to damage the mounting face of the cylinder block.

- 5. Remove cylinder head gasket (4) from the cylinder block.
- 6. Repeat Steps 2 through 5 in order to remove the other cylinder head.

Cylinder Head - Install

SMCS Code: 1100-012

Installation Procedure

Table 6

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	138-7573	Link Bracket	2

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

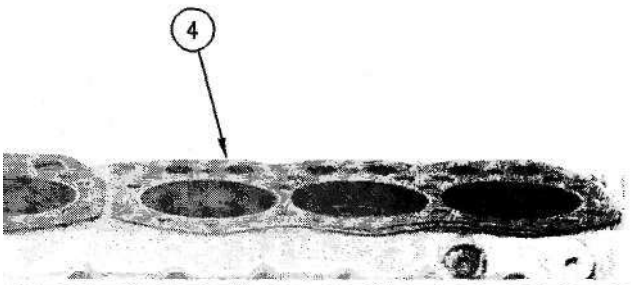


Illustration 255
Typical example

- 1. Clean the surfaces of the cylinder head and the cylinder block that are in contact with each other. Make sure that the surfaces are clean and dry.

Note: Do not use any sealant or gasket adhesive on the cylinder head gasket.

- 2. Install a new, dry cylinder head gasket (4) on the cylinder block.

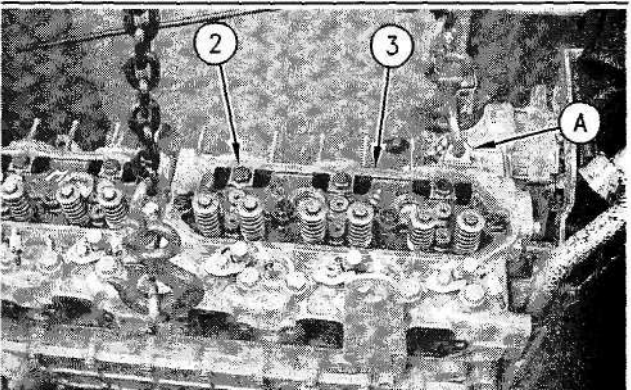
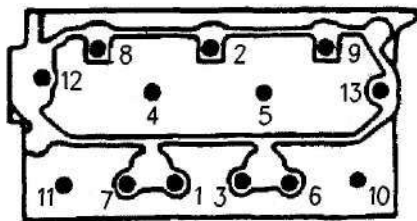


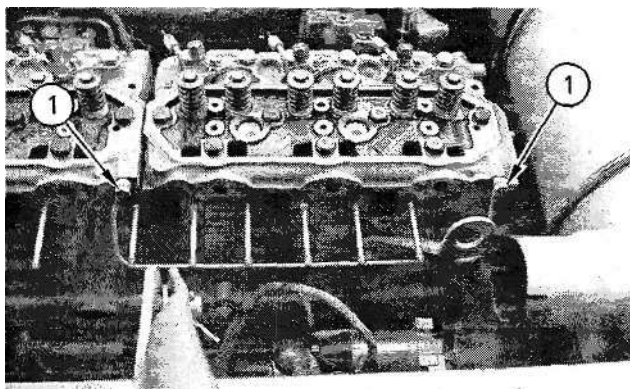
Illustration 256

- 3. Install Tooling (A) and a hoist to cylinder head (3).
- 4. Install the cylinder head in position on the cylinder block. The weight of the cylinder head assembly is 32 kg (70 lb).
- 5. Remove Tooling (A).
- 6. Install thirteen cylinder head bolts (2) in cylinder head (3).

**Illustration 257**

Torque sequence for the cylinder head bolts (3066 Engine)

7. Tighten the cylinder head bolts in a numerical order according to the torque sequence. Tighten the cylinder head bolts to a torque of $118 \pm 5 \text{ N.m}$ ($87 \pm 4 \text{ lb ft}$).
8. Repeat Steps 1 through 7 in order to install the other cylinder head.

**Illustration 258**

9. Install the washers and bolts (1) in order to install the oil line.

End By:

- a. Install the water outlet manifold. Refer to Disassembly and Assembly, "Water Outlet Manifold - Install".
- b. Install the air inlet manifold. Refer to Disassembly and Assembly, "Air Inlet Manifold - Install".
- c. Install the rocker shaft and pushrods. Refer to Disassembly and Assembly, "Rocker Shaft and Pushrod - Install".
- d. Install the exhaust manifold. Refer to Disassembly and Assembly, "Exhaust Manifold - Remove and Install".

- e. Install the engine hood. Refer to Disassembly and Assembly, "Hood - Remove and Install".

Radiator - Remove

SMCSCode: 1353-011

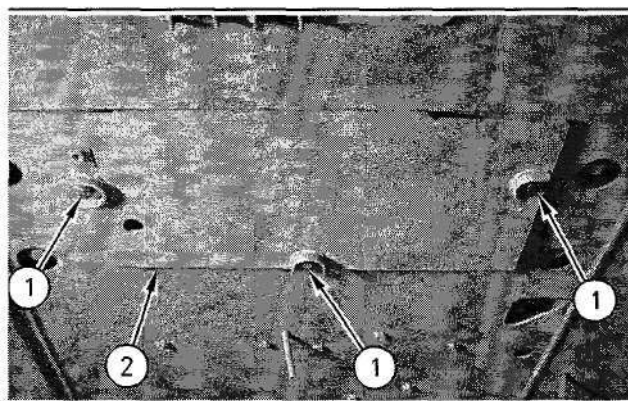
Removal Procedure

Table 7

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	138-7573	Link Bracket	2

Start By:

- a. Remove the engine hood. Refer to Disassembly and Assembly, "Hood - Remove and Install" in this manual.
- b. Remove the fan. Refer to Disassembly and Assembly, "Fan - Remove and Install" in this manual.

**Illustration 259**

1. Remove bolts (1) and the washers in order to remove access panel (2) that is located under the radiator.

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

WARNING

At operating temperature, the engine coolant is hot and under pressure.

Steam can cause personal injury.

Check the coolant level only after the engine has been stopped and the filler cap is cool enough to touch with the bare hand.

Remove the filler cap slowly to relieve pressure.

Cooling system conditioner contains alkali. Avoid contact with skin and eyes to prevent personal injury

2. Allow the coolant to cool down before you drain the radiator. Drain the engine coolant from the radiator into a suitable container for storage or disposal.

Reference: Refer to Operation and Maintenance Manual, "Refill Capacities" for the capacity of the radiator.

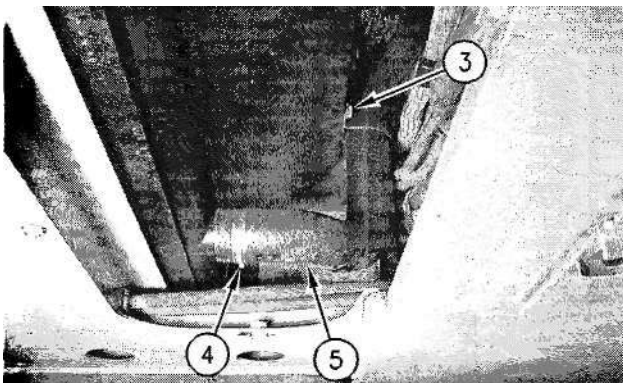


Illustration 260

3. Remove bolt (3) and the washer from the hose clamp.

4. Loosen hose clamp (4). Disconnect lower radiator hose (5).

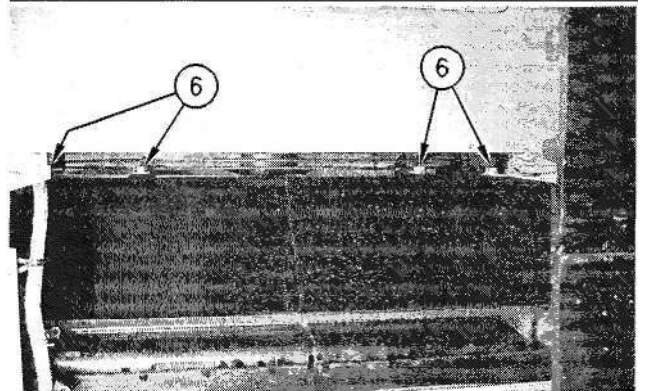


Illustration 261

This is a view of the bottom of the radiator.

5. Remove bolts (6) and the washers from the bottom half of the fan guard.

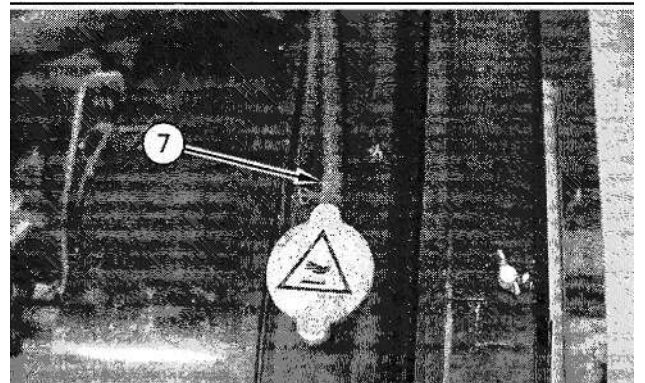


Illustration 262

Q00717598

6. Disconnect overflow hose (7) from the radiator.

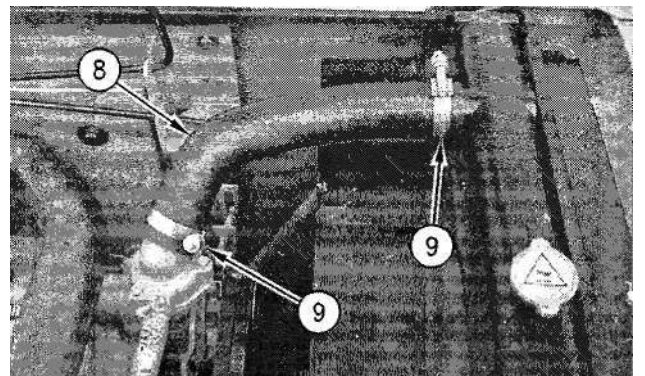


Illustration 263

7. Loosen hose clamps (9). Remove upper radiator hose (8).

8. Open the left rear access door.

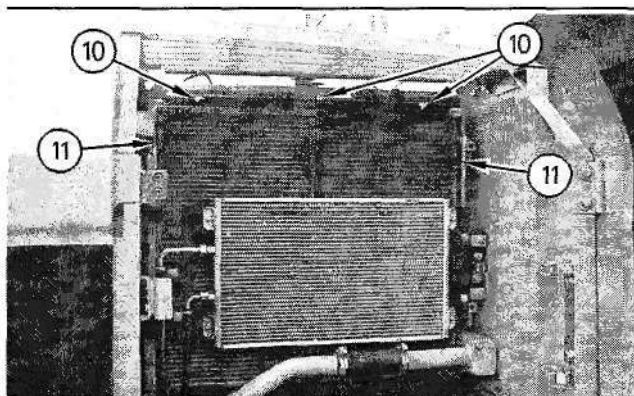


Illustration 264

9. Remove wing bolts (10). Remove screens (11) from the front of the hydraulic oil cooler.

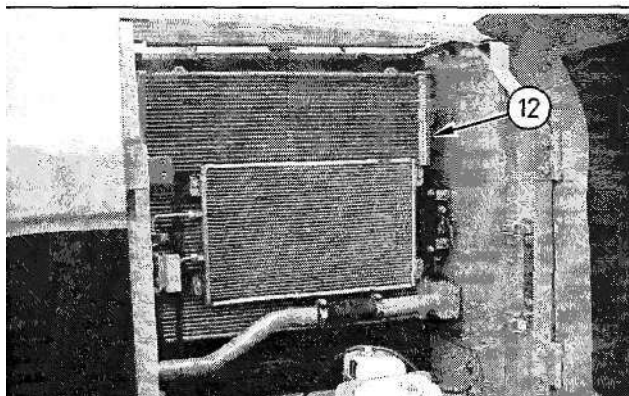


Illustration 265

10. Open swing out oil cooler (12).

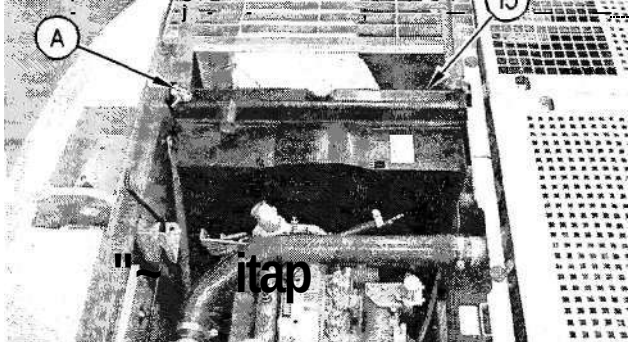


Illustration 266

11. Fasten Tooling (A), lifting straps, and a hoist to radiator (13).

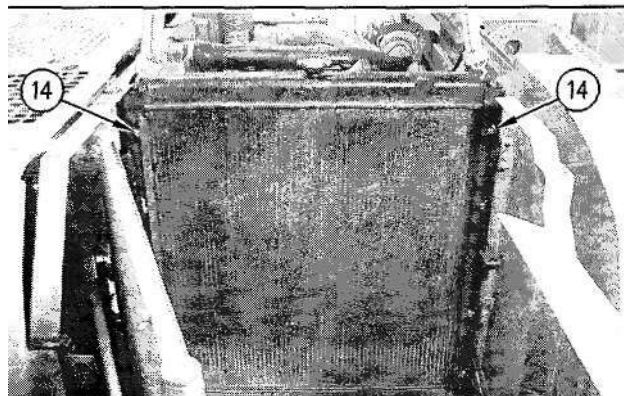


Illustration 267

12. Remove bolts (14) and the washers that secure the radiator to the support.

Note: The bottom half of the fan guard will fall while you remove the radiator.

13. Carefully remove the radiator. The weight of the radiator is 45 kg (99 lb).

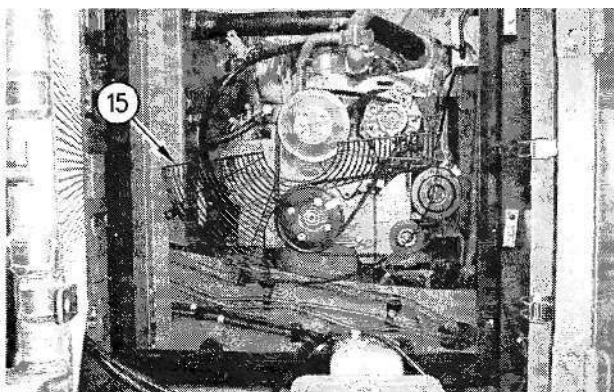


Illustration 268

14. Remove fan guard (15).

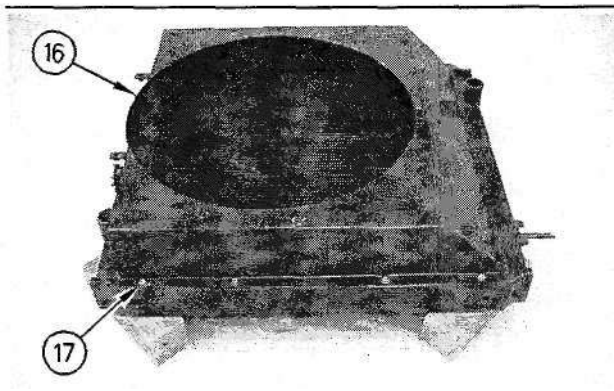


Illustration 269

Remove bolts (17) and the washers. Remove Fan shroud (16).

Radiator - Install

SMCS Code: 1353-012

Installation Procedure

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	138-7573	Link Bracket	2

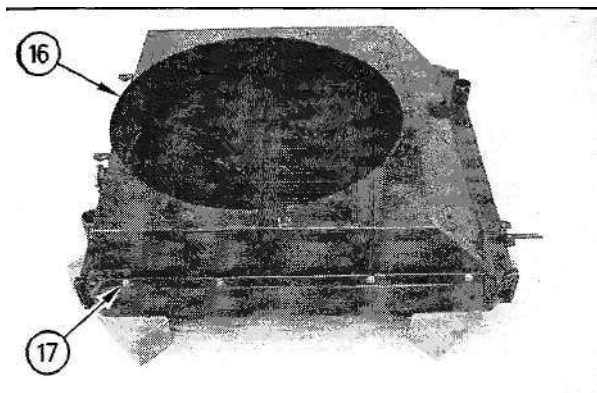


Illustration 270

1. Install fan shroud (16). Install the washers and bolts (17).

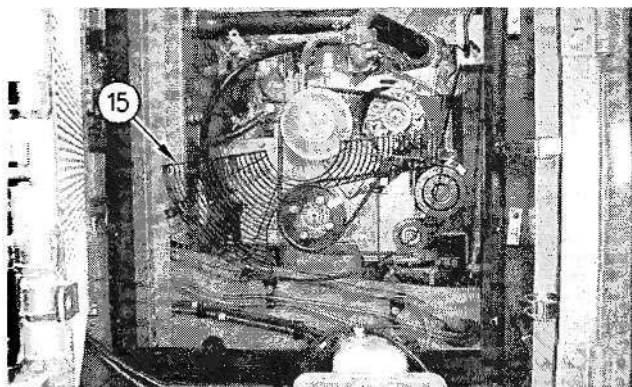


Illustration 271

2. Position fan guard (15) on the engine.

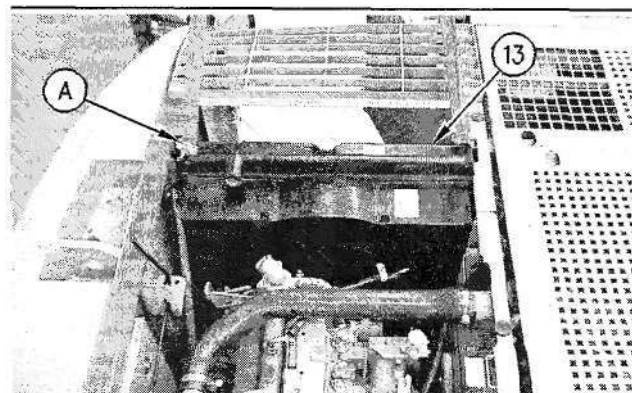


Illustration 272

3. Fasten Tooling (A), lifting straps, and a hoist to radiator (13).
4. Carefully install the radiator. The weight of the radiator is 45 kg (99 lb).

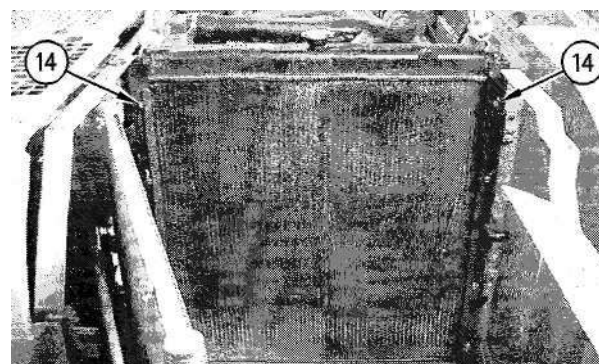


Illustration 273

5. Install the washers and bolts (14) that secure the radiator to the support.

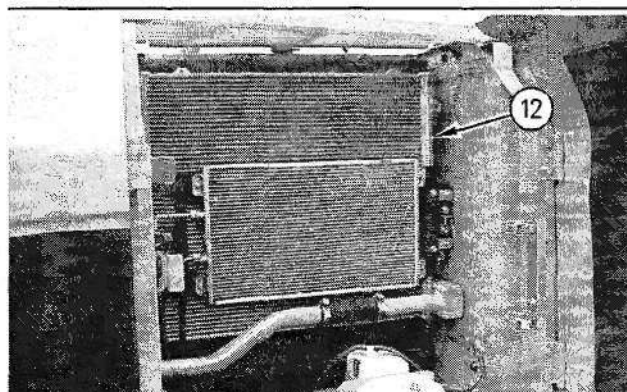


Illustration 274

6. Close swing out oil cooler (12).

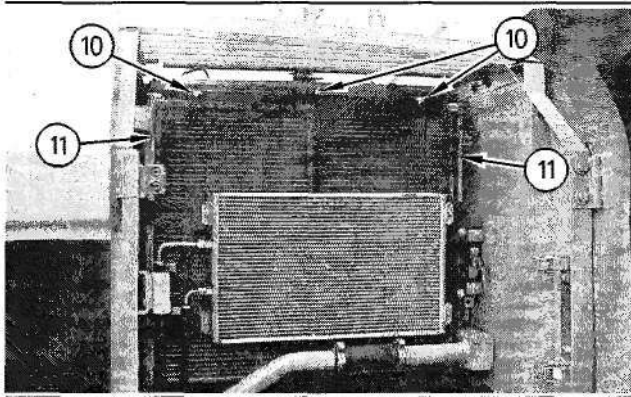


Illustration 275

7. Install screens (11) on the front of the hydraulic oil cooler. Install wing bolts (10).
8. Close the left rear access door.

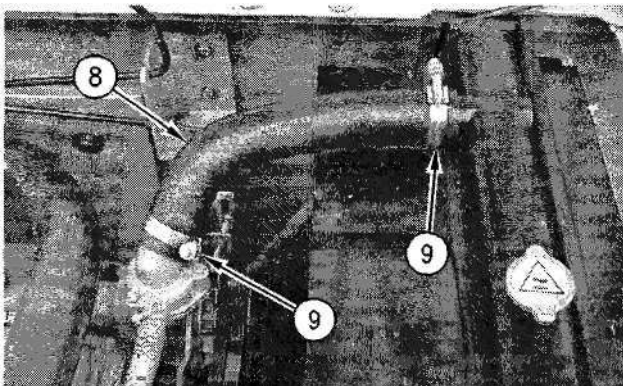


Illustration 276

9. Install upper radiator hose (8). Tighten hose clamps (9).

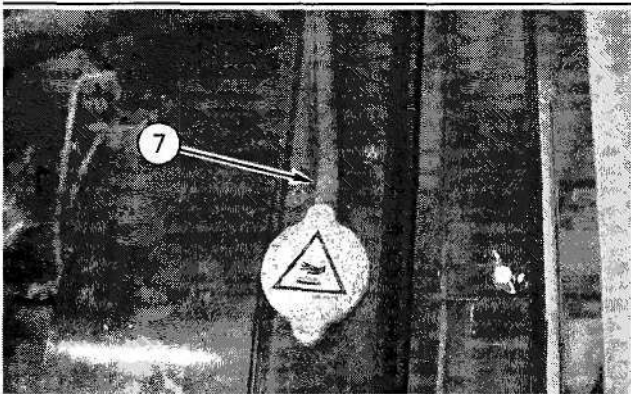


Illustration 277

900717598

10. Connect overflow hose (7) to the radiator.

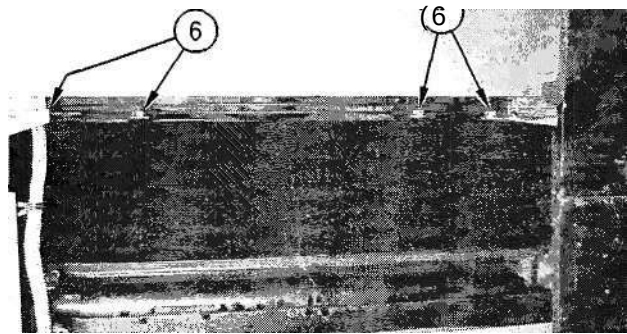


Illustration 278

This is a view of the bottom of the radiator.

11. Install the washers and bolts (6) in the bottom half of the fan guard.

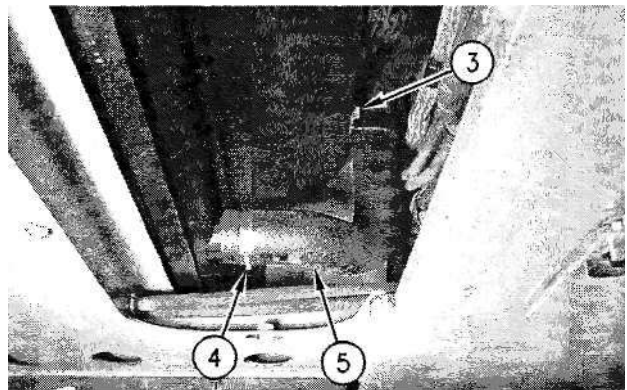


Illustration 279

12. Connect lower radiator hose (5). Tighten hose clamp (4).
13. Install the washer and bolt (3) in the hose clamp.

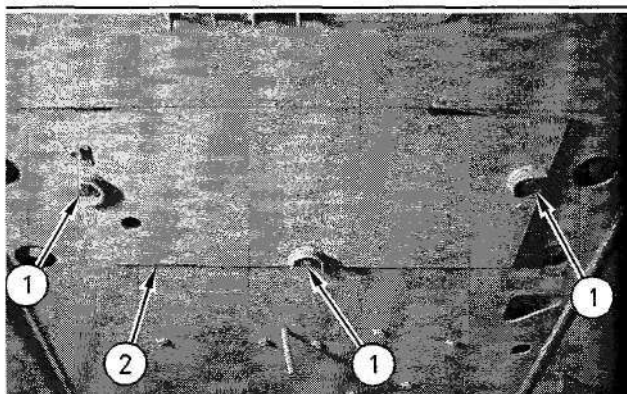


Illustration 280

14. Install access panel (2) that is located under the radiator. Install the washers and bolts (1).

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

15. Fill the cooling system.

Reference: Refer to Operation and Maintenance Manual, "Lubricant Viscosities and Refill Capacities" for the proper filling procedure.

End By:

- a. Install the fan. Refer to Disassembly and Assembly, "Fan - Remove and Install" in this manual.
- b. Install the engine hood. Refer to Disassembly and Assembly, "Hood - Remove and Install" in this manual.

i01342491

V-Belts - Remove and Install

SMCSCode: 1357-010; 1359-036-BE; 1405-036-BE; 7320-036-BE

Removal Procedure

Start By.

- a. Remove the fan. Refer to Disassembly and Assembly, "Fan - Remove and Install" in this manual.

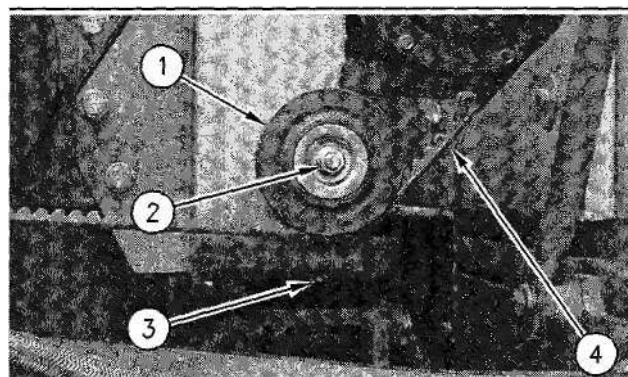


Illustration 281

g00709780

The radiator is removed for photographic purposes.

1. Loosen mounting bolt (2).
2. Loosen tension adjusting bolt (3) in order to loosen belt tensioner (1).
3. Remove air conditioner V-belt (4).

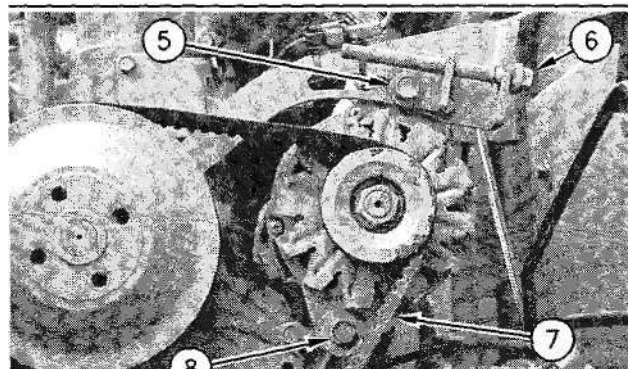


Illustration 282

g00709772

The radiator is removed for photographic purposes.

4. Loosen bolts (5) and (8).
5. Relieve the tension on alternator V-belts (7) with tension adjusting bolt (6).
6. Remove alternator V-belts (7).

Installation Procedure

1. Check the condition of all V-belts for damage or for wear. If any of the V-belts are worn or damaged, use new parts for replacement.

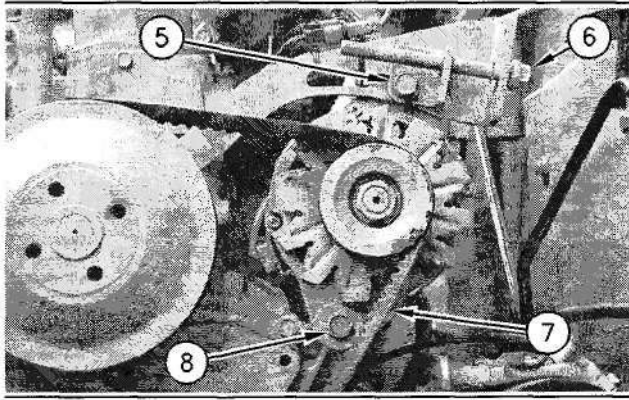


Illustration 283

The radiator is removed for photographic purposes.

2. Install alternator V-belts (7).
3. Use tension adjusting bolt (6) to adjust the tension of the alternator V-belts. Refer to the Operation and Maintenance Manual for the correct procedure for adjusting the tension of the V-belts.
4. Tighten bolts (5) and (8).

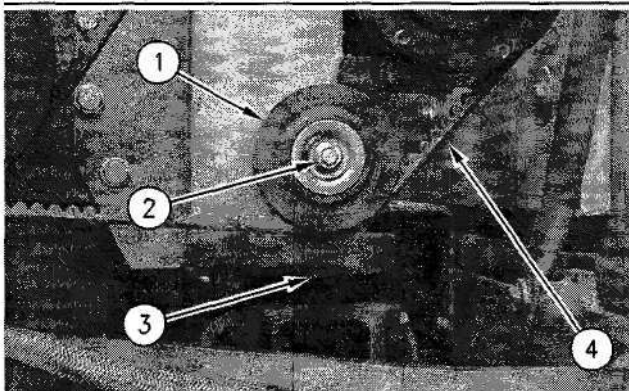


Illustration 284

900709780

The radiator is removed for photographic purposes.

5. Install air conditioner V-belt (4).
6. Partially tighten the mounting bolt (2).
7. Use tension adjusting bolt (3) to adjust belt tensioner (1). Refer to the Operation and Maintenance Manual for the correct procedure for adjusting the tension of the V-belts.
8. Fully tighten the mounting bolt (2).

End By:

- a. Install the fan. Refer to Disassembly and Assembly, "Fan - Remove and Install" in this manual.

Fan - Remove and Install

SMCSCode: 1356-011; 1356-012

Removal Procedure

WARNING

At operating temperature, the engine coolant is hot and under pressure.

Steam can cause personal injury.

Check the coolant level only after the engine has been stopped and the filler cap is cool enough to touch with the bare hand.

Remove the filler cap slowly to relieve pressure.

Cooling system conditioner contains alkali. Avoid contact with skin and eyes to prevent personal injury.

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

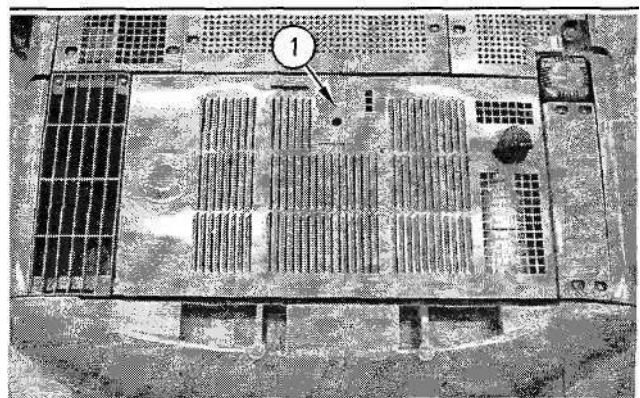


Illustration 285

1. Open hood (1).

2. Drain the engine coolant to a level below the upper radiator hose into a suitable container for storage or disposal.

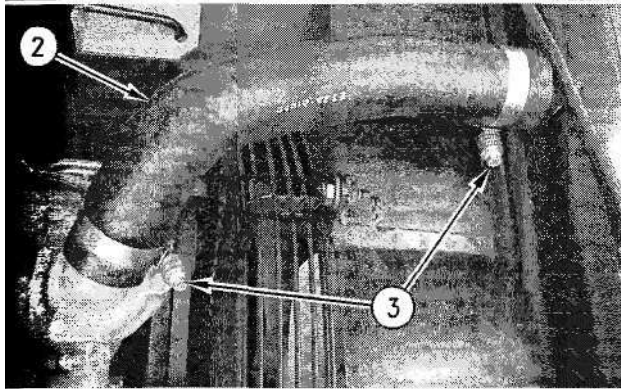


Illustration 286

3. Loosen hose clamps (3). Remove upper radiator hose (2).

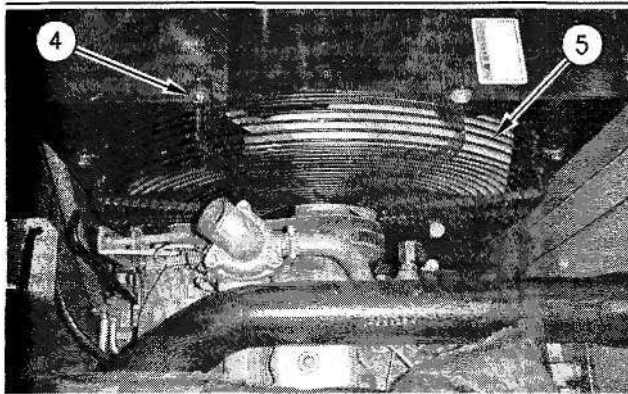


Illustration 287

4. Remove bolts (4) and the washers from the upper fan guard. Remove upper fan guard (5).

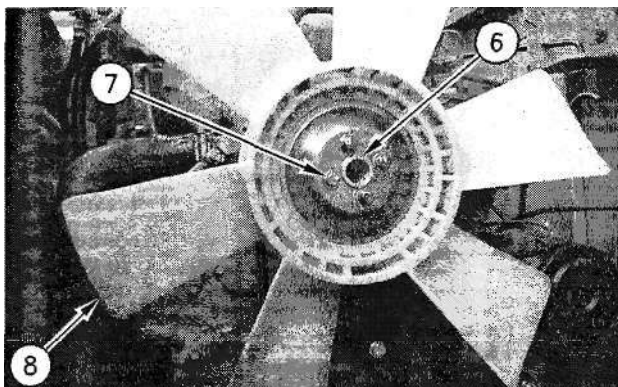


Illustration 288

The radiator is removed for photographic purposes.

Note: When bolts (7) are removed, the fan and the spacer will separate.

5. Remove bolts (7) and the washers. Remove fan (8) and spacer (6).

Installation Procedure

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

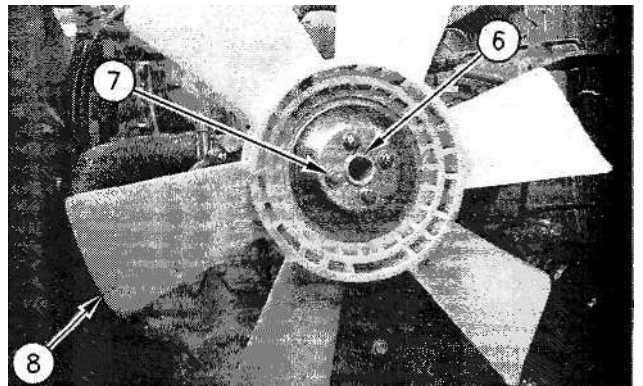


Illustration 289

The radiator is removed for photographic purposes.

1. Place spacer (6) in position on fan (8). Install the washers and one bolt (7) in the fan and in the spacer.
2. Install spacer (6), fan (8), and bolt (7) on the engine. Tighten the bolt finger tight.
3. Install the washers and the other bolts (7). Tighten bolts (7) evenly.

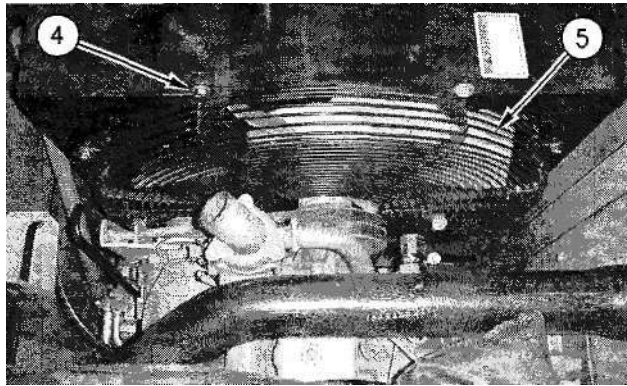


Illustration 290

4. Install upper fan guard (5). Install the washers and bolts (4).

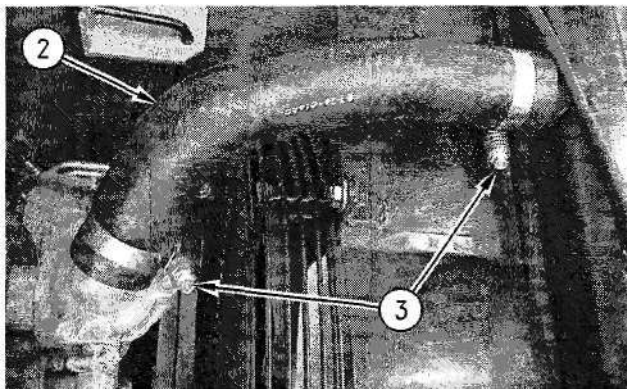
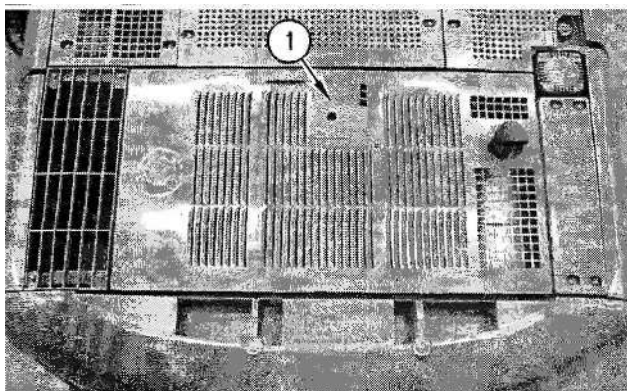


Illustration 291

5. Install upper radiator hose (2). Tighten hose clamps (3).
6. Fill the radiator with coolant to the correct level. Refer to the Operation and Maintenance Manual for further information.



Water Pump - Remove

SMCS Code: 1361-011

Removal Procedure

Start By:

- a. Remove the fan. Refer to Disassembly and Assembly, "Fan- Remove and Install" in this manual.
- b. Remove the V-belts. Refer to Disassembly and Assembly, "V-Belts - Remove and Install" in this manual.

A WARNING

At operating temperature, the engine coolant is hot and under pressure.

Steam can cause personal injury.

Check the coolant level only after the engine has been stopped and the filler cap is cool enough to touch with the bare hand.

Remove the filler cap slowly to relieve pressure.

Cooling system conditioner contains alkali. Avoid contact with skin and eyes to prevent personal injury.

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Drain the engine coolant from the cooling system into a suitable container for storage or disposal.

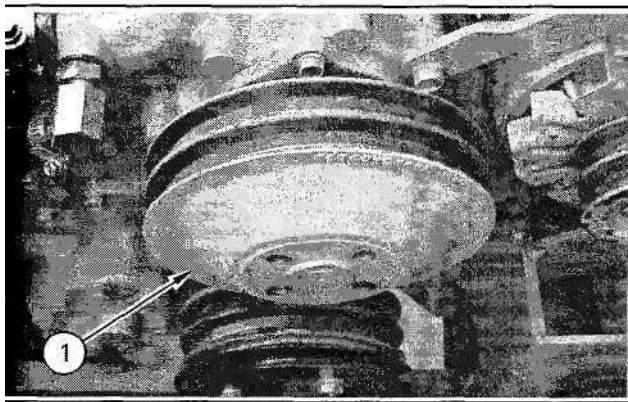


Illustration 293

2. Remove pulley (1).

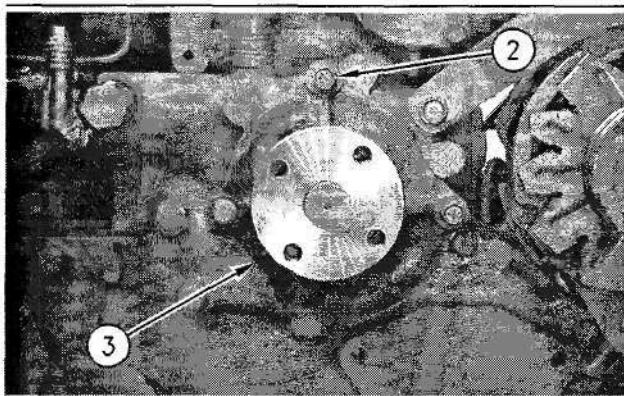


Illustration 294

- 3. Remove four bolts (2).
- 4. Remove water pump (3).
- 5. Remove the O-ring seal (not shown) from the water pump. Discard the O-ring seal.

Water Pump - Disassemble

SMCS Code: 1361-015

Disassembly Procedure

Table 9

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	1P-2321	Combination Puller	1
(B)	1P-1861	Retaining Ring Pliers	1
(C)	1P-0510	Driver Gp	1

Start By:

- a. Remove the water pump. Refer to Disassembly and Assembly, "Water Pump - Remove" in this manual.

WARNING

Always wear protective gloves when handling parts that have been heated.

Note: If the water pump is heated up to 80 °C (176 °F), the components can be easily removed.

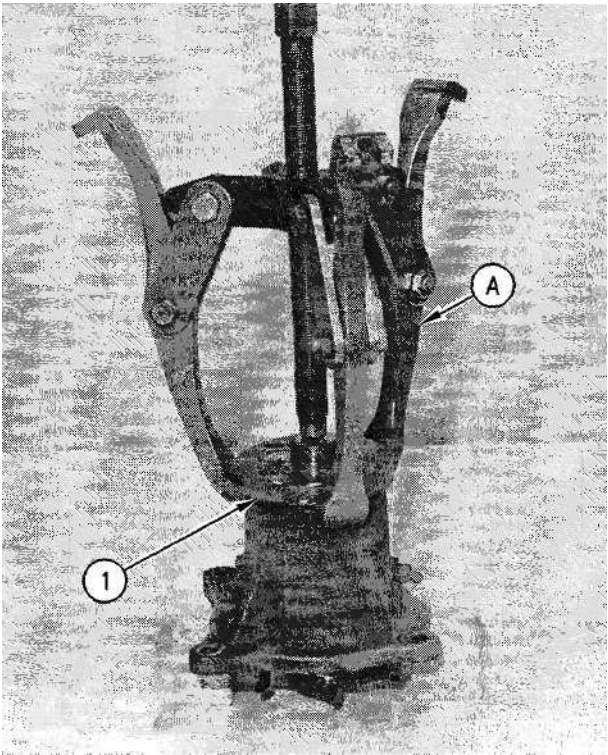


Illustration 295

- 1. Use Tooling (A) to remove flange (1) from the water pump.

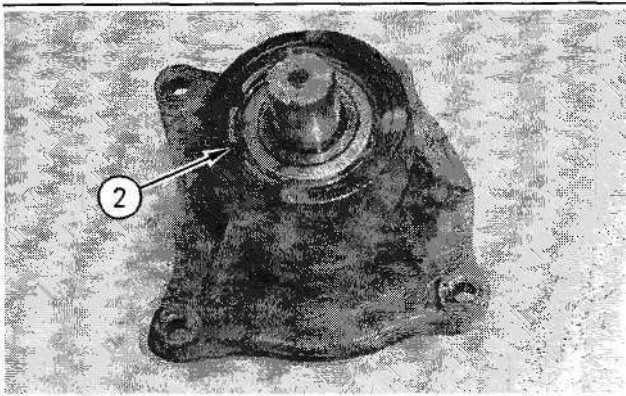


Illustration 296

2. Use Tooling (B) to remove retaining ring (2) from the water pump.

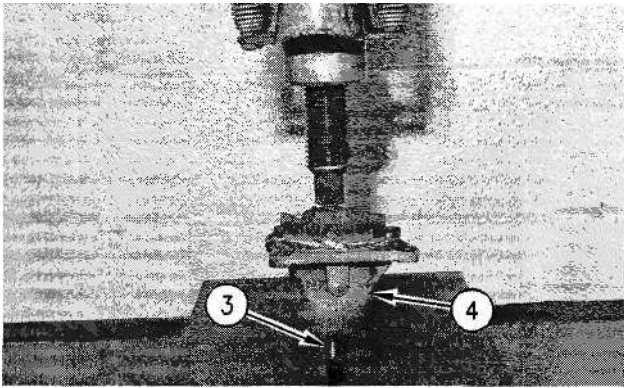


Illustration 297

3. Use a press and Tooling (C) to remove shaft assembly (3) from water pump housing (4).

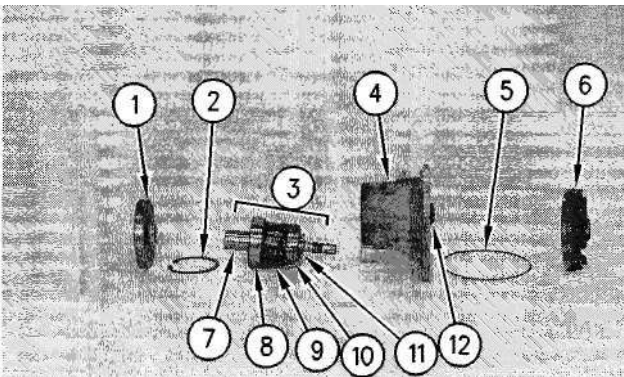


Illustration 298

4. Remove impeller (6) from the water pump assembly.

Note: Check the impeller for wear, corrosion, and metal to metal contact. Replace the impeller, if necessary.

5. Remove the following items from shaft (7):

- bearing (8)
- spacer (9)
- bearing (10)
- washer (11)

6. Once all of the components have been removed, then check shaft (7) for distortion. Replace the shaft, if necessary.

7. Check seal (12) for wear and damage. Use Tooling (C) in order to remove the seal from the water pump housing, if necessary.

Note: Replace the seal if any signs of leakage occurs during the operation of the water pump.

8. Check water pump assembly (6) for corrosion, cracks, and other damage.

9. Replace O-ring (5) with a new O-ring.

Water Pump - Assemble

SMCSCode: 1361-016

Assembly Procedure

Table 10

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	1P-0510	Driver Gp	1
(B)	1P-1861	Retaining Ring Pliers	1

Note: Refer to the Specifications Module, "Water Pump" for specifications that are required during assembly.

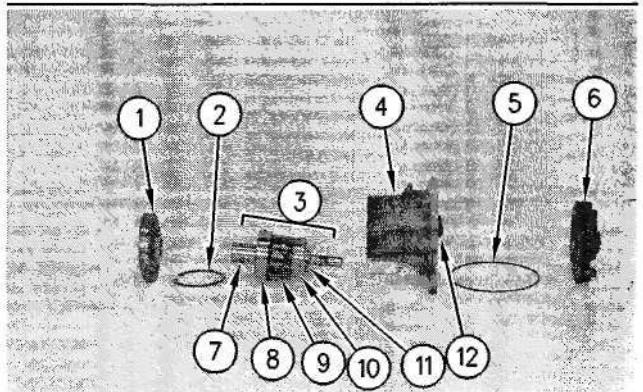


Illustration 299

900711168

1. Install seal (12), if the seal was removed during the disassembly procedure.

2. The following components are installed on the shaft (7):

- washer (11)
- bearing (10)
- spacer (9)

- bearing (8)

Note: Check two bearings (8) and (10) for correct rotation.

3. Install a new O-ring seal (5).

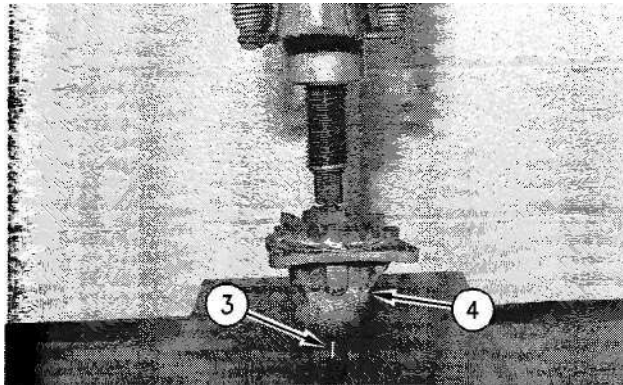


Illustration 300

4. Use a press and Tooling (A) to install shaft assembly (3) into the water pump housing.
5. Use a press and Tooling (A) to install impeller (6) onto shaft assembly (3).

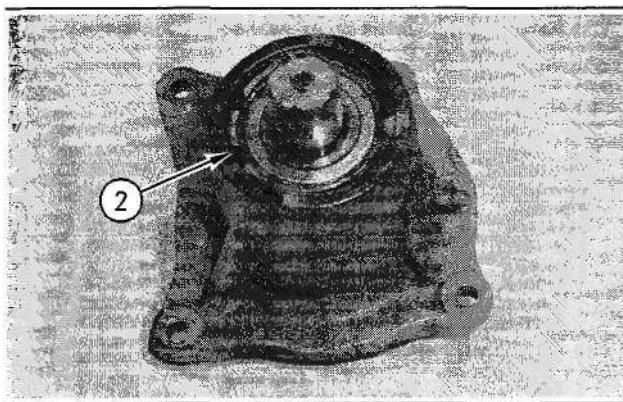


Illustration 301

6. Use Tooling (B) to install retaining ring (2) into water pump housing (4).
7. Use a press and Tooling (A) to install flange (1) onto shaft assembly (3).

End By:

- a. Install the water pump. Refer to Disassembly and Assembly, "Water Pump - Remove and Install" in this manual.

Water Pump - Install

SMCSCode: 1361-012

Installation Procedure

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Note: O-rings, gaskets, and seals should always be replaced. A used O-ring may not have the same sealing properties as a new O-ring. Use 1U-6396 O-Ring Assembly Compound during the assembly procedure.

1. Install a new O-ring seal (not shown) on the back of the water pump. Apply engine coolant to the O-ring seal before the installation of the water pump.

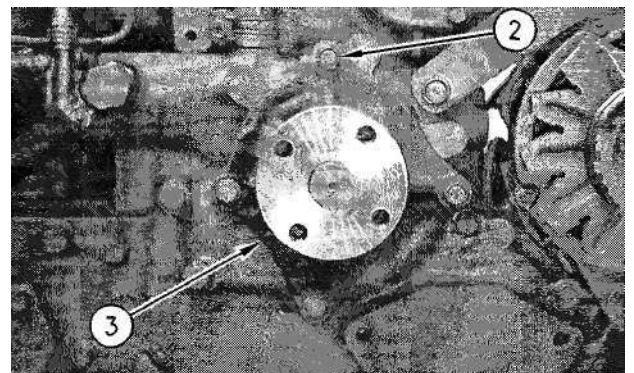


Illustration 302

2. Install water pump (3).
3. Install four bolts (2).

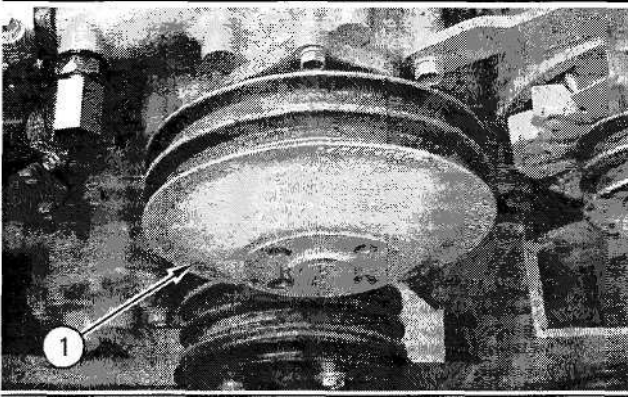


Illustration 303

900710833

4. Install pulley (1).

End By:

- a. Install the V-belts. Refer to Disassembly and Assembly, "V-Belts - Remove and Install" in this manual.
- b. Install the fan. Refer to Disassembly and Assembly, "Fan - Remove and Install" in this manual.

Water Outlet Manifold - Remove

SMCSCode: 1362-011

Removal Procedure

Start By:

- a. Remove the exhaust manifold. Refer to Disassembly and Assembly, "Exhaust Manifold - Remove and Install".
- b. Remove the water temperature regulator. Refer to Disassembly and Assembly, "Water Temperature Regulator - Remove and Install".

WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and cooling system pressure cap is cool enough to touch with your bare hand.

Do not attempt to tighten hose connections when the coolant is hot, the hose can come off causing burns.

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Drain the level of the coolant below the water outlet manifold. Drain the coolant into a suitable container for storage or disposal.

i01342375

Water Outlet Manifold - Install

SMCSCode: 1362-012

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

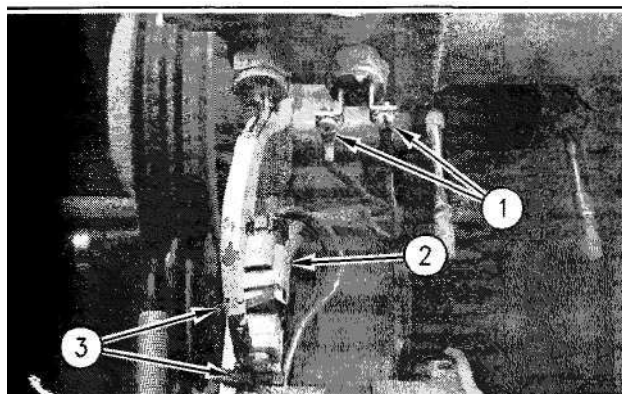


Illustration 304

Note: Put identification marks on the two wires for reinstallation purposes.

2. Remove two screws (1) in order to disconnect two wires.
3. Disconnect electrical connection (2).
4. Remove wire tie-wraps (3).

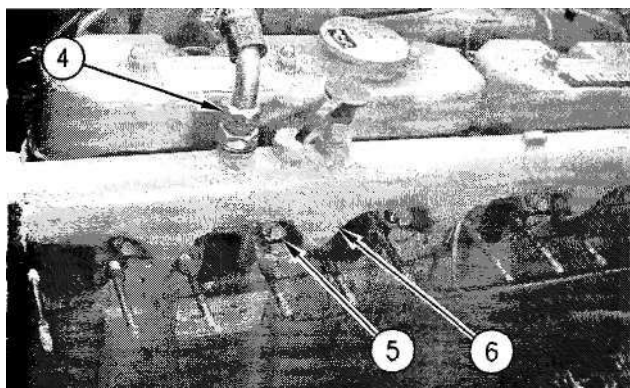


Illustration 305

5. Disconnect hose assembly (4).
6. Remove twelve bolts (5) and the washers from water outlet manifold (6).
7. Remove water outlet manifold (6) from the engine.
8. Remove six gaskets (not shown) from the engine.

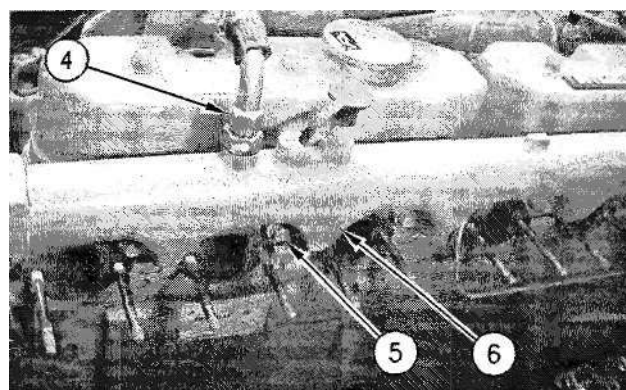


Illustration 306

Note: Gaskets should always be replaced. A used gasket may not have the same sealing properties as a new gasket. Use **8T-9013** Silicone Sealant during the assembly procedure.

1. Install the gaskets on the engine.
2. Put water outlet manifold (6) in position on the engine.
3. Install bolts (5) that secure water outlet manifold (6) to the engine.
4. Connect hose assembly (4).

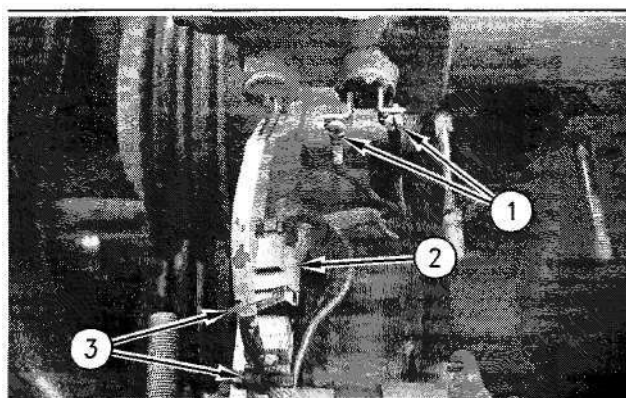


Illustration 307

5. Connect electrical connection (2).

6. Install two wires in the original location. Fasten the two wires with two screws (1). Tighten the screws to a torque of $.98 \pm .245$ N.m (8.674 ± 2.1684 lb in).
7. Install wire tie-wraps (3).

End By:

- a. Install the water temperature regulator. Refer to Disassembly and Assembly, "Water Temperature Regulator - Remove and Install".
- b. Install the exhaust manifold. Refer to Disassembly and Assembly, "Exhaust Manifold - Remove and Install".

Crankshaft Pulley - Remove and Install

SMCSCode: 1205-010

Removal Procedure

Table 11

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	6V-9120	Socket(1)	1
(B)	1P-2321	Combination Puller	1

(1) Tool (B) is a 46 mm socket.

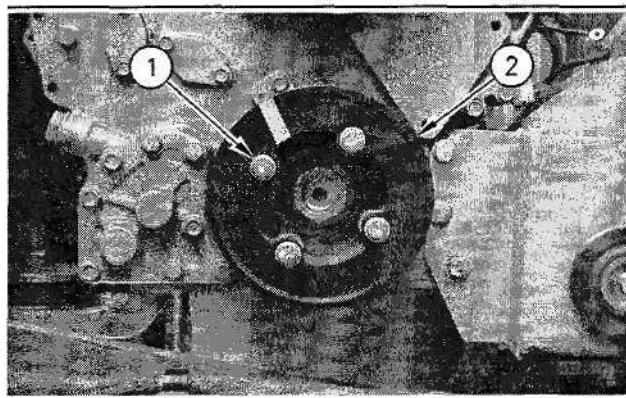
Start By:

- a. Remove the radiator. Refer to Disassembly and Assembly, "Radiator - Remove".
- b. Remove the V-belts. Refer to Disassembly and Assembly, "V-Belts - Remove and Install".

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.



1. Remove four bolts (1) and the washers in order to remove pulley (2) for the air conditioning.

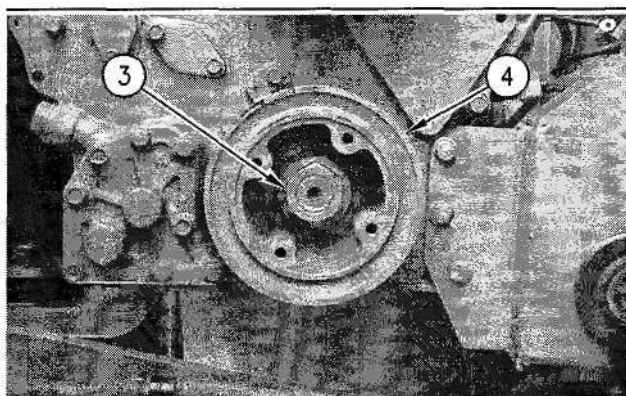


Illustration 309

2. Use Tooling (A) to remove nut (3) from the threaded end of the crankshaft.

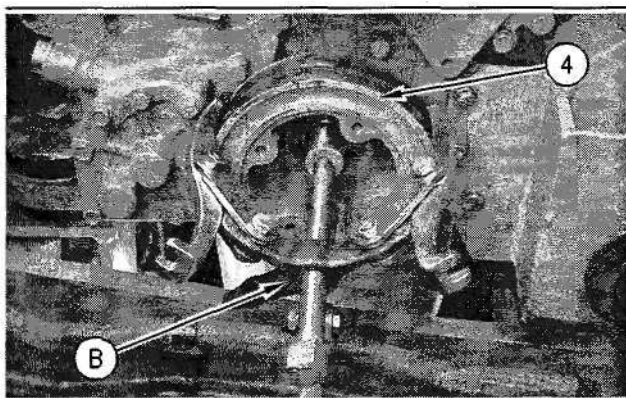


Illustration 310

3. Use Tooling (B) to remove crankshaft pulley (4) from the engine.

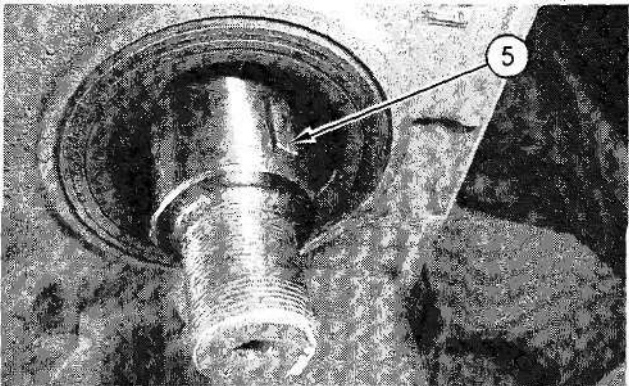
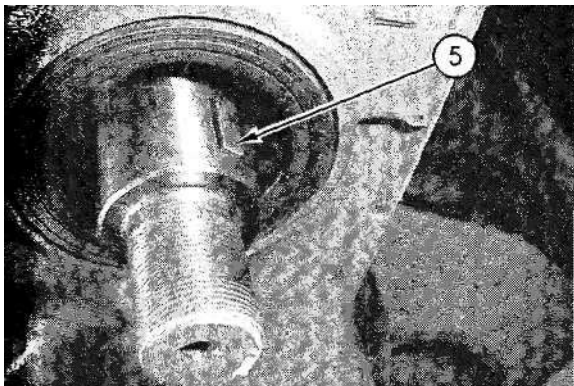


Illustration 313 900712742

4. Remove the woodruff key (5) from the crankshaft. Tap the woodruff key at one end with a hammer in order to dislodge the key.

2. Install woodruff key (5) to the crankshaft.

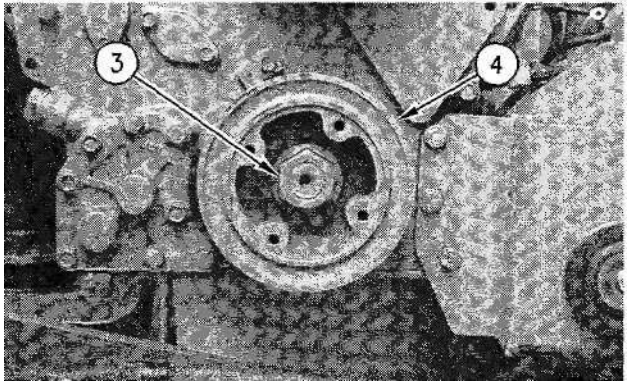
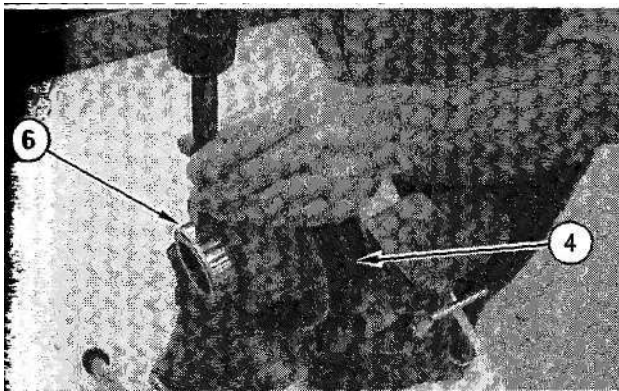


Illustration 312

Illustration 314

5. If it is necessary to remove the wear sleeve (6) from the crankshaft pulley (4), use a hammer and a chisel. Hold the chisel at right angles to the surface of the wear sleeve. Tap the wear sleeve in three places. You can remove the wear sleeve once the tension is released.

3. Put crankshaft pulley (4) in position on the engine.
4. Install nut (3). Use Tooling (A) to tighten nut (3) to a torque of 185 N-m (136 lb ft).

Installation Procedure

Table 12

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	6V-9120	Socket ^{*1)}	1

(1) Tool (B) is a 46 mm socket.

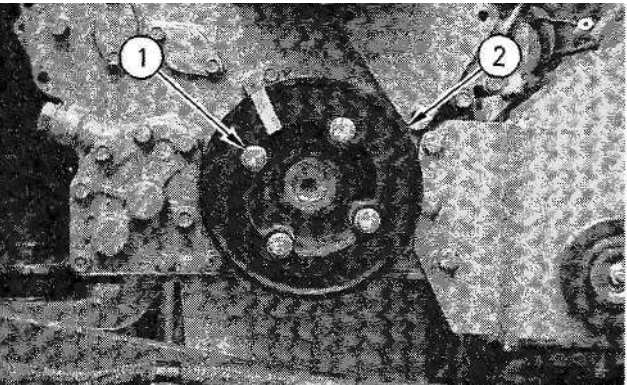


Illustration 315

NOTICE
Keep all parts clean from contaminants.
Contaminants may cause rapid wear and shortened component life.

5. Install pulley (2) for the air conditioning. Install the washers and four bolts (1) in order to hold pulley (2) in position.

1. Install a new sleeve on the crankshaft pulley.

End By:

- a. Install the V-belts. Refer to Disassembly and Assembly, "V-Belts - Remove and Install".
- b. Install the radiator. Refer to Disassembly and Assembly, "Radiator - Install".

Housing (Front) - Remove

SMCSCode: 1151-011; 1162-011

Removal Procedure

Table 13

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	1P-0510	Driver Group	1

Start By:

- a. Remove the radiator. Refer to Disassembly and Assembly, "Radiator - Remove".
- b. Remove the alternator. Refer to Disassembly and Assembly, "Alternator - Remove".
- c. Remove the water pump. Refer to Disassembly and Assembly, "Water Pump - Remove".
- d. Remove the crankshaft pulley. Refer to Disassembly and Assembly, "Crankshaft Pulley - Remove and Install".
- e. Remove the fuel injection pump. Refer to Disassembly and Assembly, "Fuel Injection Pump - Remove".

NOTICE

Keep all parts clean from contaminants.

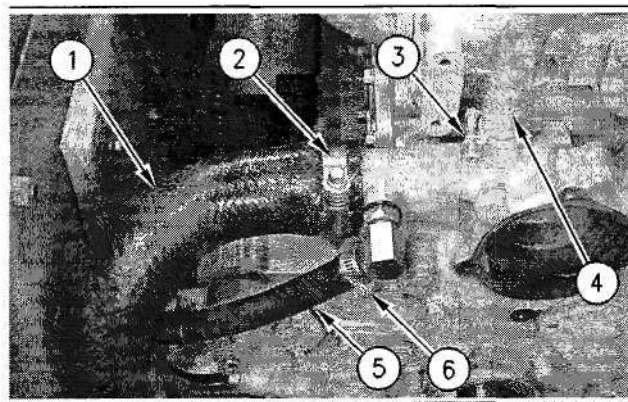
Contaminants may cause rapid wear and shortened component life.

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.



1. Loosen hose clamp (2) and remove radiator hose (1).
2. Loosen hose clamp (3) that secures hose (4) to the front housing.
3. Loosen hose clamp (6) that secures heater hose (5) to the front housing.

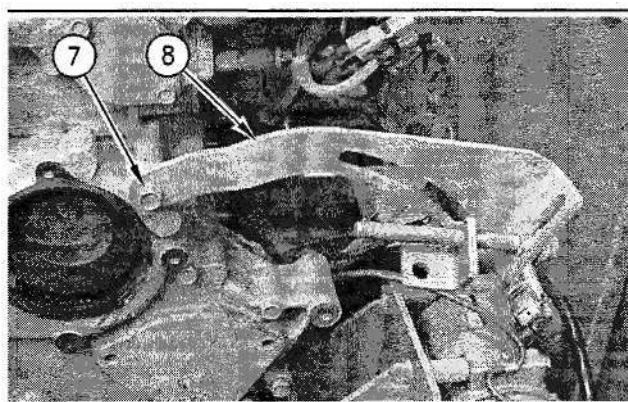


Illustration 317

4. Remove bolt (7) that secures alternator mounting bracket (8) to the engine.

5. Remove alternator mounting bracket (8).

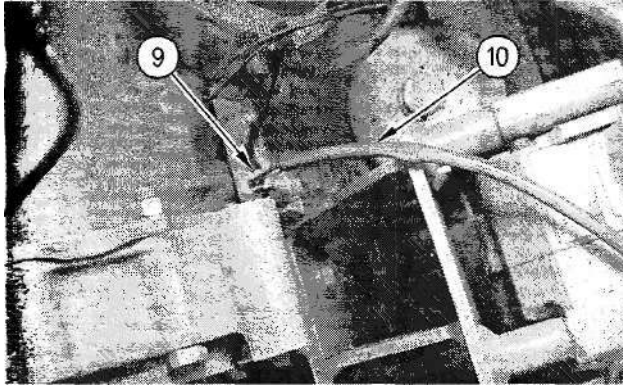


Illustration 318

6. Disconnect electrical connector (9). Remove wire (10) and the connector from the front housing.

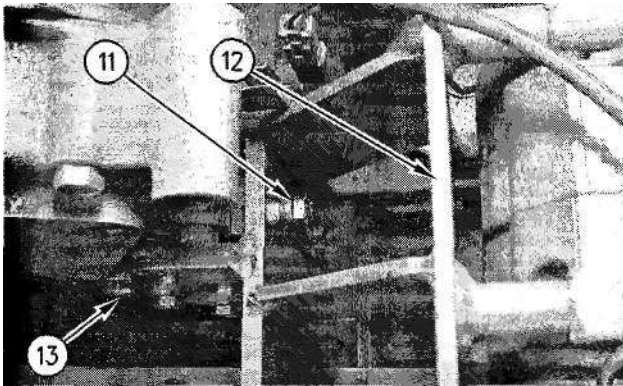


Illustration 319

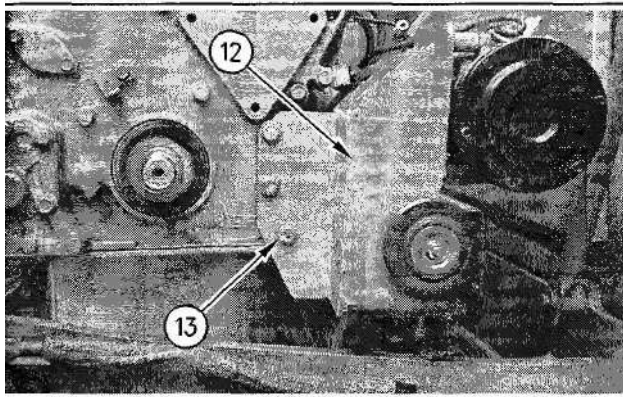


Illustration 320

7. First, remove two bolts (11) and the washers that secure mounting bracket (12) to the engine.
8. Support the refrigerant compressor and mounting bracket (12). Remove three bolts (13) and the washers.
9. Lay the refrigerant compressor and mounting bracket (12) to the side.

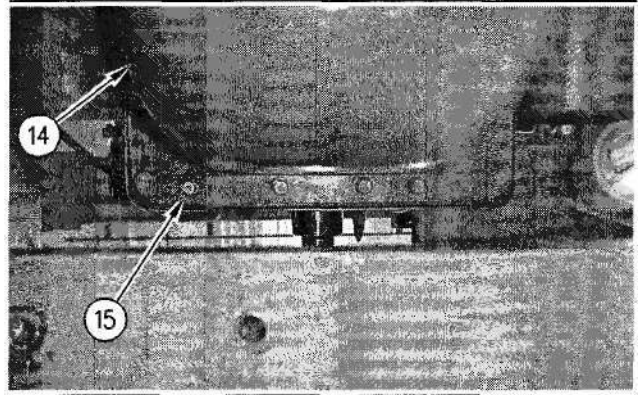


Illustration 321

10. Remove bolts (15) and the washers that mount the front housing to oil pan (14).

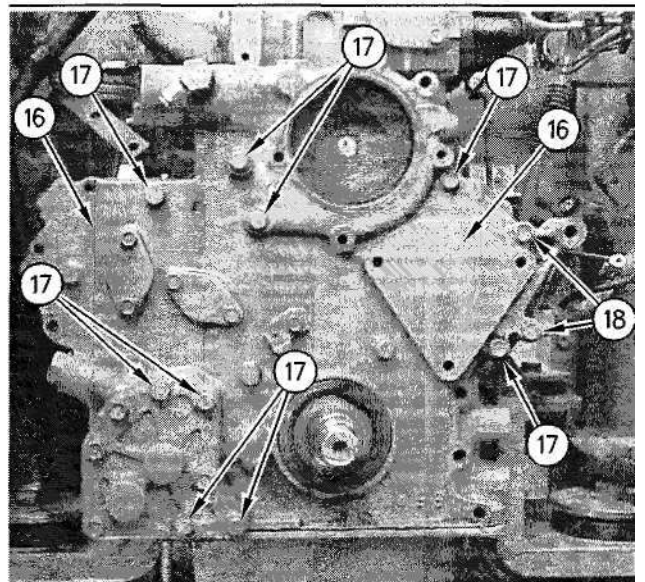


Illustration 322

11. Remove nine bolts (17) and the washers that hold front housing (16) to the plate and the cylinder block.
12. Remove two bolts (18), the washers, the nuts, and one clip from the front housing (16).

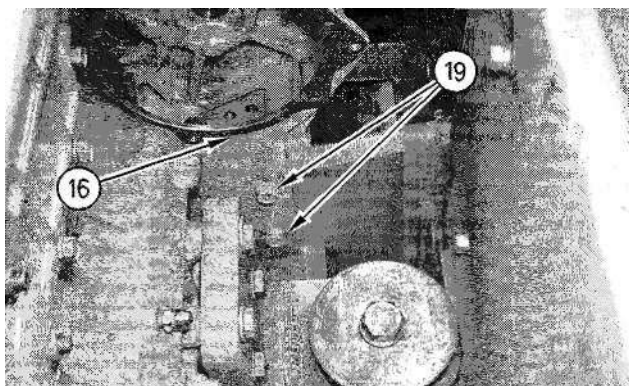
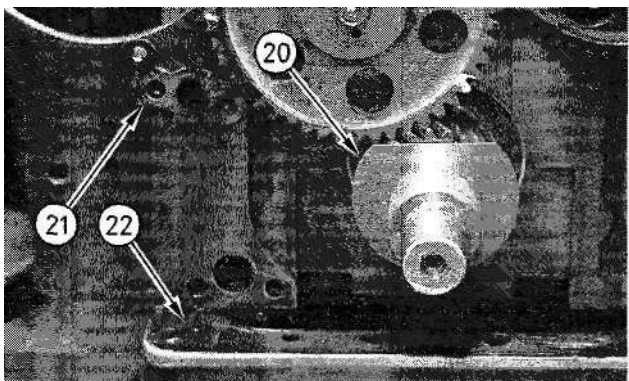


Illustration 323

13. Remove two bolts (19) and the washers that mount the front housing (16) to the front plate and the cylinder block.
14. Use two technicians to remove the front housing from the cylinder block and the front plate. The weight of the front housing is 20 kg (45 lb).



15. Remove gasket (21).

Note: Check the condition of the gasket (22) for the engine oil pan. If the gasket is damaged, it may be necessary to replace the gasket. Refer to Disassembly and Assembly, "Engine Oil Pan - Remove and Install" for replacement of the gasket for the engine oil pan.

16. Replace plate (20) if the plate is worn or damaged.

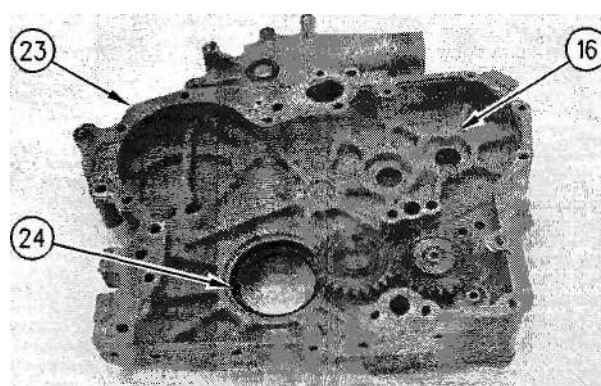


Illustration 325

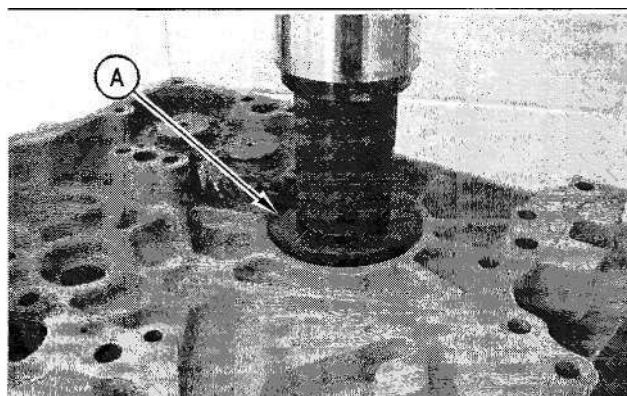


Illustration 326

17. Remove old gasket material (23) from the mating surface of front housing (16) and the timing gear plate.

Note: Replace crankshaft front seal (24).

18. Use Tooling (A) to remove the crankshaft front seal (24) from the front housing (16).
19. Check the teeth of the timing gears for the following items: wear, nicks, chips, and uneven contact. Check the keyway for wear or damage.

Housing (Front) - Install

SMCS Code: 1151-012; 1162-012

Installation Procedure

Table 14

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	1P-0510	Driver Group	1

NOTICE

keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

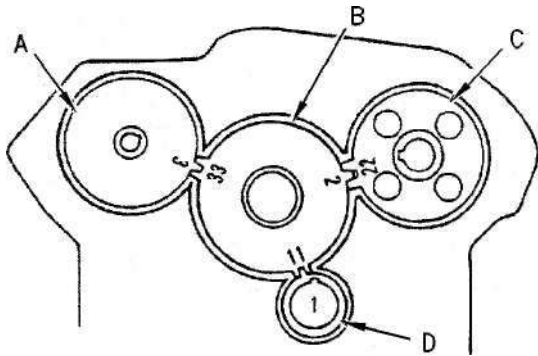


Illustration 327

1. Check the alignment of the timing gears.

Note: When the marks are aligned, the piston in No. 1 cylinder is at the top center position on the compression stroke.

Note: Refer to the Specifications Module, "Gear Group (Front)" for specifications on the assembly of the timing gears.

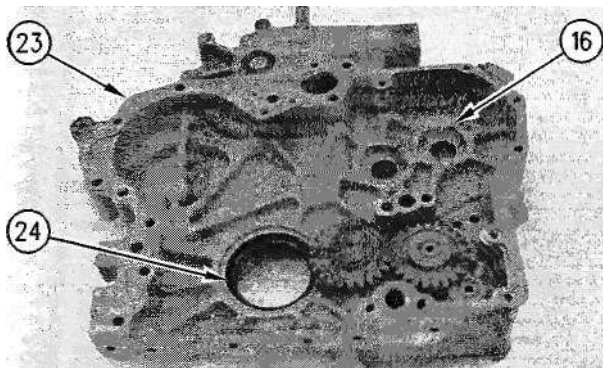


Illustration 328

2. Ensure that the old gasket material (23) is removed from the mating surface of front housing (16) and the timing gear plate. Install a new gasket.
3. If the crankshaft front seal (24) was removed, use Tooling (A) to install a new crankshaft front seal.

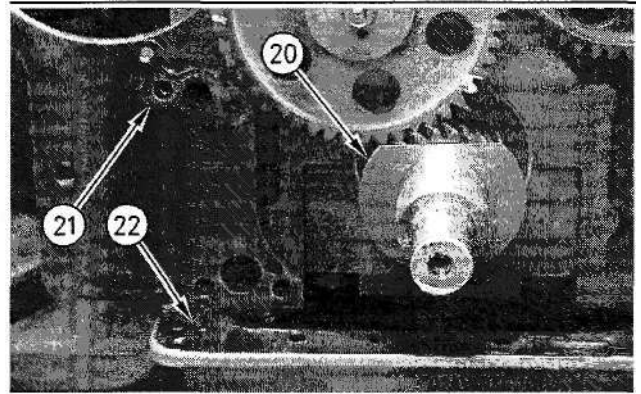


Illustration 329

4. Before installation of the front housing, check the gasket (22) for the oil pan for damage. Replace the gasket, if necessary.

Reference: Refer to Disassembly and Assembly, "Engine Oil Pan - Remove and Install" for replacement of the gasket for the engine oil pan.

5. Install plate (20).
6. Install gasket (21).
7. Install gasket (23) onto the mating surface of front housing (16) and the timing gear plate.
8. Use two technicians to install the front housing onto the front plate and the cylinder block. The weight of the front housing is 20 kg (45 lb).

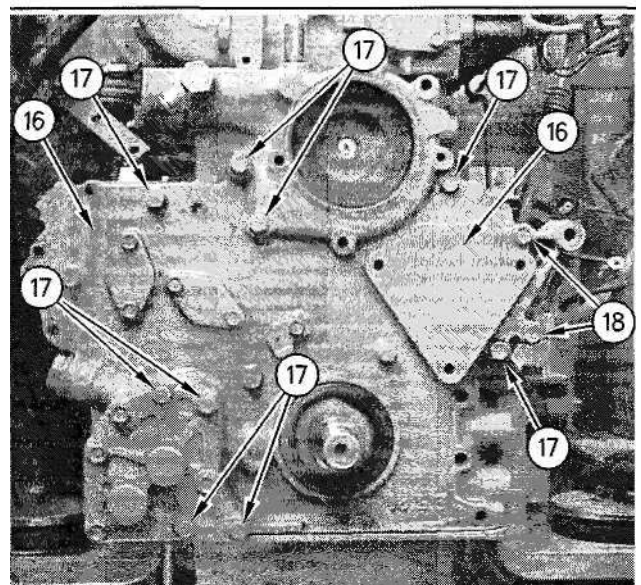


Illustration 330

9. Install nine bolts (17) and the washers that hold front housing (16) to the front plate and the cylinder block.

10. Install one clip, the nuts, the washers, and two bolts (18) to the front housing (16).

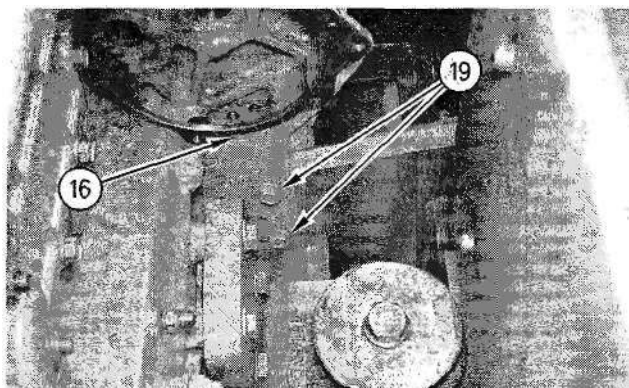


Illustration 331

11. Install two bolts (19) in order to fasten front housing (16) onto the cylinder block and the front plate.

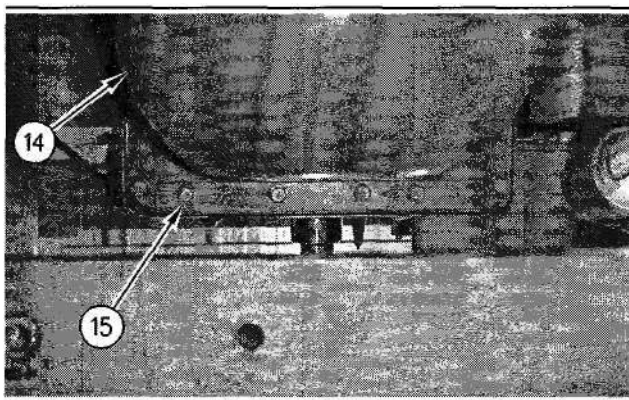


Illustration 332

12. Install the washers and bolts (15) in order to secure front housing (14) onto engine oil pan.

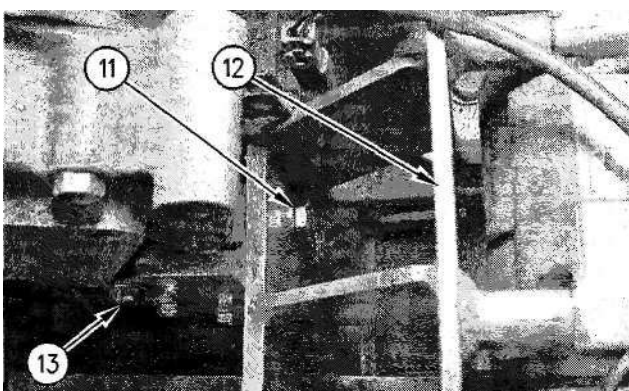


Illustration 333

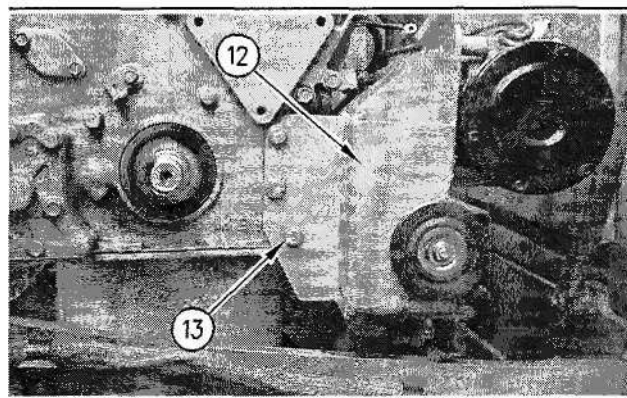


Illustration 334

13. Support the refrigerant compressor and mounting bracket (12).

14. Install the washers and three bolts (13).

15. Install the washers and two bolts (11) that secure mounting bracket (12) for the refrigerant compressor to the engine.

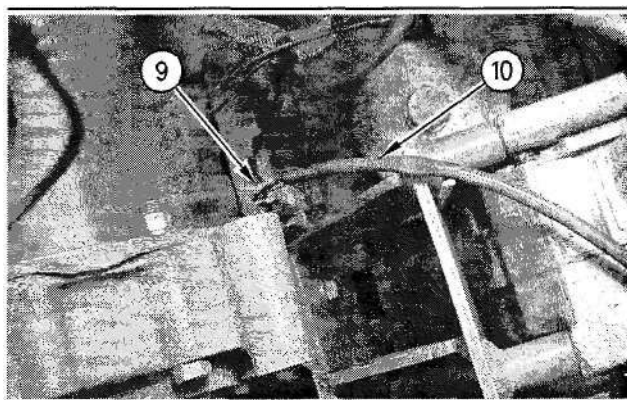


Illustration 335

16. Install wire (10) and the electrical connector to the front housing. Connect electrical connector (9).

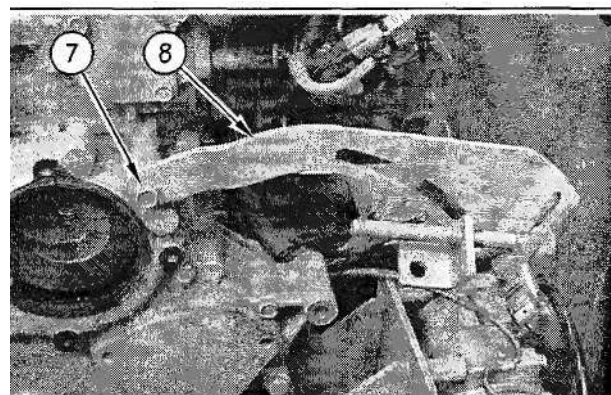


Illustration 336

17. Install alternator mounting bracket (8).
18. Install bolt (7) that secures alternator mounting bracket (8) to the engine.

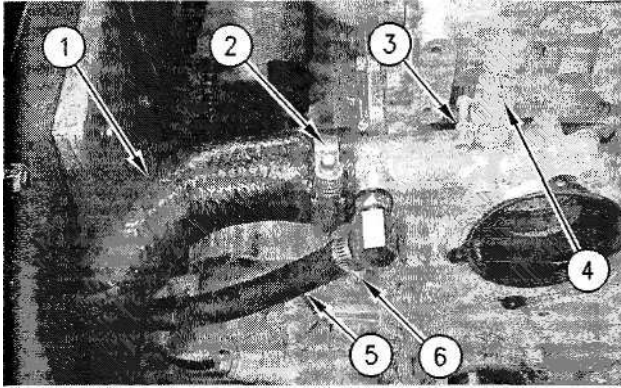


Illustration 337

19. Install heater hose (5) to the front housing and tighten hose clamp (6).
20. Install hose (4) to the front housing. Tighten hose clamp (3).
21. Install radiator hose (1). Tighten hose clamp (2).

End By:

- a. Install the fuel injection pump. Refer to Disassembly and Assembly, "Fuel Injection Pump - Install".
- b. Install the crankshaft pulley. Refer to Disassembly and Assembly, "Crankshaft Pulley - Remove and Install".
- c. Install the water pump. Refer to Disassembly and Assembly, "Water Pump - Install".
- d. Install the alternator. Refer to Disassembly and Assembly, "Alternator - Install".
- e. Install the radiator. Refer to Disassembly and Assembly, "Radiator - Install".

Crankshaft Front Seal - Remove

SMCS Code: 1160-011

Removal Procedure

Table 15

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	1U-7600	Slide Hammer Puller	1

Start By:

- a. Remove the crankshaft pulley. Refer to Disassembly and Assembly, "Crankshaft Pulley - 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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

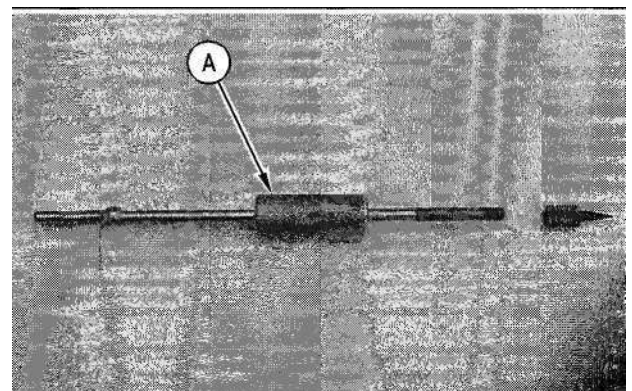


Illustration 338

Photo of Tooling (A)

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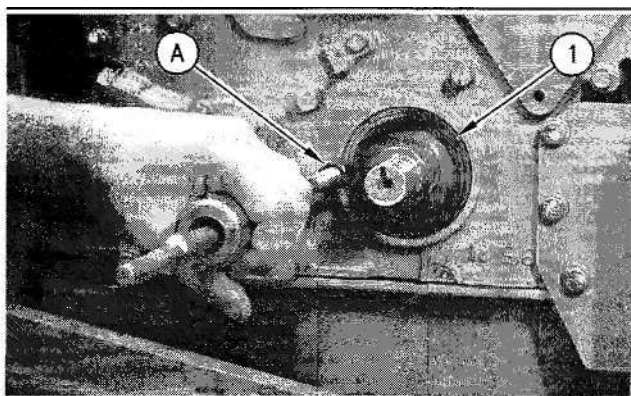


Illustration 339

1. Drill three evenly spaced 3 mm (0.12 inch) holes in crankshaft front seal (1).
2. Use Tooling (A) to remove crankshaft front seal (1). Remove the seal evenly by alternating the position of Tooling (A) from hole to hole.

Note: Do not damage the flange of the crankshaft during the removal process for the crankshaft front seal.

i01342160

Crankshaft Front Seal - Install

SMCSCode: 1160-012

Installation Procedure

Table 16

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	9U-6180	Front Seal Installer ⁽¹⁾	1
	9U-6178	Installer Stud	1
	9U-6179	Washer	1
	9U-6181	Sleeve	1

(1) The front seal installer includes the Installer Stud, the Washer, and the Sleeve.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

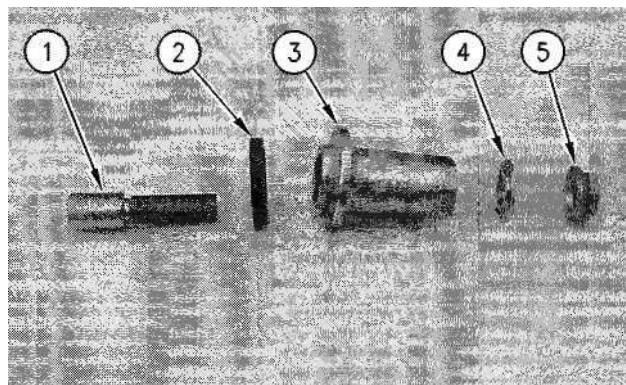


Illustration 340

g0014156

Exploded view of Tooling (A), the front seal, and the nut (5).

1. Clean the faces of all the mating parts. Apply a thin coat of clean engine oil to a new crankshaft front seal.

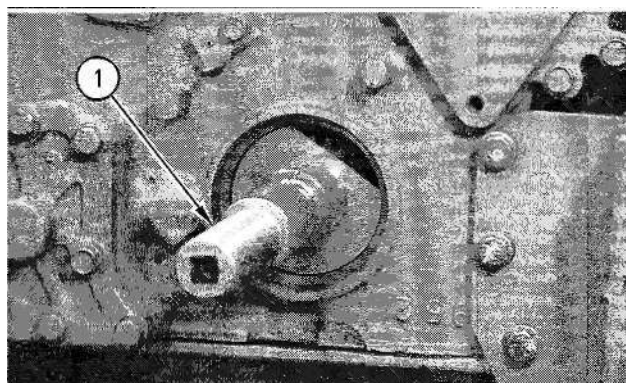


Illustration 341

g00714158

2. Install the installer stud (1) onto the crankshaft.

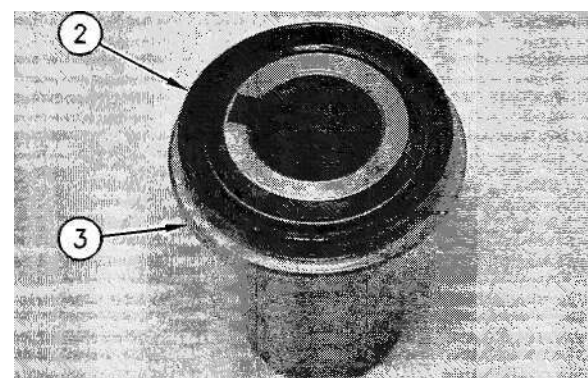


Illustration 342

3. Place front seal (2) on sleeve (3). Make sure that the lip on front seal (2) faces toward the front housing upon installation.

i01342288

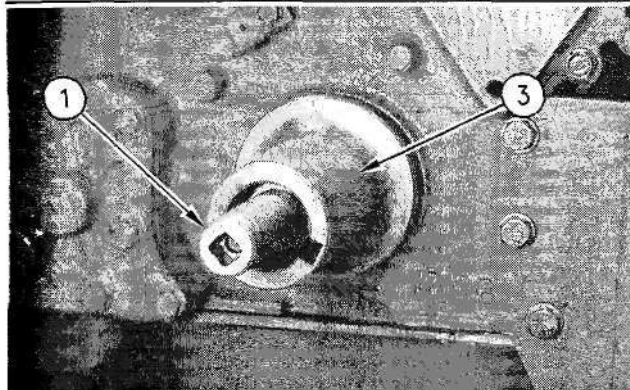


Illustration 343

4. Place the front seal and sleeve (3) over installer stud (1).

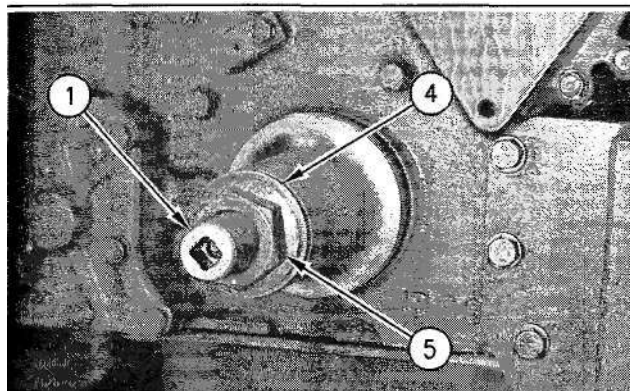


Illustration 344

5. Install washer (4) and nut (5) on the installer stud (1).
6. Tighten nut (5) until sleeve (3) bottoms out.
7. Remove Tooling (A) and check the crankshaft front seal for correct installation.
8. Apply clean engine oil to the face of the crankshaft pulley that will be in contact with the new crankshaft front seal.

End By:

- a. Install the crankshaft pulley. Refer to Disassembly and Assembly, "Crankshaft Pulley - Remove and Install".

Oil Pan - Remove and Install

SMCS Code: 1302-010

Removal Procedure

Note: Before you begin the following procedure, swing the upper frame so that the upper frame is parallel with the undercarriage.

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Drain the oil from the engine into a suitable container for disposal.
2. Remove the dipstick.

Reference: Refer to Disassembly and Assembly, "Engine Oil Level Gauge (Dipstick) - Remove and Install" in this manual.

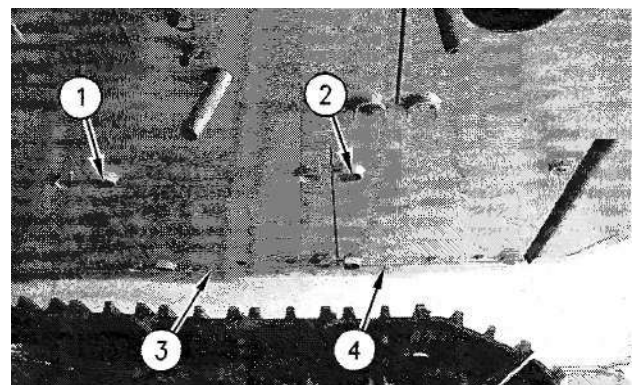


Illustration 345

3. Remove bolts (2) and the washers in order to remove access panel (4) that is located under the main pump.
4. Remove bolts (1) and the washers in order to remove access panel (3) that is located under the main pump.

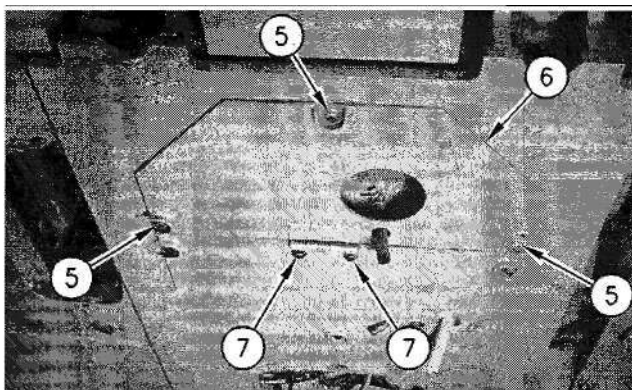


Illustration 346

5. Remove bolts (7) and the washers from the hinge.
6. Remove bolts (5) and the washers in order to remove access panel (6).

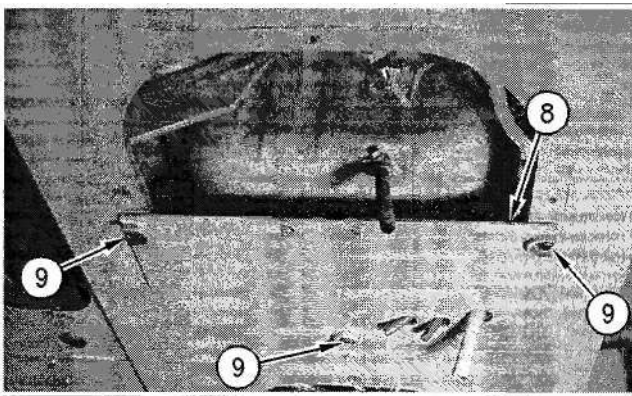


Illustration 347

7. Remove bolts (9) and the washers in order to remove access panel (8).

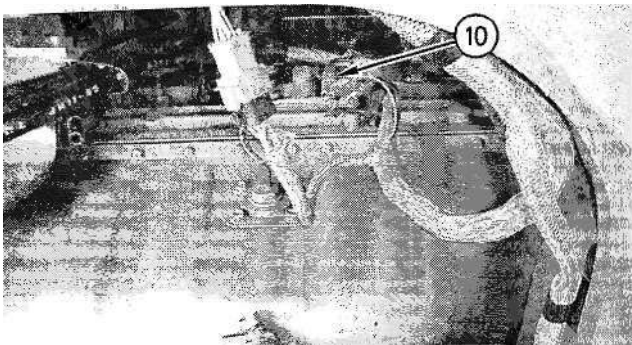
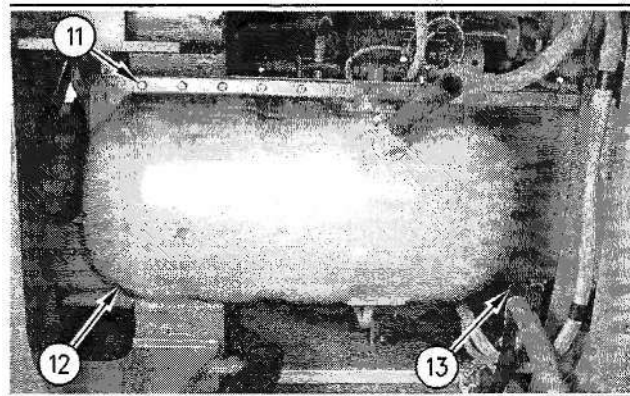


Illustration 348

8. Disconnect electrical connector (10) for the engine oil level switch.



Note: Mark the location of clip (13) for the drain tube.

9. Remove bolts (11) and the washers.
10. Remove oil pan (12).
11. Remove the gasket from the oil pan.

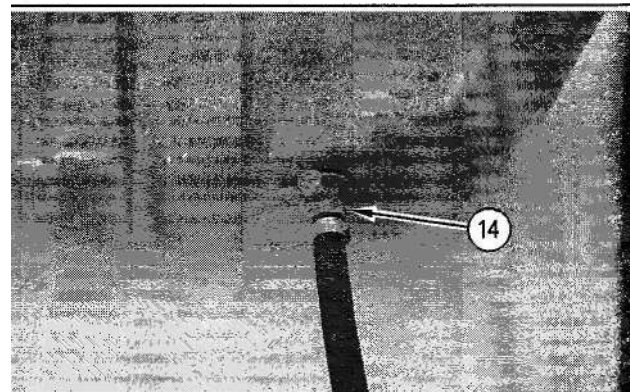


Illustration 350

g00709919

12. Remove drain valve (14) from the oil pan.

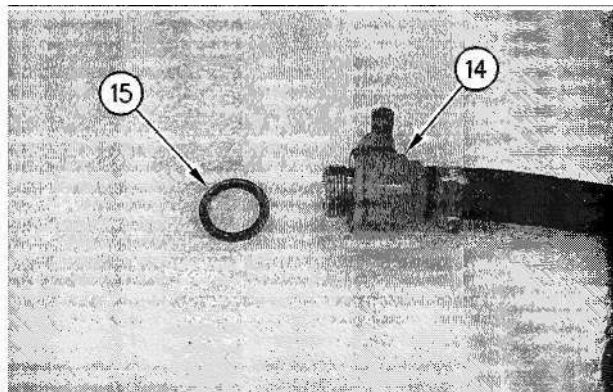


Illustration 351

g00709924

13. Remove seal (15) from the oil pan.

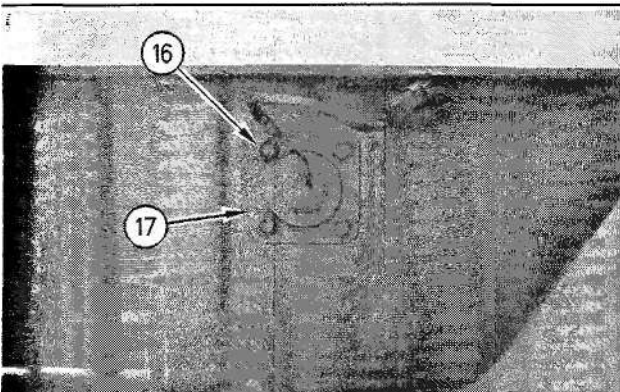


Illustration 352

g00709926

14. Remove bolts (16) in order to remove plate (17).

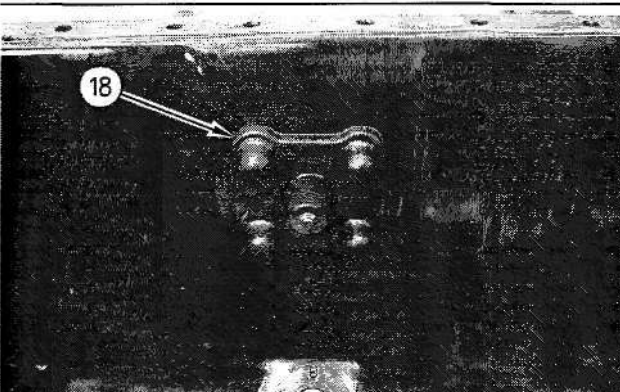


Illustration 353

g00709931

15. Remove plate (18) and the oil level switch.

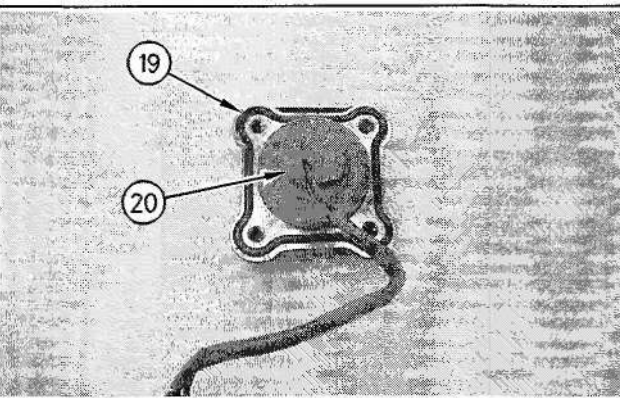


Illustration 354

16. Remove seal (19) from the plate.

17. Remove oil level switch (20) from the plate

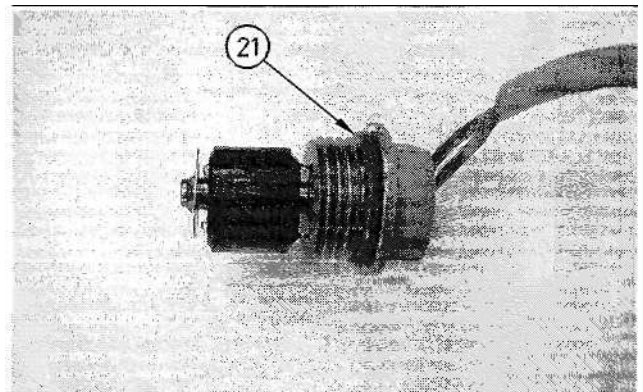


Illustration 355

g00709936

18. Remove O-ring seal (21) from the oil level switch.

Installation Procedure

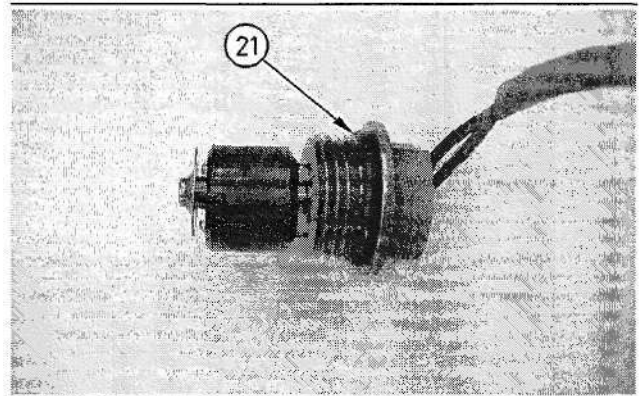


Illustration 356

1. Install new O-ring seal (21) on the oil level switch.

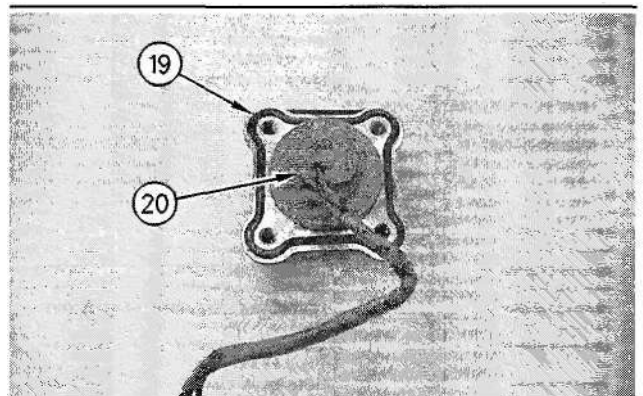


Illustration 357

g00709932

2. Install oil level switch (20) in the plate.

3. Install seal (19) on the plate.

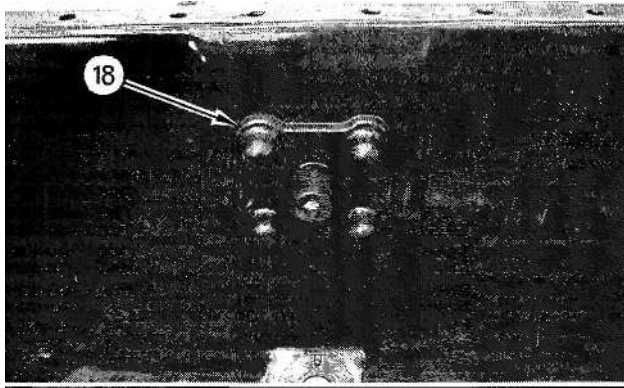


Illustration 358

4. Install plate (18) and the oil level switch in the oil pan.

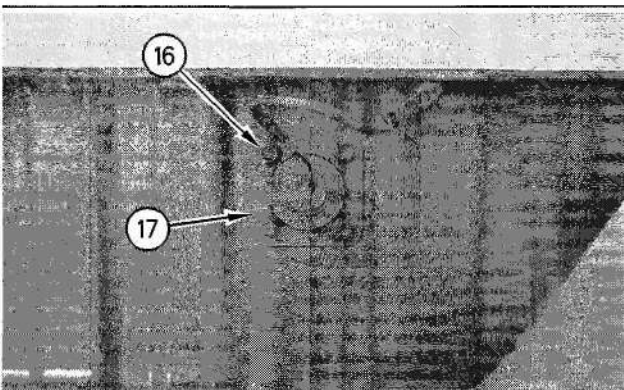


Illustration 359

900709926

5. Install plate (17). Install bolts (16).

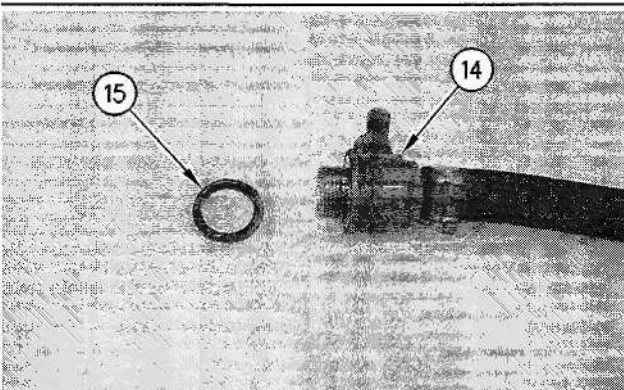


Illustration 360

6. Install seal (15) on drain valve (14).

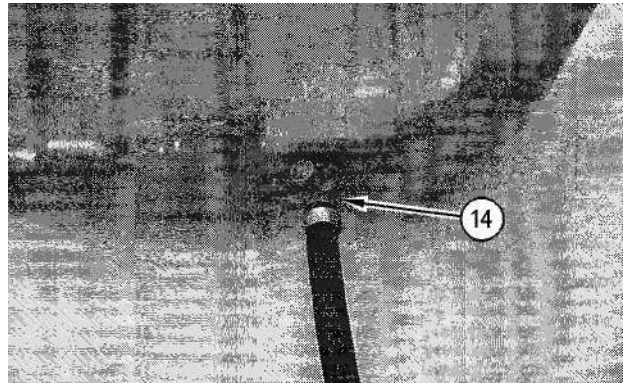


Illustration 361

7. Install drain valve (14) in the oil pan.
8. Thoroughly clean the mating surfaces of the oil pan and the engine block.
9. Install the gasket on the oil pan.

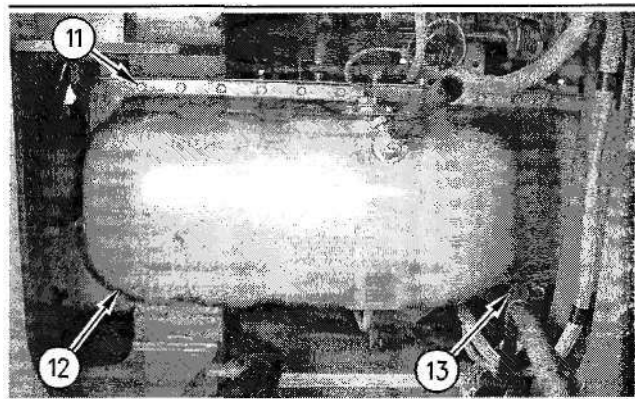


Illustration 362

Note: Make sure that clip (13) for the drain tube is installed in the correct location.

10. Install oil pan (12).
11. Install the washers and bolts (11).

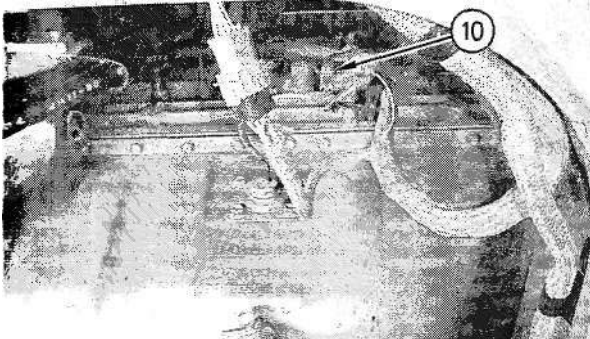


Illustration 363

12. Connect electrical connector (10) for the engine oil level switch.

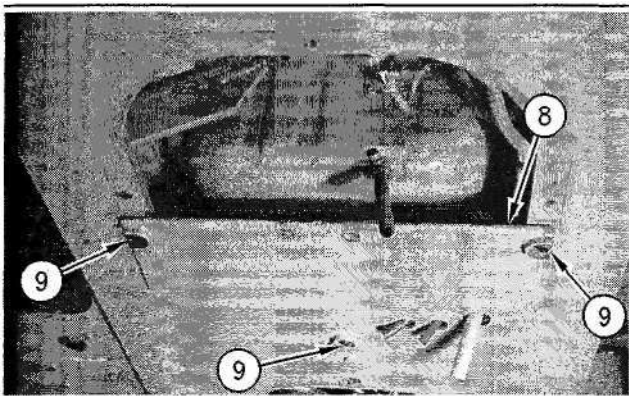


Illustration 364

13. Install access panel (8). Install the washers and bolts (9).

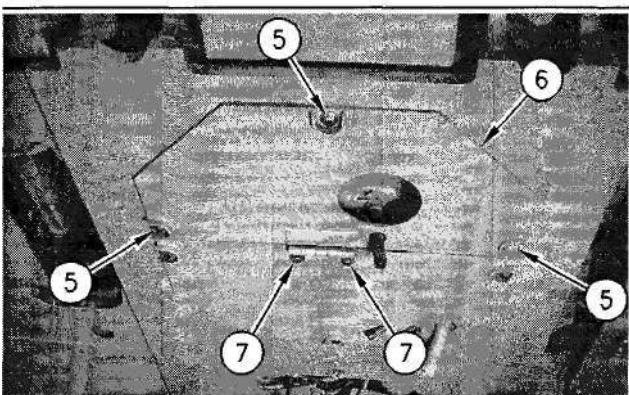


Illustration 365

14. Install access panel (6). Install the washers and bolts (5).
15. Install the washers and bolts (7) to the hinge.

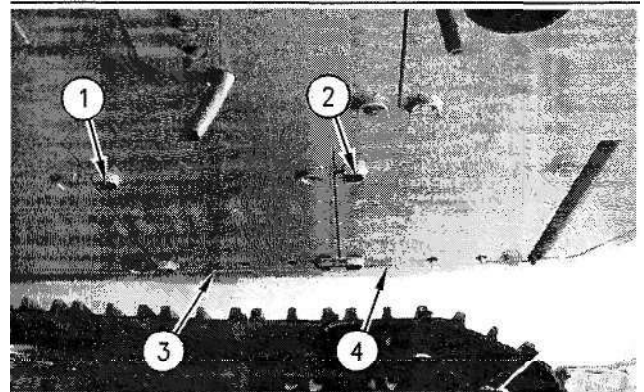


Illustration 366

16. Install access panel (3) that is located under the main pump. Install the washers and bolts (1).
17. Install access panel (4) that is located under the main pump. Install the washers and bolts (2).
18. Install the dipstick.

Reference: Refer to Disassembly and Assembly, "Engine Oil Level Gauge (Dipstick) - Remove and Install" in this manual.

19. Fill the engine with oil to the correct level.

Reference: Refer to Operation and Maintenance Manual for the correct procedure.

Reference: Refer to Operation and Maintenance Manual for the refill capacities.

i01342150

Refrigerant Compressor - Remove and Install

SMCSCode: 1802-010

Removal Procedure

Start By:

- a. Remove the hood. Refer to Disassembly and Assembly, "Hood - Remove and Install" in this manual.
- b. Remove the V-belt from the refrigerant compressor. Refer to Disassembly and Assembly, "V-Belts - Remove and Install" in this manual.

WARNING

Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if the gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, release it slowly in a well ventilated area.

Personal injury or death can result from inhaling refrigerant through a lit cigarette.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

NOTICE

Effective July 1, 1992 regulations prohibit the venting of any refrigerant into the atmosphere. Refer to Caterpillar publications Service Manuals, SENR3334, SENR5664, and NEDG5065 for the proper procedure, the proper equipment, and the proper tools needed in order to reclaim refrigerant from any Caterpillar equipment.

Note: Reclaim the refrigerant before any lines are loosened or before any bolts are loosened.

1. Reclaim the refrigerant in the air conditioning system.

Reference: Refer to Testing and Adjusting, "Refrigerant Recovery" for the correct procedure.

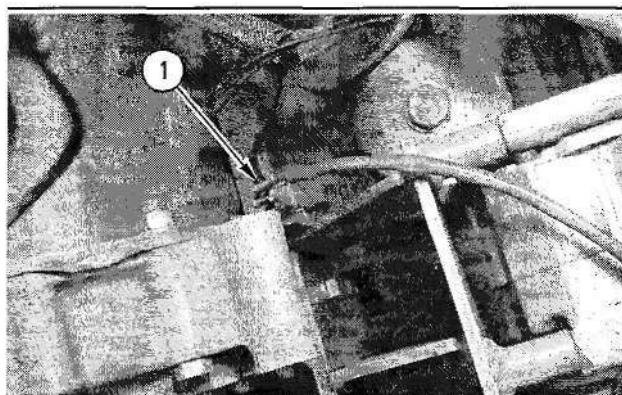


Illustration 367

900722281

The alternator is removed for photographic purposes.

2. Disconnect the electrical wiring connection (1).

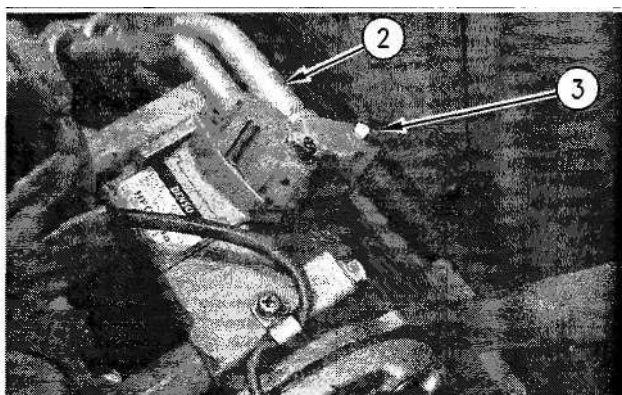


Illustration 368

3. Remove two bolts (3) and the washers.
4. Disconnect two tube assemblies (2). Put tape over the ends of the tube assemblies. Put tape over the holes in the refrigerant compressor. Tape will help to prevent contaminating the refrigerant system.

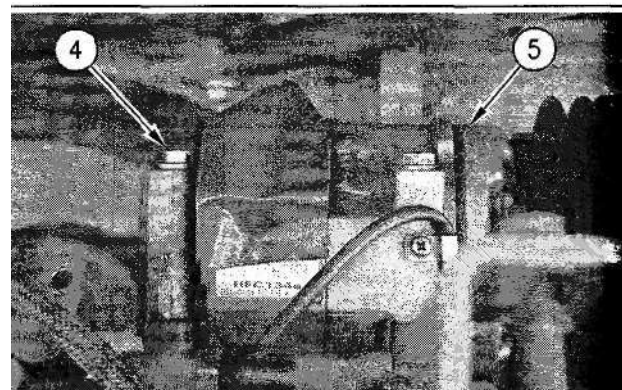


Illustration 369

5. Remove four bolts (4) and the washers. Remove refrigerant compressor (5).

Installation Procedure

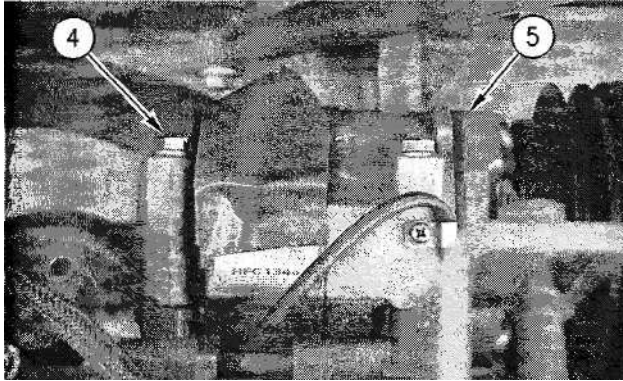


Illustration 370

1. Place refrigerant compressor (5) in position. Install the washers and four bolts (4).

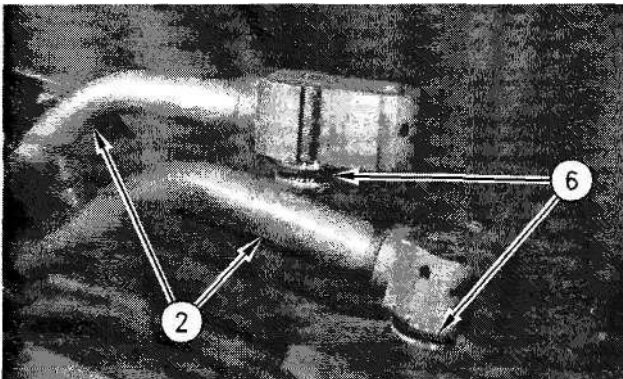


Illustration 371

Note: O-rings, gaskets, and seals should always be replaced. A used O-ring may not have the same sealing properties as a new O-ring. Use **1U-6396** O-Ring Assembly Compound during the assembly procedure.

2. Remove the tape from tube assemblies (2). Replace O-ring seals (6) with new O-ring seals.

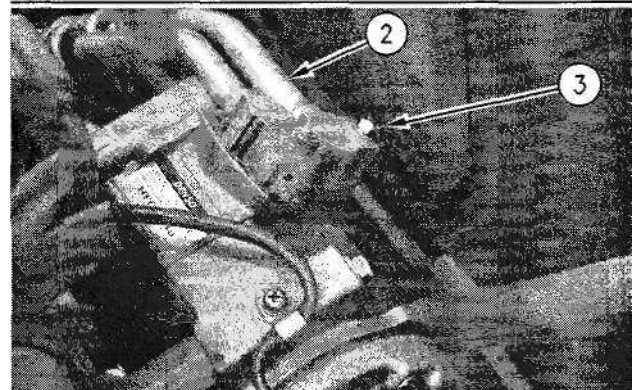


Illustration 372

3. Remove the tape from the refrigerant compressor. Connect tube assemblies (2). Install the washers and bolts (3). Tighten the bolts to a torque of 10 ± 2 N-m (88.5 ± 17.7 lb in).

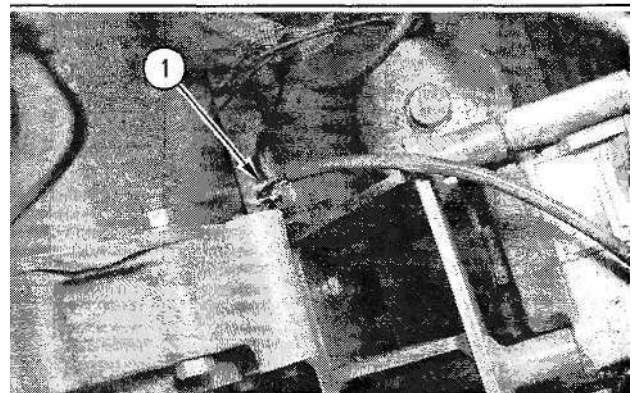


Illustration 373

The alternator is removed for photographic purposes.

4. Connect the electrical wiring connection (1).

WARNING

Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if the gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, release it slowly in a well ventilated area.

Personal injury or death can result from inhaling refrigerant through a lit cigarette.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

5. Evacuate the air conditioning system.

Reference: Refer to Testing and Adjusting, "Refrigerant System - Evacuate" for the correct procedure.

6. Charge the air conditioning system. The correct charge is 1.1 kg (2.4 lb).

Reference: Refer to Testing and Adjusting, "Refrigerant System - Charge" for the correct procedure.

7. Check the air conditioning system for leaks.

Note: Use a 4C-2964 Refrigerant Leak Detector to check the system.

End By:

- a. Install the V-belt on the refrigerant compressor. Refer to Disassembly and Assembly, "V-Belts - Remove and Install" in this manual.
- b. Install the hood on the refrigerant compressor. Refer to Disassembly and Assembly, "Hood - Remove and Install" in this manual.

Refrigerant Condenser Remove and Install

SMCSCode: 1805-010

S/N: ANB1-Up

S/N: BDB1-Up

S/N: BGB1-Up

S/N: AMC1-Up

S/N: BBC1-Up

S/N: BDC1-Up

S/N: CCD1-Up

S/N: BEF1-Up

S/N: BKK1-Up

S/N: CLM1-Up

S/N: BER1-Up

S/N: BPR1-Up

S/N: BRX1-Up

S/N: CLZ1-Up

Removal Procedure

WARNING

Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if the gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, release it slowly in a well ventilated area.

Personal injury or death can result from inhaling refrigerant through a lit cigarette.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

NOTICE

Effective July 1, 1992 regulations prohibit the venting of any refrigerant into the atmosphere. Refer to Caterpillar publications Service Manuals, SENR3334, SENR5664, and NEDG5065 for the proper procedure, the proper equipment, and the proper tools needed in order to reclaim refrigerant from any Caterpillar equipment.

Note: Reclaim the refrigerant before any lines are loosened or any bolts are loosened.

1. Reclaim the refrigerant in the air conditioning system.

Reference: Refer to Testing and Adjusting, "Refrigerant Recovery" for the correct procedure.



Illustration 374

2. Open the side door (1).

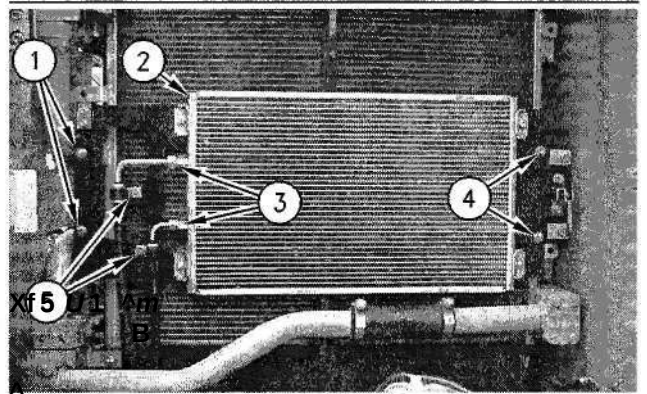


Illustration 375

3. Disconnect two hose assemblies (3) from refrigerant condenser (2).
4. Remove two bolts (5) and the clamps from the mounting bracket.
5. Remove two bolts (1), two washers, and two nuts from the mounting bracket.
6. Remove two bolts (4) and washers from refrigerant condenser (2).

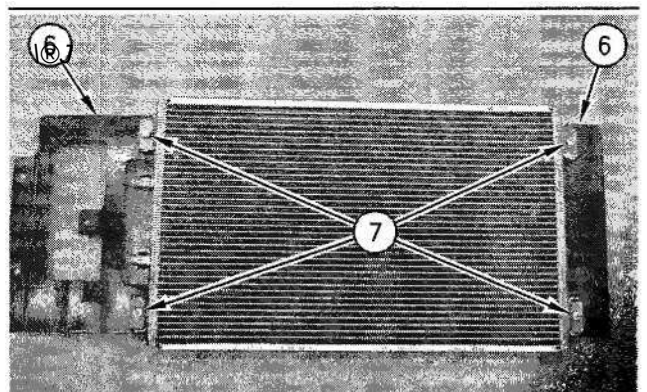


Illustration 376

7. Remove four bolts (7) and washers from the two mounting brackets (6).

Installation Procedure

WARNING

Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if the gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, release it slowly in a well ventilated area.

Personal injury or death can result from inhaling refrigerant through a lit cigarette.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

NOTICE

Effective July 1, 1992 regulations prohibit the venting of any refrigerant into the atmosphere. Refer to Caterpillar publications Service Manuals, SENR3334, SENR5664, and NEDG5065 for the proper procedure, the proper equipment, and the proper tools needed in order to reclaim refrigerant from any Caterpillar equipment.

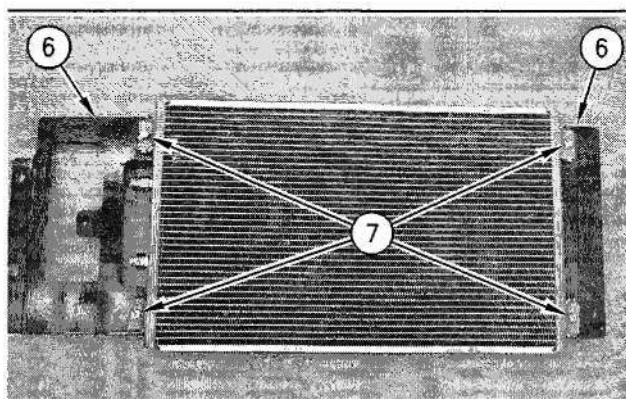


Illustration 377

1. Position two mounting brackets (6) onto the condenser. Install the washers and four bolts (7).

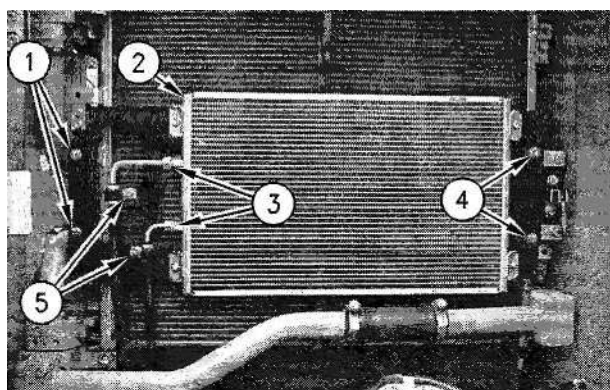


Illustration 378

2. Install washers and two bolts (4) to the refrigerant condenser (2).
3. Install two nuts, two washers, and two bolts (1) to the mounting bracket.
4. Connect two hose assemblies (3) to refrigerant condenser (2).
5. Install the clamps and two bolts (5) that hold hose assemblies (3) to the mounting bracket.

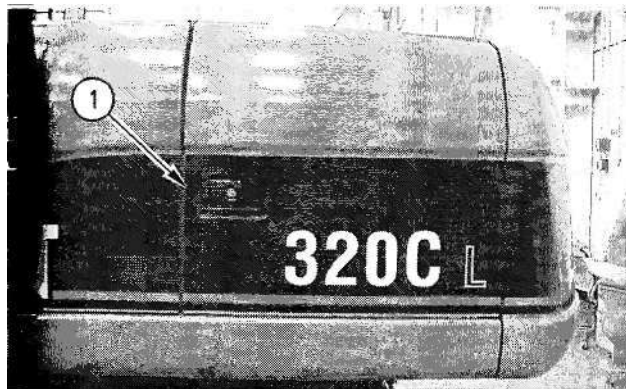


Illustration 379

6. Close the side door (1).

WARNING

Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if the gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, release it slowly in a well ventilated area.

Personal injury or death can result from inhaling refrigerant through a lit cigarette.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

7. Evacuate the air conditioning system.

Reference: Evacuate the system. Refer to Testing and Adjusting, "Refrigerant System - Evacuate" for the correct procedure.

8. Charge the air conditioning system. The correct charge is 1.1 kg (2.42 lb).

Reference: Refer to Testing and Adjusting, "Refrigerant System - Charge" for the correct procedure.

9. Check the entire air conditioning system for leaks.

Note: Use a 4C-2964 Electronic Leak Detector to check for leaks.

Hood - Remove and Install

SMCSCode: 7251-010

Removal Procedure

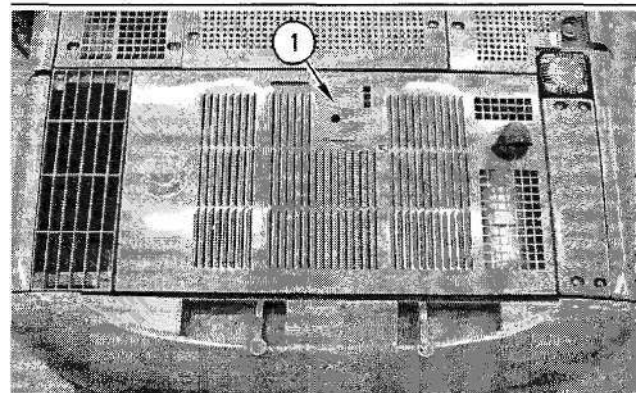


Illustration 380

1. Open hood (1).

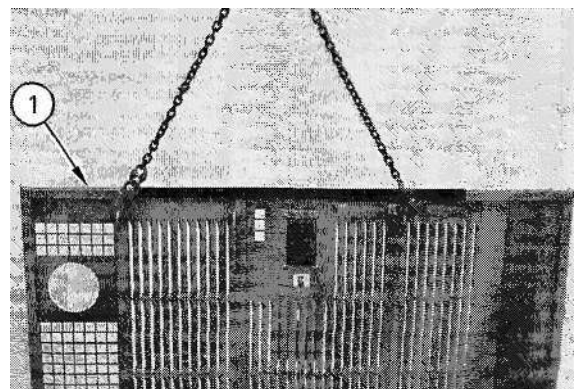


Illustration 381

2. Fasten a suitable lifting device to hood (1).

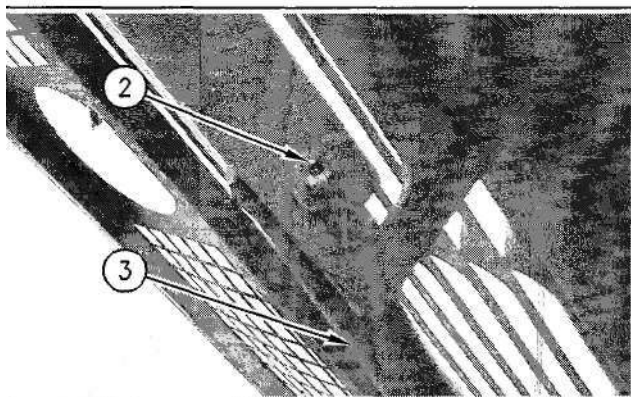


Illustration 382

3. Remove cotter pin (2) and the washer that holds support (3) in place.
4. Position support (3) out of the way and reinstall the washer and cotter pin (2).

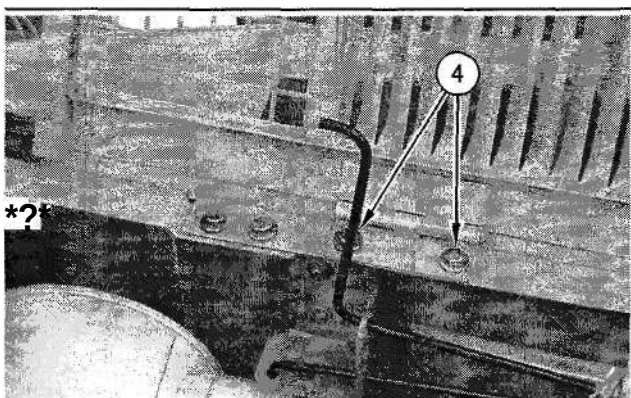


Illustration 383

5. Remove two bolts (4) and the washers from the left side hinge.

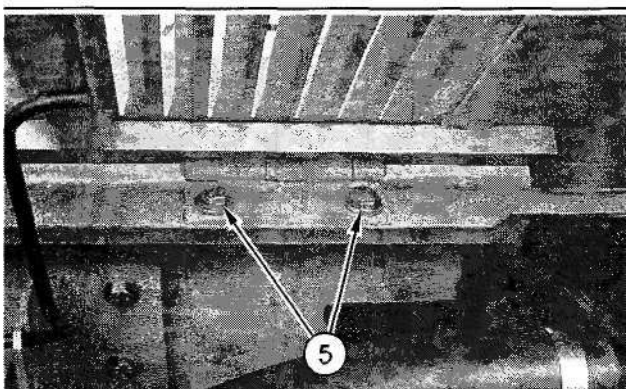


Illustration 384

6. Remove two bolts (5) and the washers from the right side hinge.

7. Carefully remove hood (1) from the machine. The weight of the hood is 34 kg (75 lb).

Installation Procedure

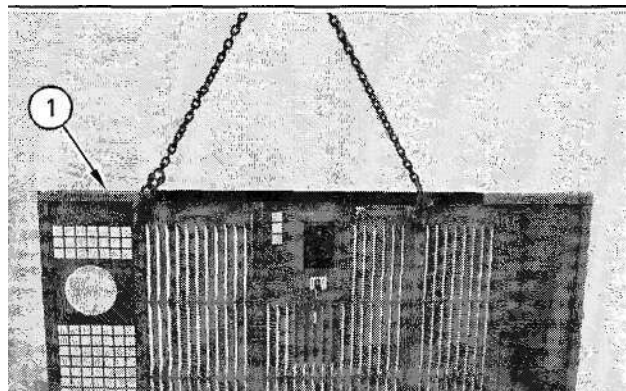


Illustration 385

g00709389

1. Fasten a suitable lifting device to hood (1).
2. Carefully install hood (1) to the machine. The weight of the hood is 34 kg (75 lb).

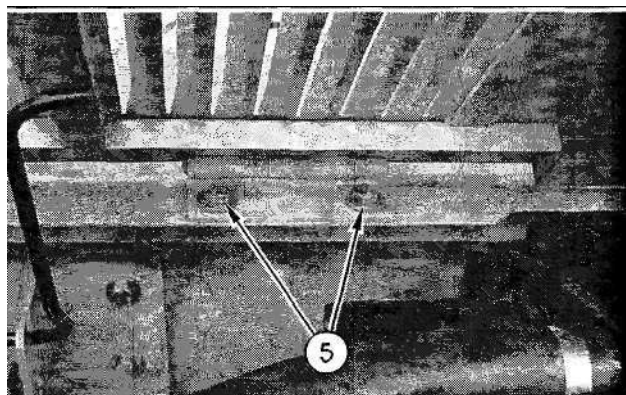


Illustration 386

3. Install the washers and two bolts (5) to the right side hinge.

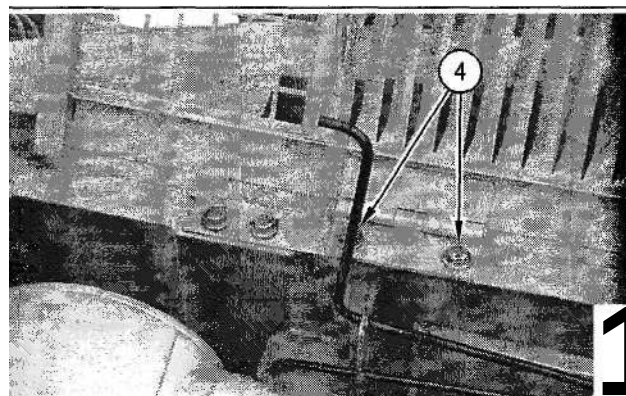


Illustration 387

1

Install the washers and two bolts (4) to the left side hinge.

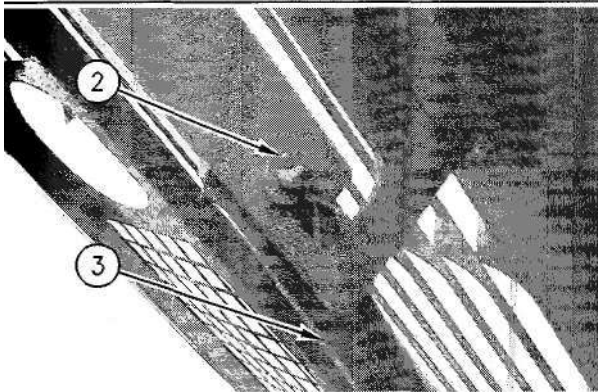


Illustration 388

5. Install support (3) to the hood.
6. Install the washer and cotter pin (2) that holds support (3) in place.

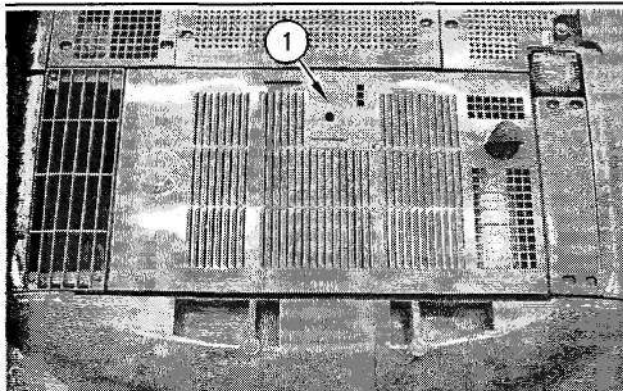


Illustration 389

7. Close hood (1).

Engine and Main Hydraulic Pump - Remove

SMCS Code: 1024-011

Removal Procedure

Start By:

- a. Remove the engine hood. Refer to Disassembly and Assembly, "Hood - Remove" in the service manual.
- b. Remove the fan. Refer to Disassembly and Assembly, "Fan - Remove" in the service manual.

- c. Deactivate the electrical system. Refer to Operation and Maintenance Manual, "Battery Disconnect Switch" in order to deactivate the electrical system.

Table 17

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	FT-2674	Vacuum Cap	1
(B)	6V-3145	Load Leveling Beam	1
(C)	138-7573	Link Bracket	1
	8S-9906	Ratchet Puller	1
		1/2 inch shackle	1

NOTICE

Keep all parts clean from contaminants.

Contamination of the hydraulic system with foreign material will reduce the service life of the hydraulic system components.

To prevent contaminants from entering the hydraulic system, always plug or cap the lines, fittings, or hoses as they are disconnected. Cover any disassembled components and clean them properly before assembly.

Clean the hydraulic system properly after any major component exchange or especially after a component failure, to remove any contamination.

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

WARNING

At operating temperature, the hydraulic oil is hot and under pressure. Hot oils can cause burns.

To prevent possible personal injury, release the pressure in the implement hydraulic circuit (boom, stick, bucket, and swing), travel circuits, and the hydraulic oil tank at the filler cap before any hydraulic lines or components are disconnected or removed.

Remove the filler cap only when the engine is stopped and the filler cap is cool enough to touch.

Note: The following procedure has an attachment valve that is mounted next to the main pump. The exact amount of hoses will vary depending on your machine configuration. Remove only the hoses that are necessary to remove the main hydraulic pump.

Note: A hydraulic oil sample should be obtained before any maintenance is performed in order to establish the system contaminant level. Refer to Fluid Analysis Laboratory Guide, SEBF3116, "Obtaining an Oil Sample for S.O.S Analysis". Refer to Operation and Maintenance Manual, "Sampling Interval and Location of Sampling Valve" for the correct location.

1. Release the hydraulic system pressure.

Reference: Refer to Disassembly and Assembly, "Hydraulic System Pressure - Release" in this manual.

WARNING

Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if the gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, release it slowly in a well ventilated area.

Personal injury or death can result from inhaling refrigerant through a lit cigarette.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

NOTICE

Effective July 1, 1992 regulations prohibit the venting of any refrigerant into the atmosphere. Refer to Caterpillar publications Service Manuals, SENR3334, SENR5664, and NEDG5065 for the proper procedure, the proper equipment, and the proper tools needed in order to reclaim refrigerant from any Caterpillar equipment.

Note: Reclaim the refrigerant before any lines are loosened or before any bolts are loosened.

2. Reclaim the refrigerant in the air conditioning system.

Reference: Refer to Testing and Adjusting, "Refrigerant Recovery" for the correct procedure.

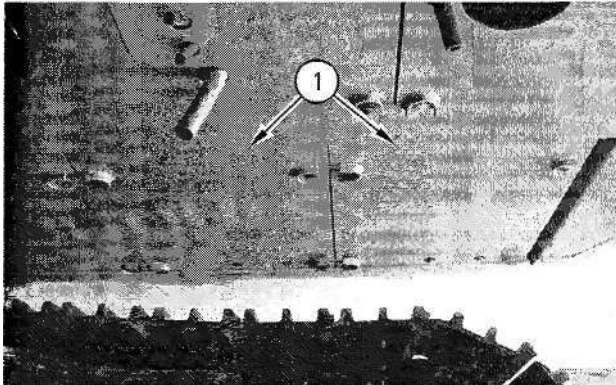


Illustration 390

3. Remove eight bolts and the washers in order to remove two access covers (1) that are under the main hydraulic pump.
4. Drain the oil from the hydraulic oil tank into a suitable container for storage or disposal. The capacity of the hydraulic oil tank is 120 L (32 US gal).

Reference: Refer to Operation and Maintenance, "Hydraulic System Oil - Change" in the service manual.



Illustration 391

5. Open access door (2) on the right side of the machine.

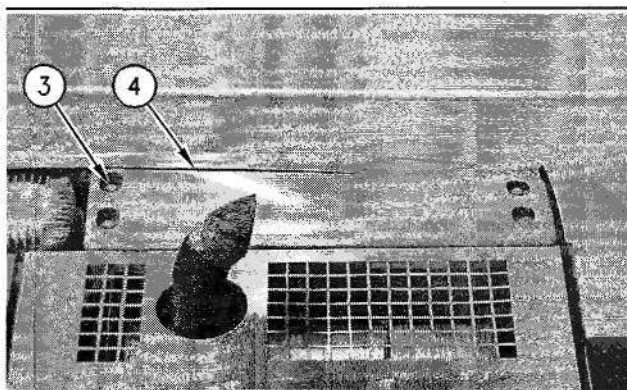


Illustration 392

6. Remove four bolts (3) and the washers.
7. Remove cover (4).

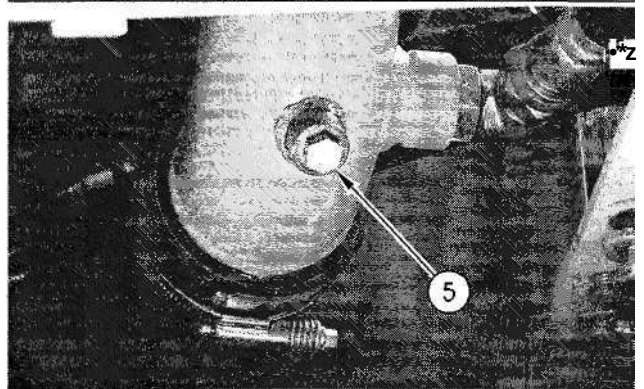


Illustration 393

8. Place a suitable container for storage or disposal under the main pump suction line.
9. Remove plug (5) from the main pump suction line.
10. Drain the oil from the main pump suction line.

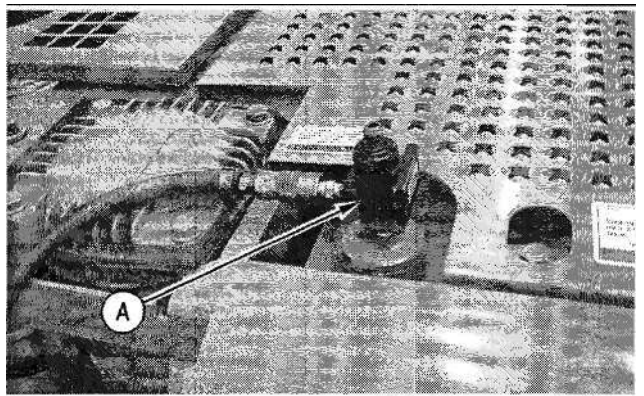


Illustration 394

g00690963

11. Remove the cap from the hydraulic tank. Attach Tooling (A) to the hydraulic tank.

Note: Hook up the air to Tooling (A) in order to create a vacuum in the hydraulic system. This will minimize the leakage from the tubes and the lines.

Note: A small amount of oil will drain from all of the hose assemblies and tube assemblies when the hose assemblies and tube assemblies are disconnected from the main pump. Place a suitable container under the main pump in order to contain the oil.

12. Put identification marks on all of the hose assemblies and on all of the tube assemblies that are connected to the main hydraulic pump for installation purposes.

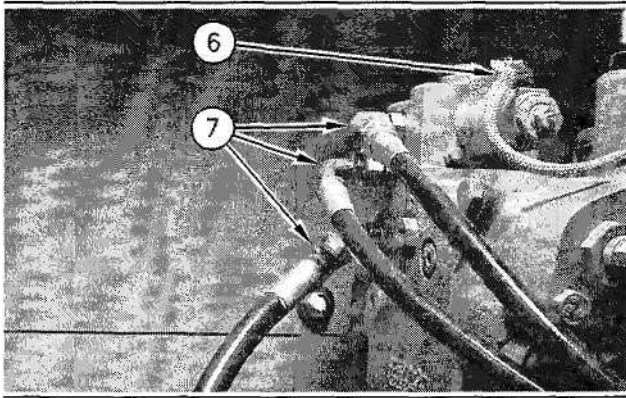


Illustration 395

Left side view of the main pump

13. Disconnect electrical connector (6).

14. Disconnect three hose assemblies (7) from the main pump.

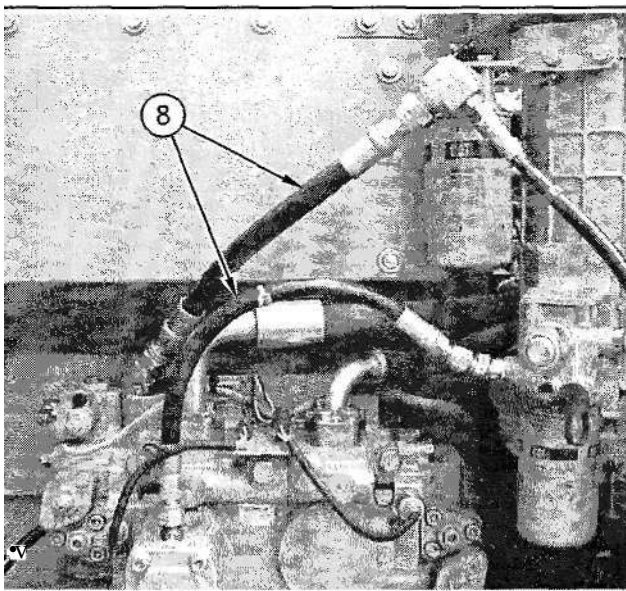


Illustration 396

15. Remove two hose assemblies (8) from the main pump and the hydraulic filters.

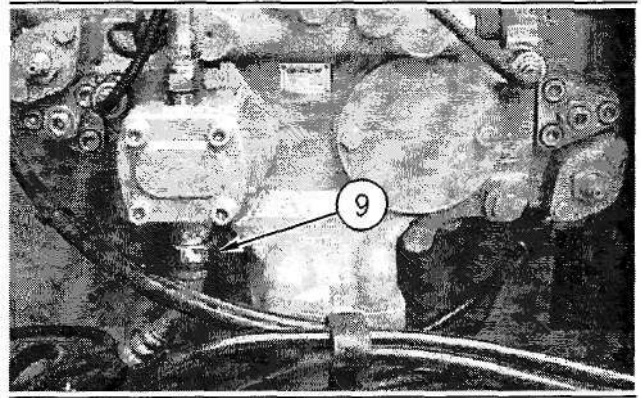


Illustration 397

16. Disconnect two hose assemblies (9) from the pilot pump.

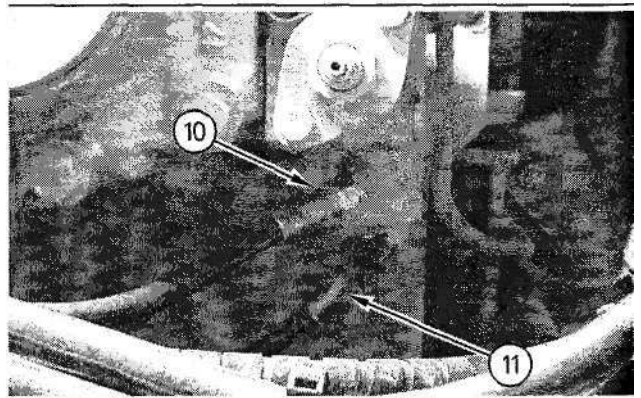


Illustration 398

17. Remove hose assembly (10).

18. Disconnect hose assembly (11) from the main pump.

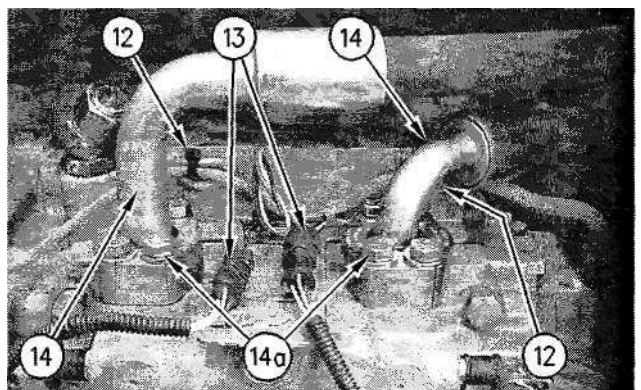


Illustration 399

19. Remove two wire ties (12).

20. Disconnect two electrical connections (13)

21. Remove the bolts (14a), the washers and the split flanges.

22. Disconnect two hose assemblies (14) from the main pump.

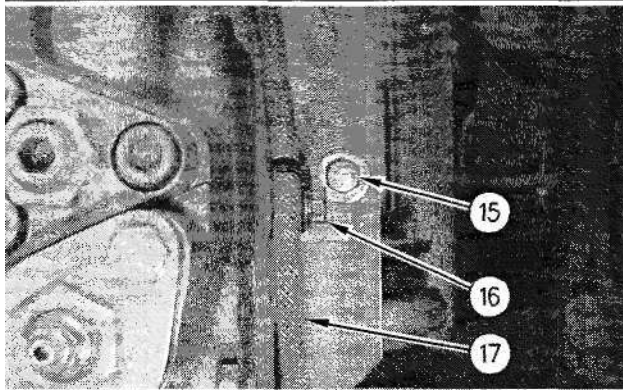


Illustration 400

Right side view of the main pump

23. Remove bolt (16) and the clip.

24. Remove wiring harness (17) from the main pump.

25. Loosen, but do not remove bolt (15).

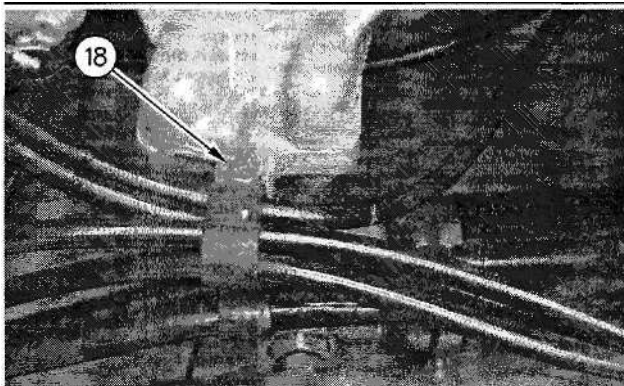


Illustration 401

26. Remove bolt (18), the washer, and the nut in order to remove the clamp from the main pump.

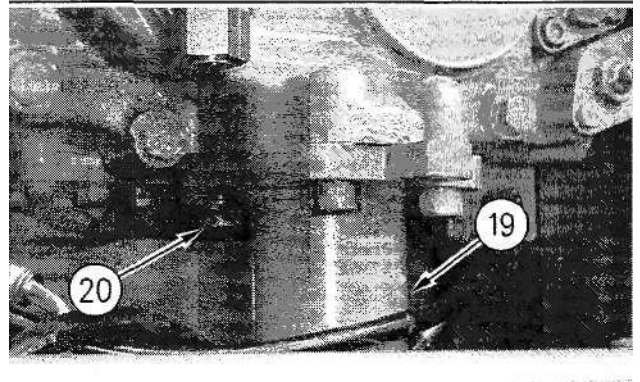


Illustration 402

27. Remove four bolts (20) that hold suction line (19) in position.

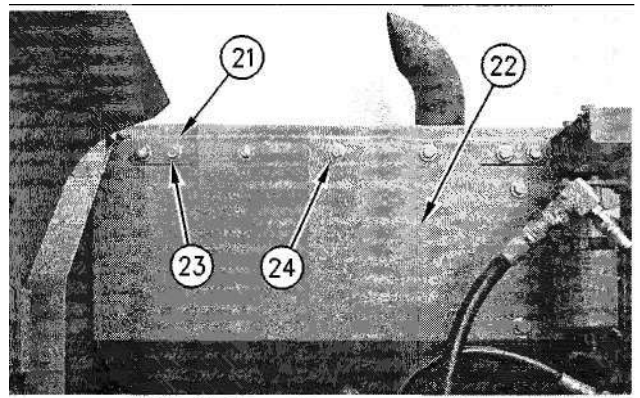


Illustration 403

Top shield

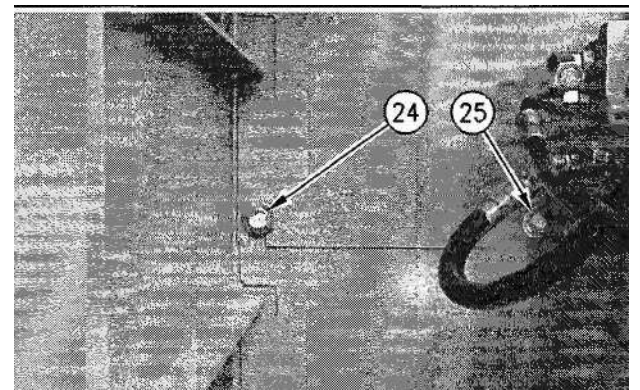


Illustration 404

g00719074

The bottom shield and the top shield bolted together.

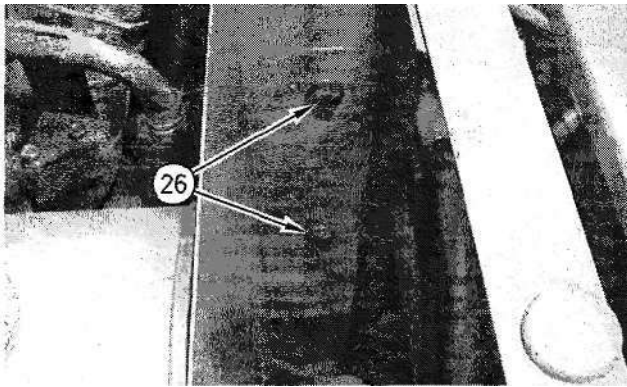


Illustration 405

View behind shield (22)

28. Remove six bolts (24) and the washers from the top shield and the bottom shield.
29. Remove four bolts (23) and the washers from support (21).
30. Remove support (21).
31. Loosen but do not remove bolt (25).
32. Remove two bolts (26).
33. Remove the muffler.

Reference: Refer to Disassembly and Assembly, "Muffler - Remove" in the service manual.

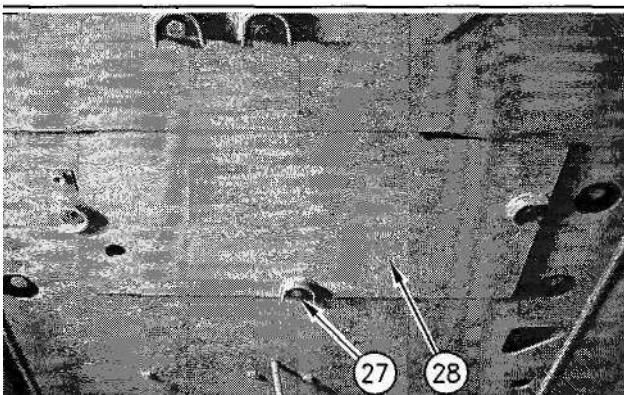


Illustration 406

900721971

34. Remove three bolts (27) and the washers.
35. Remove access panel (28).

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

WARNING

At operating temperature, the engine coolant is hot and under pressure.

Steam can cause personal injury.

Check the coolant level only after the engine has been stopped and the filler cap is cool enough to touch with the bare hand.

Remove the filler cap slowly to relieve pressure.

Cooling system conditioner contains alkali. Avoid contact with skin and eyes to prevent personal injury.

36. Allow the coolant to cool down before you drain the radiator. Open the drain valve and allow the coolant to drain from the cooling system into a suitable container for storage or disposal.

37. The drain valve is located on the bottom of the radiator. The capacity of the cooling system is 30 L (7.9 US gal).

38. Close the drain valve after the coolant has been drained.

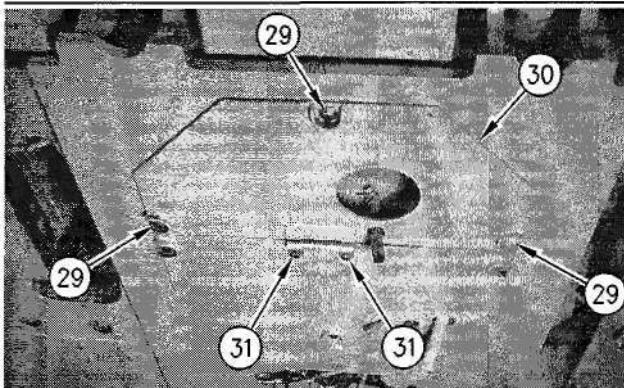


Illustration 407

- 39. Remove bolts (31) and the washers from the hinge.
- 40. Remove bolts (29) and the washers in order to remove access panel (30).

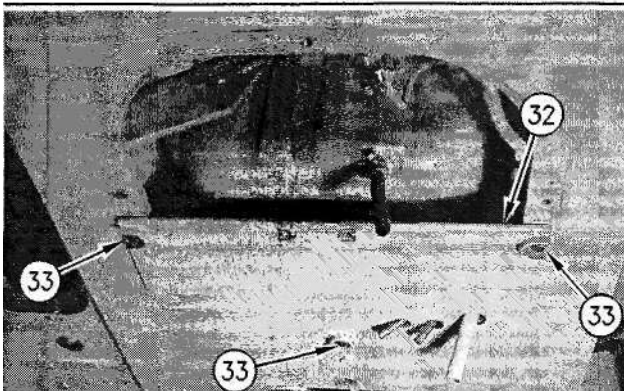


Illustration 408

- 41. Remove bolts (33) and the washers in order to remove access panel (32).

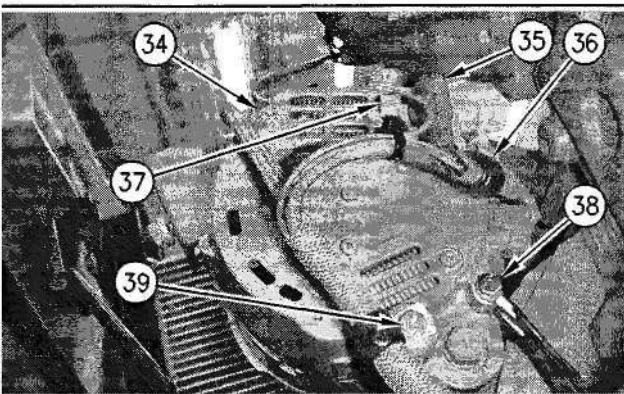


Illustration 409
Rear view of alternator

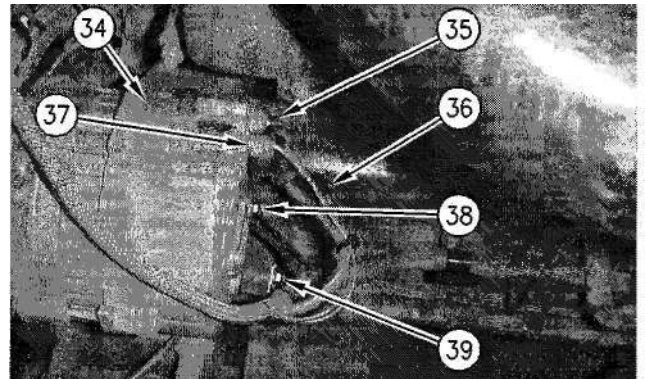


Illustration 410
Top view of alternator

- 42. Remove the nut and the washer behind rubber boot (35). Disconnect the wire behind the rubber boot.
- 43. Remove electrical connection (37) from the alternator (34).
- 44. Disconnect electrical connection (36).
- 45. Remove bolt (38) and the washer in order to disconnect two ground wires from alternator (34).
- 46. Remove bolt (39), the washer, and the spacer in order to remove the wiring harness from alternator (34).

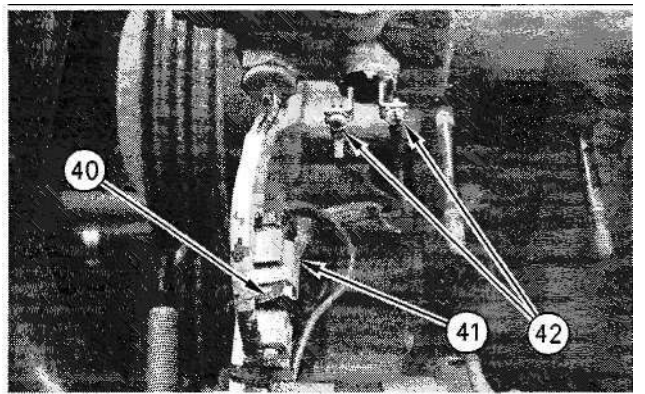


Illustration 411

Note: Put identification marks on the two wires for installation purposes.

- 47. Remove two screws (42) in order to disconnect two wires.
- 48. Remove two wire ties (40) from the alternator bracket.
- 49. Disconnect electrical connection (41).

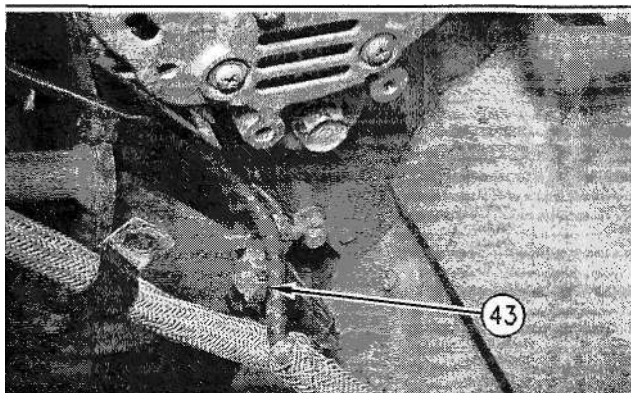


Illustration 412

50. Disconnect electrical connection (43) from the refrigerant compressor.

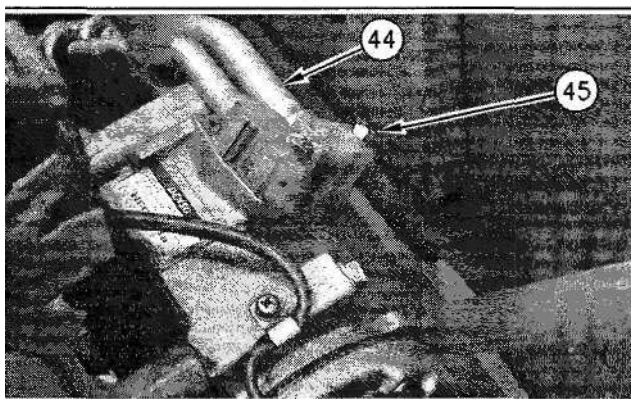


Illustration 413

51. Remove two bolts (45) and the washers.

52. Disconnect two tube assemblies (44). Put tape over the ends of the tube assemblies. Put tape over the holes in the refrigerant compressor. Tape will help to prevent contaminating the refrigerant system.

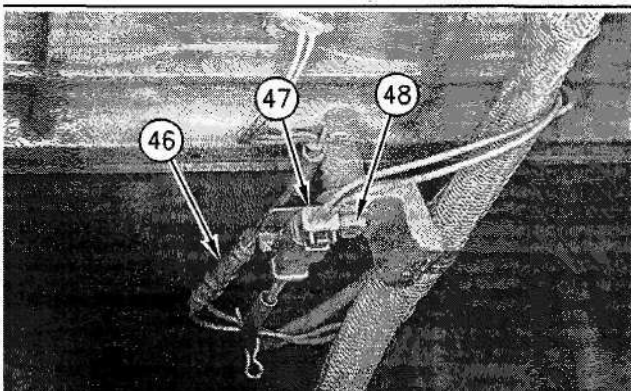


Illustration 414

g00722093

53. Disconnect electrical connections (46) and (47).

54. Remove bolt (48), the washer, and the harness clip.

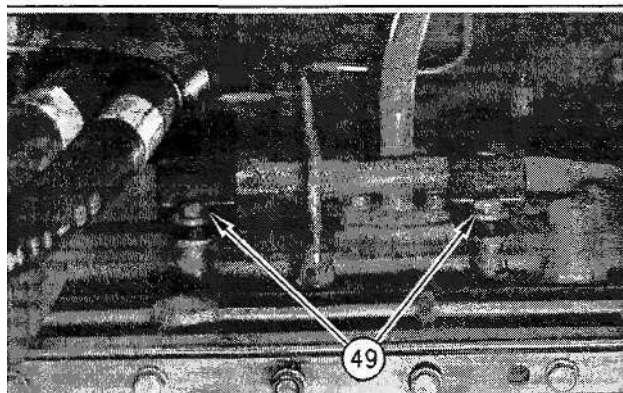


Illustration 415

55. Remove the bolts and the washers that fasten the harness clips (49) to the engine.

Note: Put identification marks on all wires prior to the removal of the electric starting motor.

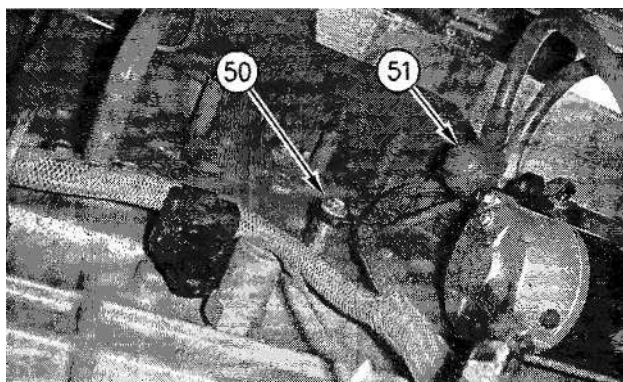


Illustration 416

56. Remove bolt (50) and the washer in order to remove the wiring clip.

57. Remove rubber boot (51). Slide the rubber boot down the battery cable in order to access the nut under the rubber boot.

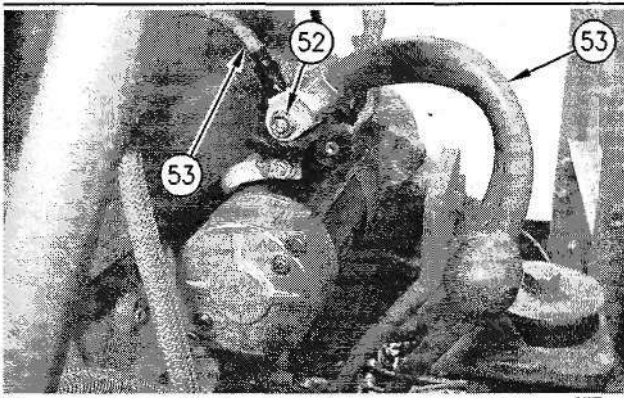


Illustration 417

58. Remove nut (52) and the washer. Disconnect battery cables (53).

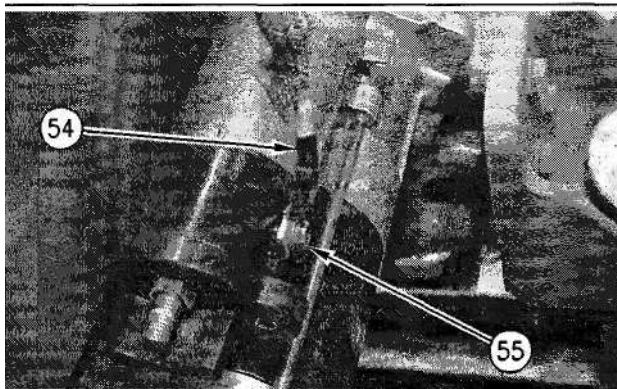


Illustration 418

59. Remove bolt (55) and the washer. Disconnect grounding strap (54).

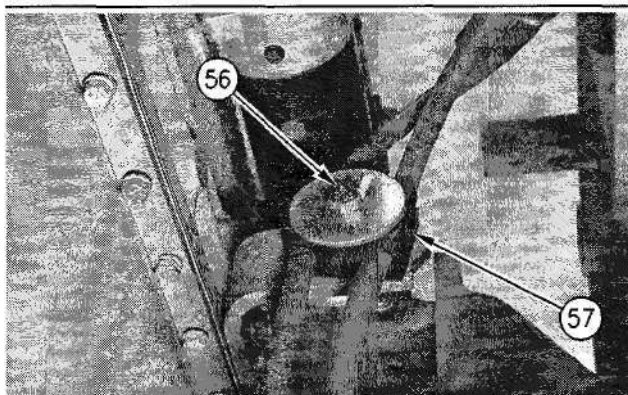


Illustration 419

60. Remove bolt (56) and the washer from wire clamp (57).

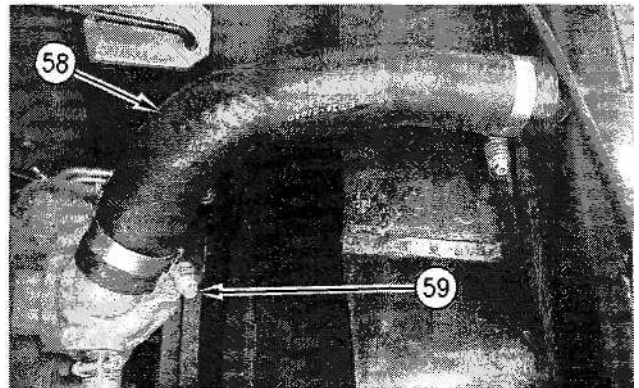


Illustration 420

61. Loosen hose clamp (59).

62. Disconnect upper radiator hose (58) at the water temperature regulator.

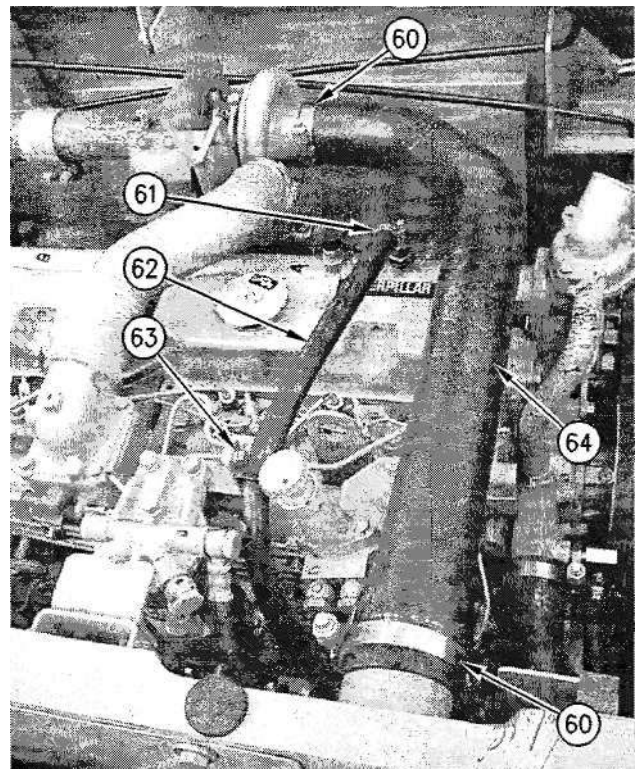


Illustration 421

63. Remove two hose clamps (60).

64. Remove hose (64).

65. Remove hose clamp (61).

66. Remove bolt (63) and the washer that holds hose (62).

67. Place hose (62) out of the way.

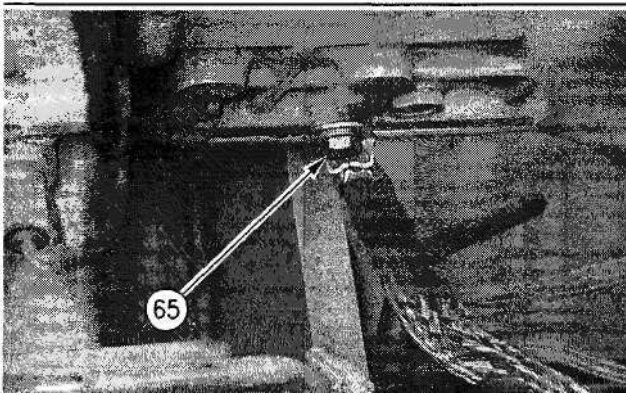


Illustration 422

68. Remove bolt (65) in order to disconnect the ground strap.

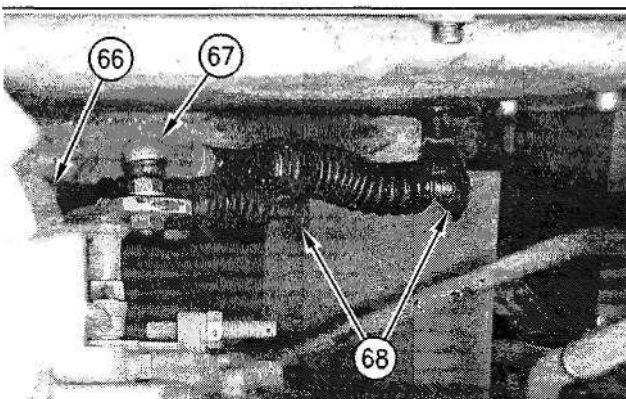


Illustration 423

g00722153

69. Disconnect governor control cable (66).
Disconnect governor control cable (67).

Note: Mark the location of nuts (68) for installation purposes.

70. Loosen nuts (68) in order to disconnect the governor control cables.

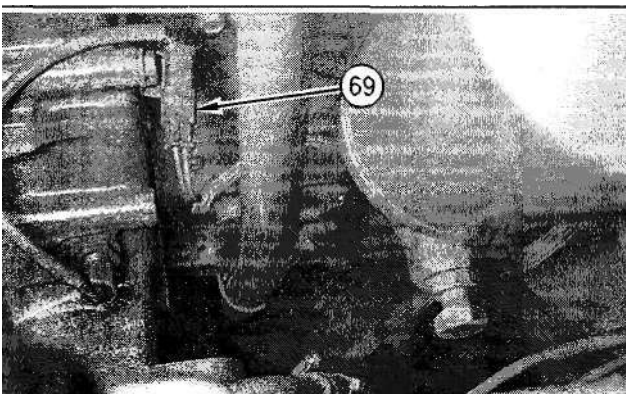


Illustration 424

71. Disconnect electrical connector (69) from the flywheel.

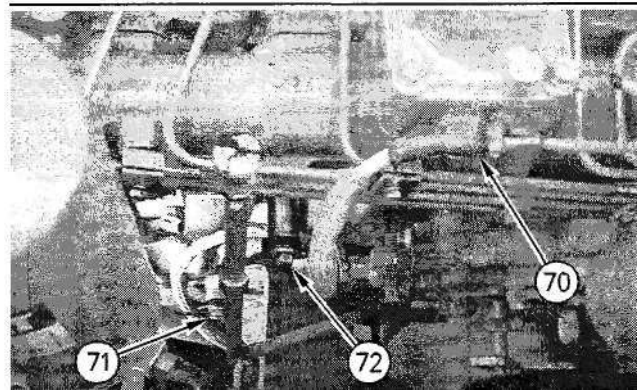


Illustration 425

72. Disconnect electrical connector (70) from the air inlet heater.

73. Remove bolt (72), the washer, and the spacer in order to disconnect the wiring harness and the dipstick tube.

74. Remove bolt (71) and the washer from the clip for the wiring harness.

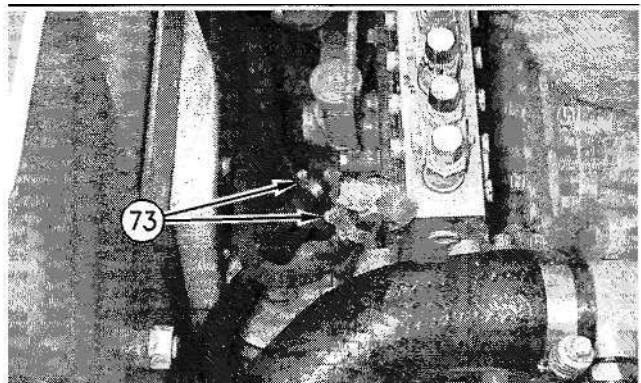


Illustration 426

Note: Mark the fuel lines for installation purposes.

75. Loosen hose clamps (73) in order to disconnect the fuel lines from the fuel injection pump.

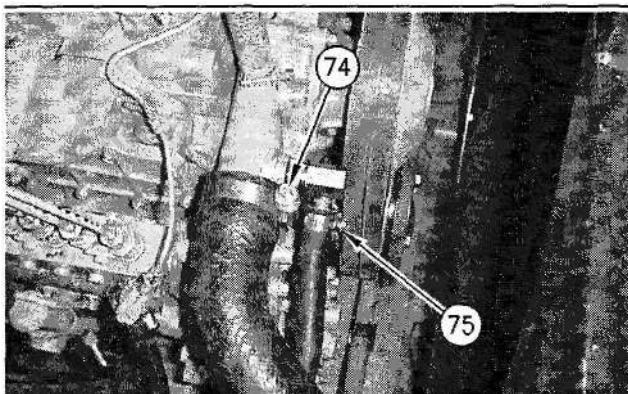


Illustration 427

76. Loosen hose clamp (74) in order to disconnect the lower radiator hose.
77. Loosen hose clamp (75) in order to disconnect the heater line.

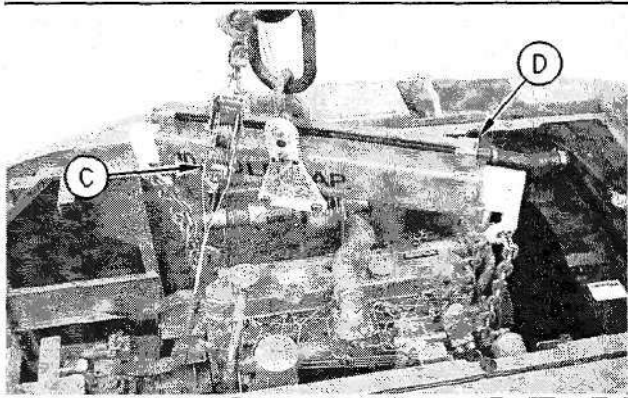


Illustration 428

78. Fasten Tooling (B) and a hoist to the engine. Fasten Tooling (C) to the main hydraulic pump and the hoist, as shown. Use Tooling (C) in order to balance the engine.

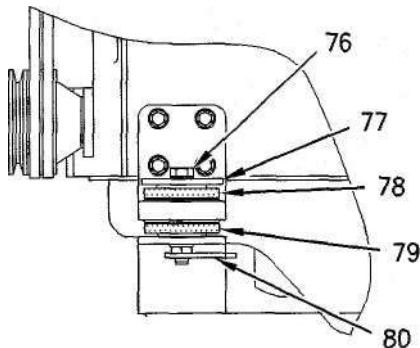


Illustration 429

79. Remove bolts (76), the washers, and nut assemblies (80). Remove washer (77) and rubber mounts (78) from the engine mounts.

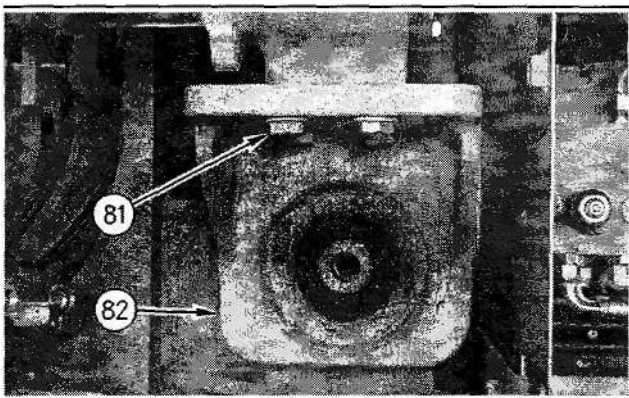


Illustration 430

80. Remove bolts (81) and the washers. Remove two rear engine mounts (82).
81. Remove the engine and the main hydraulic pump. The weight of the engine and the main hydraulic pump is approximately 635 kg (1400 lb).

Engine and Main Hydraulic Pump - Install

SMCSCode: 1024-012

Installation Procedure

Table 18

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	FT-2674	Vacuum Cap	1
(B)	6V-3145	Load Leveling Beam	1
(C)	138-7573	Link Bracket	1
	8S-9906	Ratchet Puller	1
		1/2 inch shackle	1

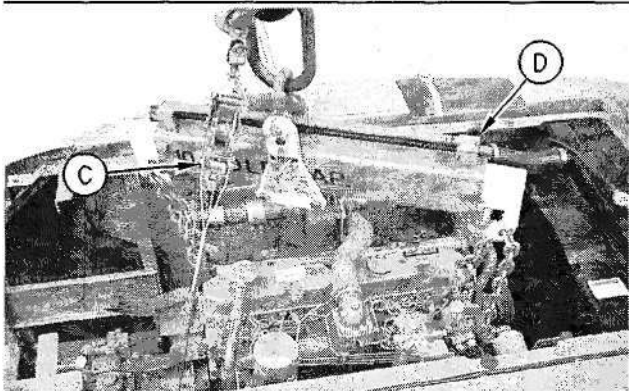


Illustration 431

1. Fasten Tooling (B) and a hoist to the engine and the main hydraulic pump. Fasten Tooling (C) to the main hydraulic pump and the hoist, as shown. Use Tooling (C) in order to balance the engine and the main hydraulic pump.
2. Position the engine and the main hydraulic pump in the machine. The weight of the engine and the main hydraulic pump is 635 kg (1400 lb).

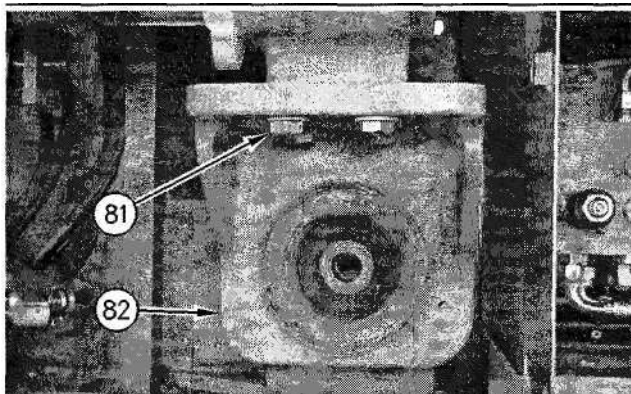


Illustration 432

3. Install two rear engine mounts (82). Install the washers and bolts (81).

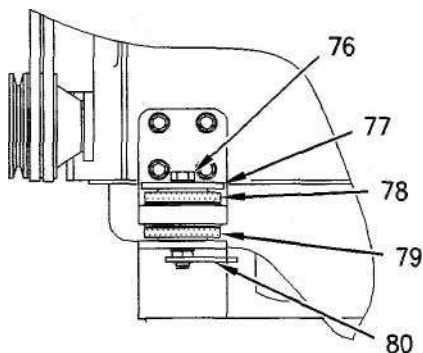


Illustration 433

4. Make sure that rubber mounts (79) are in the correct position in the frame.
5. Lower the engine onto the frame.
6. Install rubber mounts (78) and washer (77) on the engine mounts.
7. Install the washers and bolts (76). Install nut assemblies (80). Tighten the bolts to a torque of 530 ± 70 N.m (390.9 ± 51.6 lb ft).

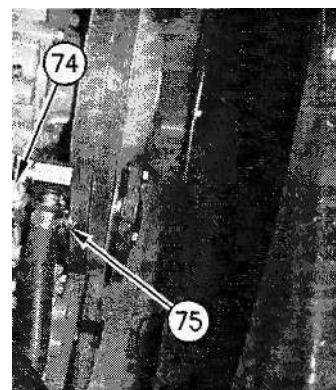


Illustration 434

g00722018

8. Connect the heater line. Tighten hose clamp (75).
9. Connect the lower radiator hose. Tighten hose clamp (74).

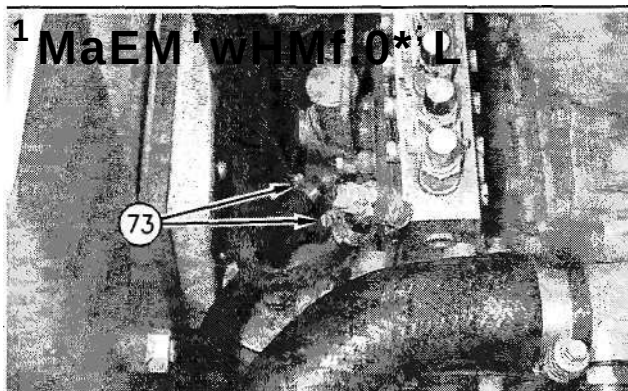


Illustration 435

Note: Make sure that the fuel lines are connected to the correct location.

10. Connect the fuel lines to the fuel injection pump. Tighten hose clamps (73).

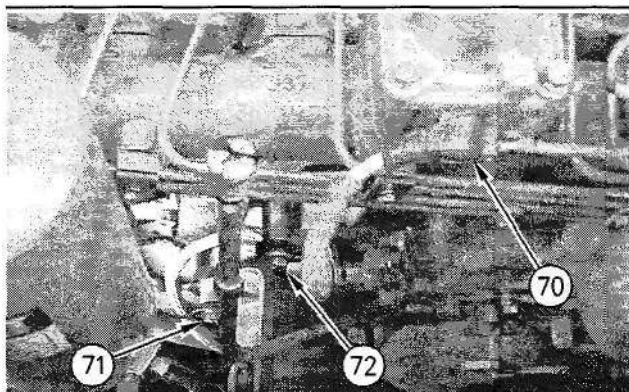


Illustration 436

11. Install the washer and bolt (71) in the clip for the wiring harness.
12. Install the spacer, the washer, and bolt (72) in order to connect the wiring harness and the dipstick tube.
13. Connect electrical connector (70) to the air inlet heater.

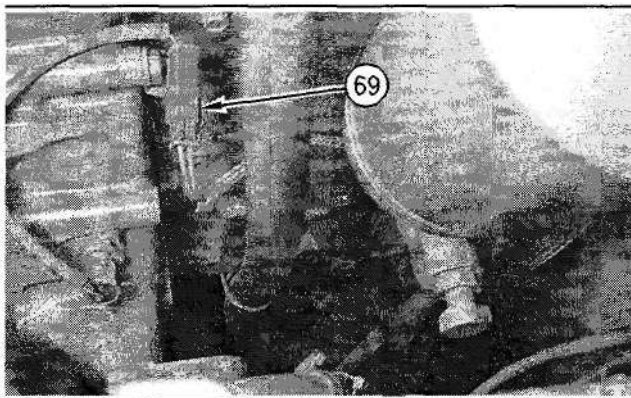


Illustration 437

900722359

14. Connect electrical connector (69) to the flywheel.

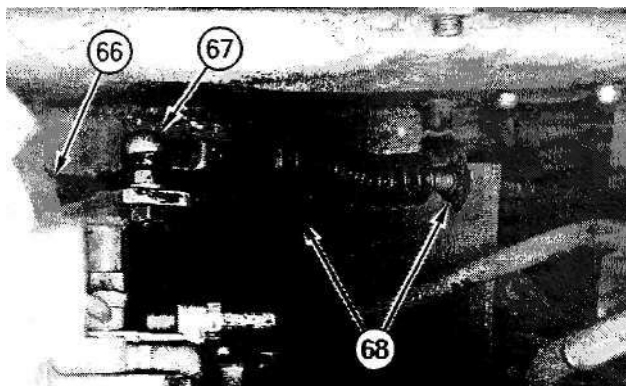


Illustration 438

Note: Make sure that nuts (68) are installed in the original locations.

15. Tighten nuts (68) in order to connect the governor control cables.

16. Connect governor control cable (66). Connect governor control cable (67).

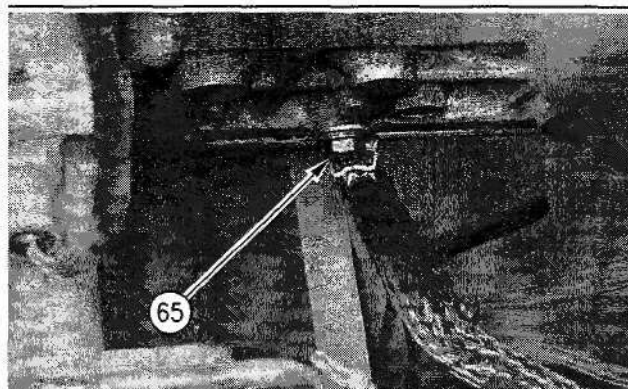


Illustration 439

17. Install bolt (65) in order to connect the ground strap.

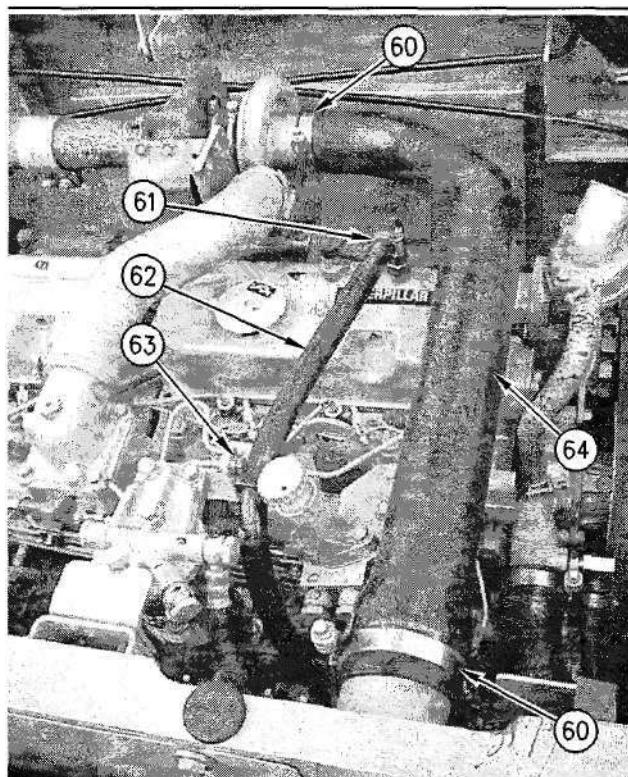


Illustration 440

goo/22124

18. Connect hose (62).
19. Tighten hose clamp (61).
20. Install the washer and bolt (63) that holds hose (62).
21. Install hose (64).

22. Tighten two hose clamps (60).

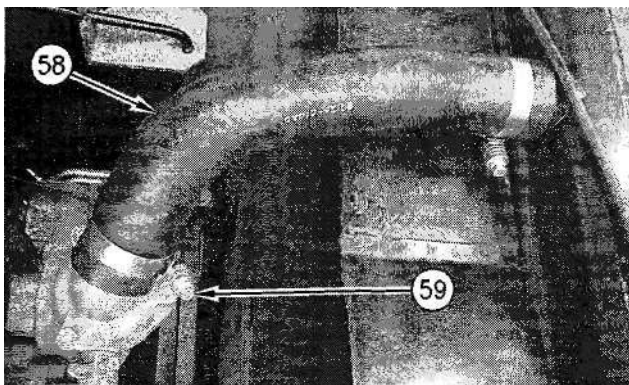


Illustration 441

23. Connect upper radiator hose (58) to the water temperature regulator.

24. Tighten hose clamp (59).

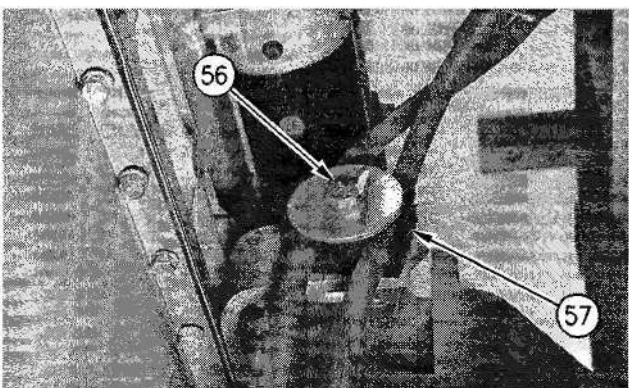


Illustration 442

25. Install the washer and bolt (56) in wire clamp (57).

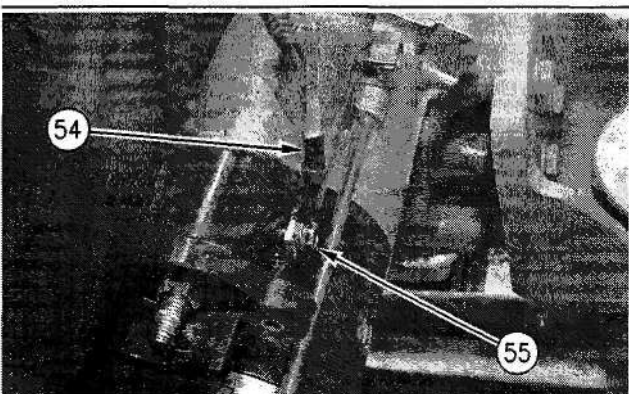


Illustration 443

26. Connect grounding strap (54). Install the washer and bolt (55).

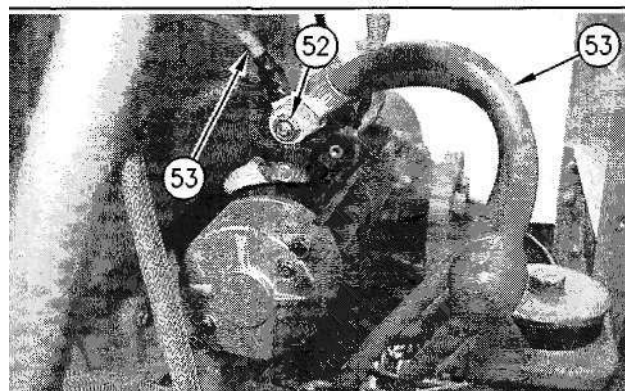


Illustration 444

27. Connect battery cables (53). Install the washer and nut (52).

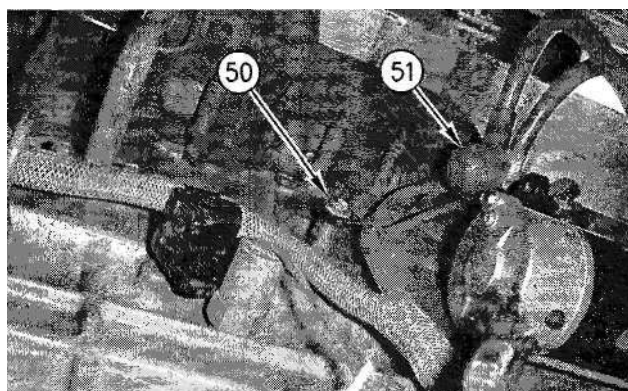


Illustration 445

900722109

28. Install rubber boot (51).

29. Install the washer and bolt (50) in the wiring clip.

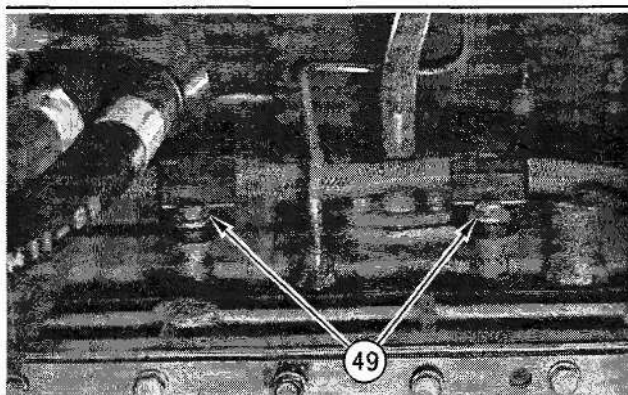


Illustration 446

30. Install the washers and the bolts that fasten harness clips (49) to the engine.

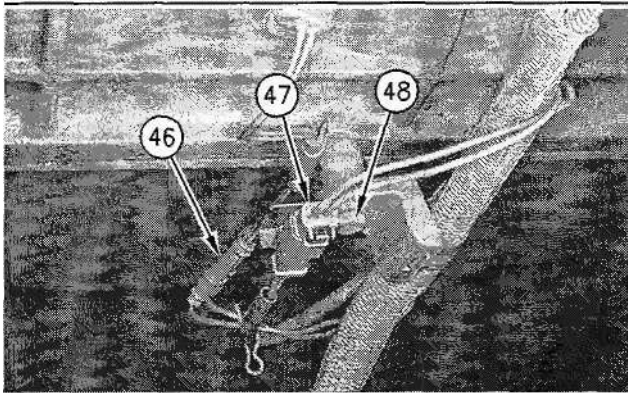


Illustration 447

g00722093

31. Install the harness clip, the washer, and bolt (48).

32. Connect electrical connections (46) and (47).

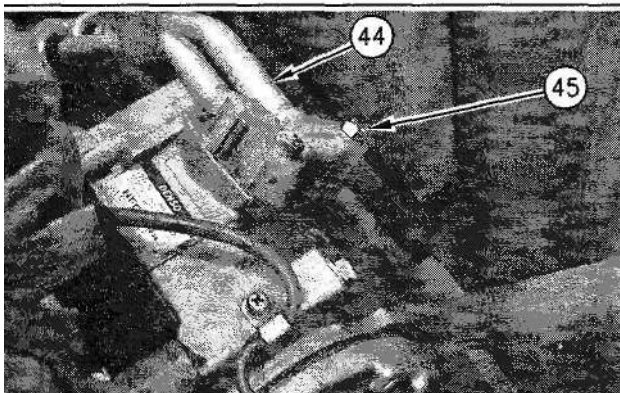


Illustration 448

33. Connect two tube assemblies (44).

34. Install the washers and two bolts (45).
Tighten the bolts to a torque of 10 ± 2 N-m
(88.5 ± 17.7 lb in).

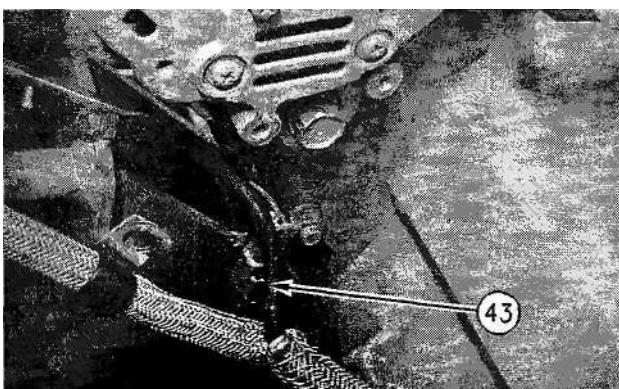


Illustration 449

35. Connect **electrical connection (43)** to the
refrigerant **compressor**.

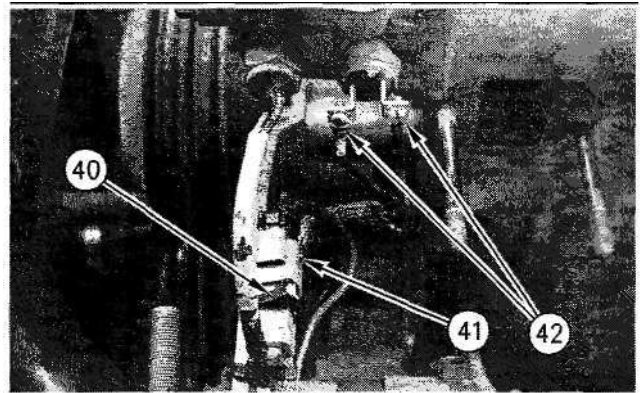


Illustration 450

36. Connect electrical connection (41).

37. Install two screws (42) in order to connect the
two wires. Tighten the screws to a torque of
 $.98 \pm .245$ N-m (8.674 ± 2.1684 lb in).

38. Install two wire ties (40) to the alternator bracket.

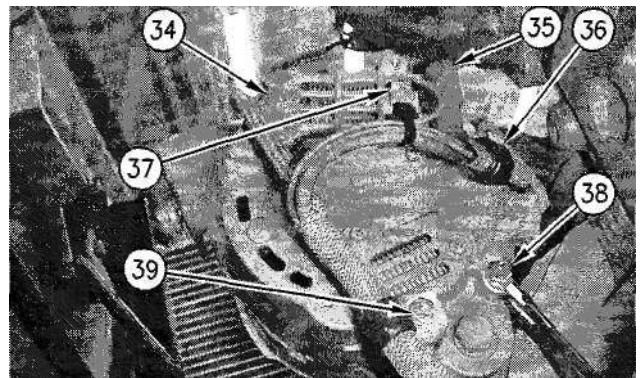


Illustration 451

Rear view of alternator

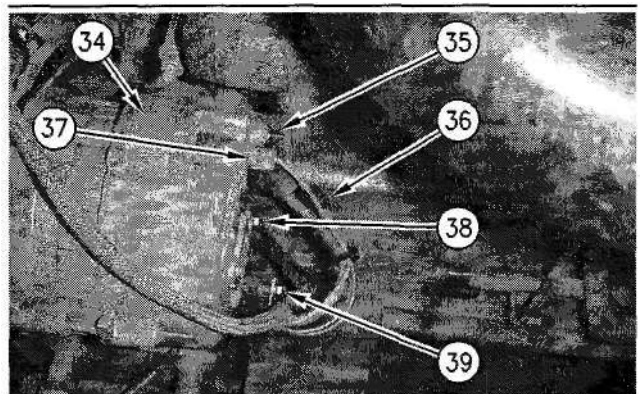


Illustration 452

Top view of alternator

39. Install the spacer, the washer, and bolt (39) in
order to install the wiring harness to alternator
(34).

Excavator Supplement for 3066 Engine
Disassembly and Assembly Section

40. Install the washer and bolt (38) in order to connect two ground wires to alternator (34).
41. Connect the wire that is located behind the rubber boot. Install the washer and the nut that is located behind rubber boot (35):
42. Install electrical connection (37) to alternator (34).
43. Connect electrical connection (36).

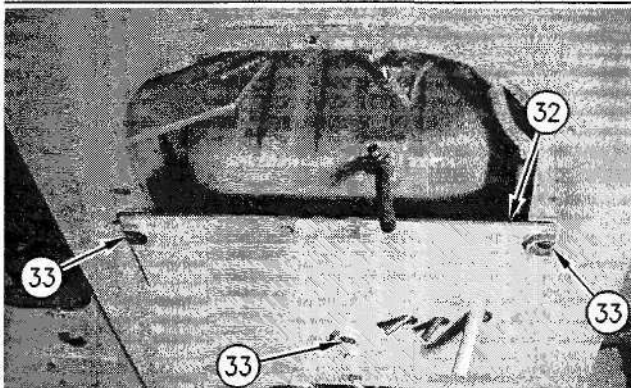


Illustration 453

44. Install access panel (32). Install the washers and bolts (33).

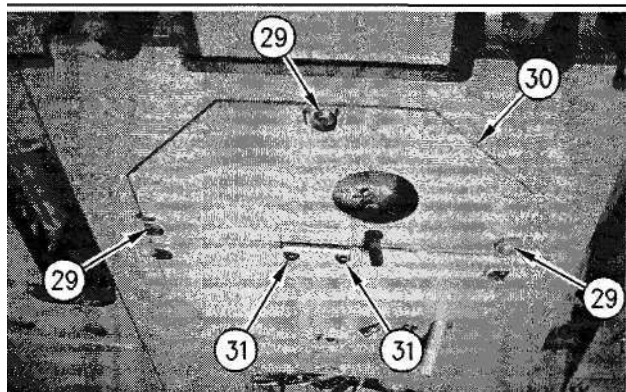


Illustration 454

45. Install access panel (30). Install the washers and bolts (29).
46. Install the washers and bolts (31) in the hinge.

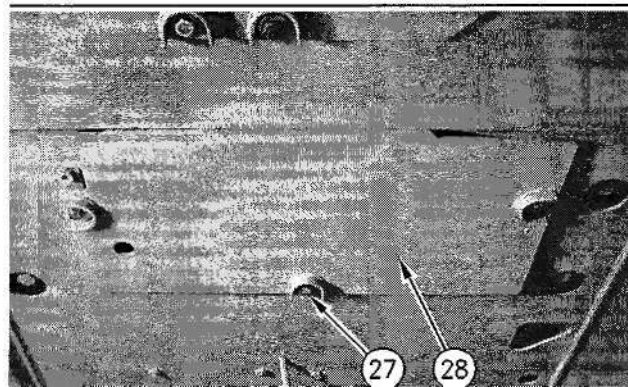


Illustration 455

47. Install access panel (28). Install the washers and bolts (27).

48. Install the muffler.

Reference: Refer to Disassembly and Assembly, "Muffler - Install" in the service manual.

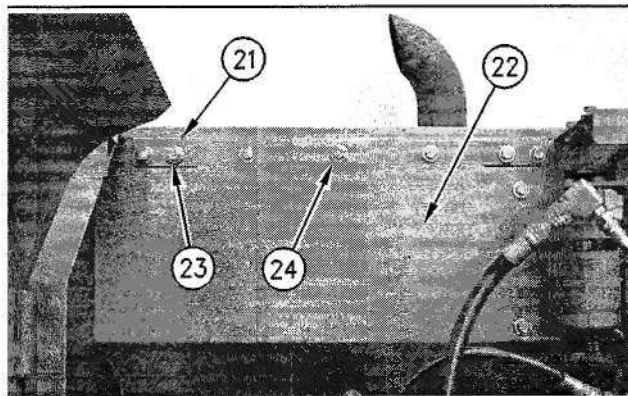


Illustration 456

Top shield

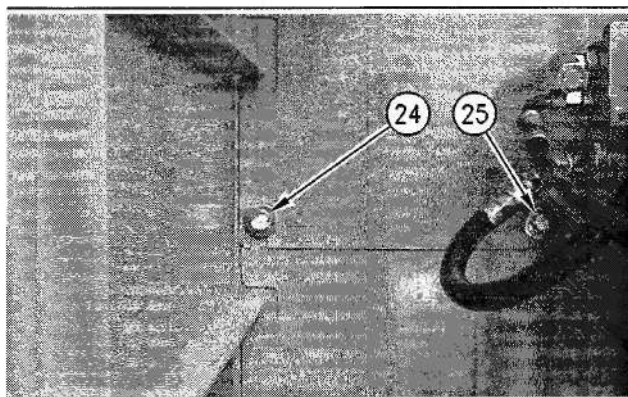


Illustration 457

900719074

The bottom shield and the top shield bolted together.

49. Install support (21).

50. Install the washers and four bolts (23) in support (21).

51. Install upper shield (22).

52. Install the washers and six bolts (24) in the top shield and the bottom shield.

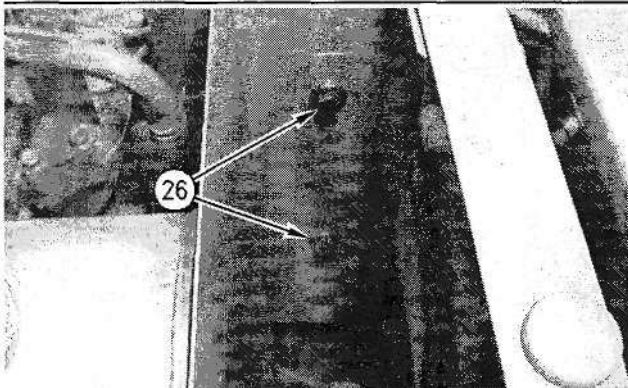


Illustration 458
View behind shield (24)

53. Install two bolts (26).

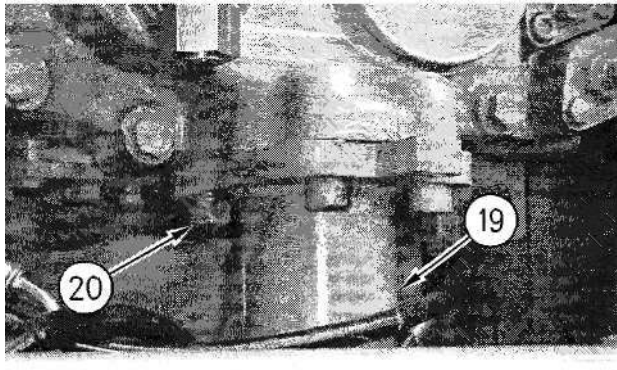


Illustration 459

54. Install four bolts (20) that hold suction line (19) in position.

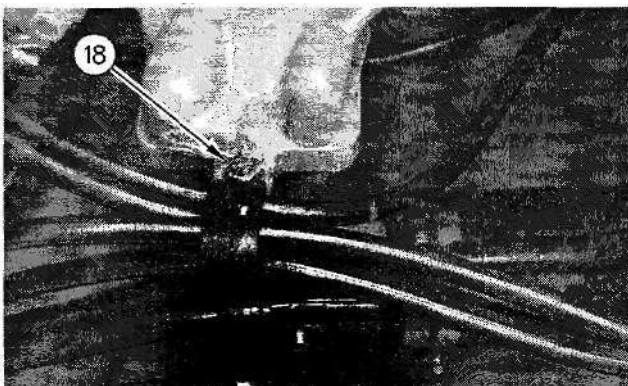


Illustration 460

55. Install the nut, the washers, and bolt (18) in order to install the clamp on the main pump.

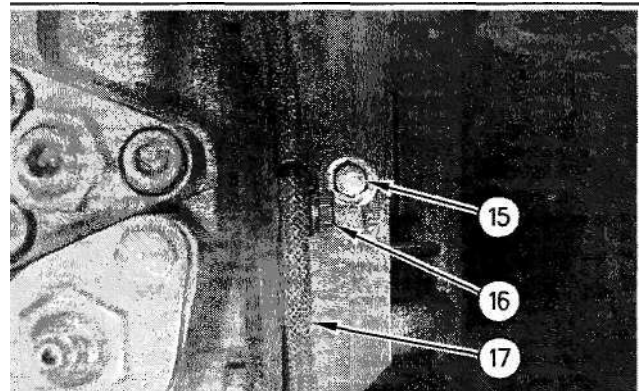


Illustration 461

Right side view of the main pump

56. Install bolt (15).

57. Install the wiring harness (17) to the main pump.

58. Install the clip and bolt (16).

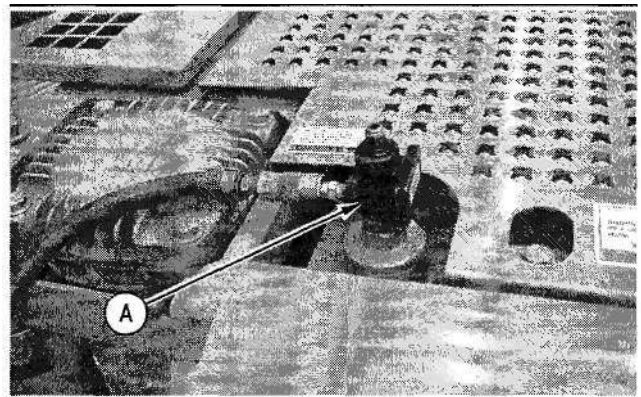


Illustration 462

59. Remove the cap from the hydraulic tank. Attach Tooling (A) to the hydraulic tank.

Note: Hook up the air to Tooling (A) in order to create a vacuum in the hydraulic system. This will minimize the leakage from the tubes and the lines.

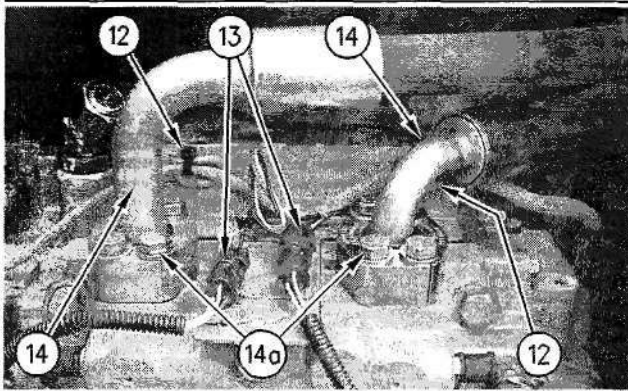


Illustration 463

- 60. Connect two hose assemblies (14) to the main pump.
- 61. Install the split flanges, the washers and bolts (14a).
- 62. Connect two electrical connections (13).
- 63. Install two wire ties (12).

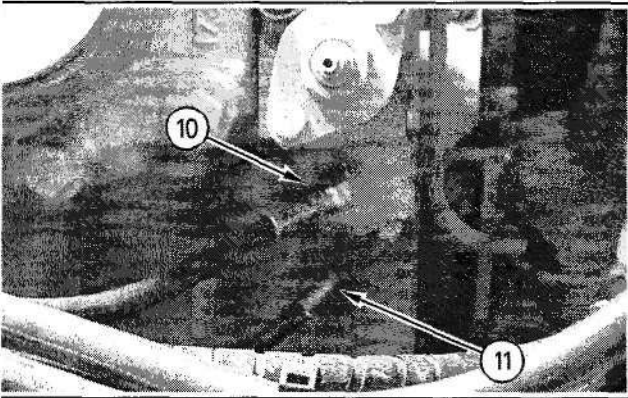


Illustration 464

- 64. Connect hose assembly (11).
- 65. Connect hose assembly (10).

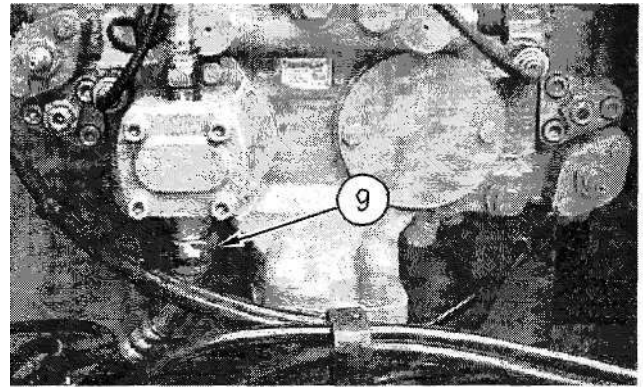


Illustration 465

- 66. Connect two hose assemblies (9) to the pilot pump.

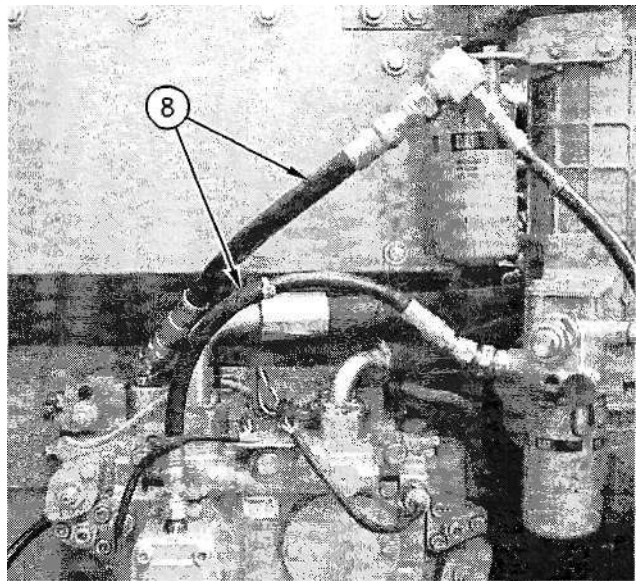


Illustration 466

- 67. Install two hose assemblies (8) to the main pump and the hydraulic filters.

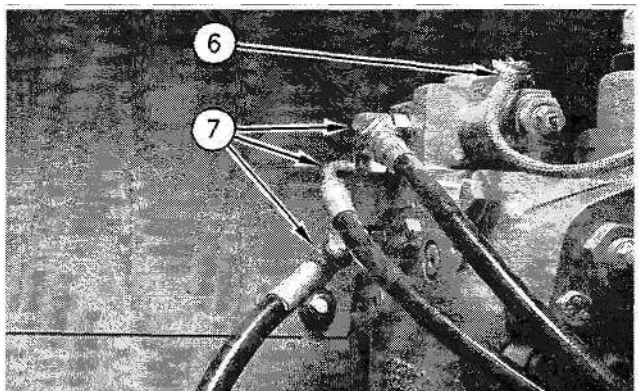


Illustration 467

Left side view of the main pump

68. Connect three hose assemblies (7) to the main pump,

69. Connect electrical connector (6).

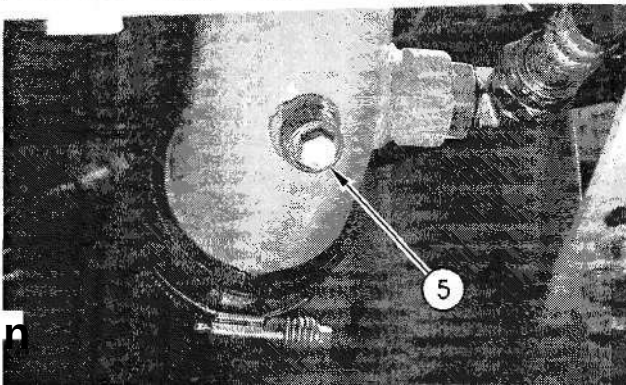
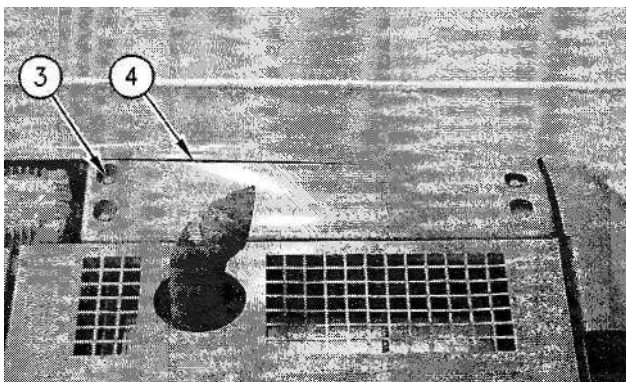


Illustration 468

g00689094

70. Install plug (5) in the main pump suction line.

71. Remove Tooling (A) from the hydraulic tank.
Install the cap on the hydraulic tank.



72. Install cover (4).

73. Install the washers and four bolts (3).



Illustration 470

74. Close access door (2) on the right side of the machine.

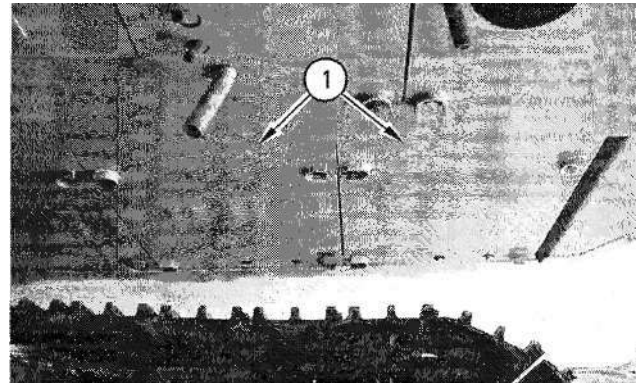


Illustration 471

75. Install two access covers (1) that are under the main hydraulic pump. Install the washers and eight bolts.

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

76. Fill the cooling system.

Reference: Refer to Operation and Maintenance Manual, "Lubricant Viscosities and Refill Capacities" for the proper filling procedure.

WARNING

Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if the gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, release it slowly in a well ventilated area.

Personal injury or death can result from inhaling refrigerant through a lit cigarette.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

77. Evacuate the air conditioning system.

Reference: Evacuate the system. Refer to Testing and Adjusting, "Refrigerant System - Evacuate" for the correct procedure.

78. Charge the air conditioning system. The correct charge is 1.1 kg (2.42 lb).

Reference: Refer to Testing and Adjusting, "Refrigerant System - Charge" for the correct procedure.

79. Install high efficiency filters in place of the pilot filter, case drain filter, and the return filter.

Note: High efficiency filters should not be run for more than 250 hours before you change back to the standard filters.

NOTICE

When the main hydraulic pump has been serviced or the hydraulic oil has been replaced, the air in the hydraulic system must be purged. Do not start the engine until the main hydraulic pump has been filled with oil.

Operating the hydraulic pump without proper lubrication will damage the pump and other hydraulic components.

80. Fill the hydraulic oil tank with oil to the correct level.

Reference: Refer to Operation and Maintenance Manual, "Lubricant Viscosities" for the proper oil viscosity.

Reference: Refer to Operation and Maintenance Manual, "Hydraulic System Oil Level - Check" for the correct filling procedure.

81. Release the pressure from the main hydraulic pump.

Reference: Refer to Testing and Adjusting, "Main Hydraulic Pump Air Pressure - Purge" in the service manual.

82. Obtain a hydraulic oil sample from the main S-O-S port.

Reference: Refer to Operation and Maintenance Manual, "Sampling Interval and Location of Sampling Valve" for the correct location.

83. If the S-O-S sample exceeds ISO 18/15, flush the hydraulic system.

Reference: Refer to Contamination Control Guidelines, SEBF8436, "Hydraulic System Flushing Procedure for 320C Hydraulic Excavators" for further information.

84. Check the governor actuator.

Reference: Refer to Systems Operation/Testing and Adjusting, "Governor Actuator - Calibrate" for further information.

End By:

a. Install the fan. Refer to Disassembly and Assembly, "Fan - Remove and Install" in this manual.

b. Install the engine hood. Refer to Disassembly and Assembly, "Hood - Remove and Install" in this manual.

101301806

Flywheel and Ring Gear - Remove and Install

SMCS Code: 1156-011; 1156-012; 1158-011;
1158-012

Removal Procedure

Start By:

- a. Remove the main hydraulic pump and the pump drive coupling. Refer to Disassembly and Assembly, "Main Hydraulic Pump and Pump Drive Coupling - Remove".
- b. Remove the muffler. Refer to Disassembly and Assembly, "Muffler - Remove and Install" in this manual.

Table 19

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	6V-2082	Hook assembly	1
	138-7574	Link Bracket	1
	8T-0358	Bolt	1
	8T-3282	Washer	1

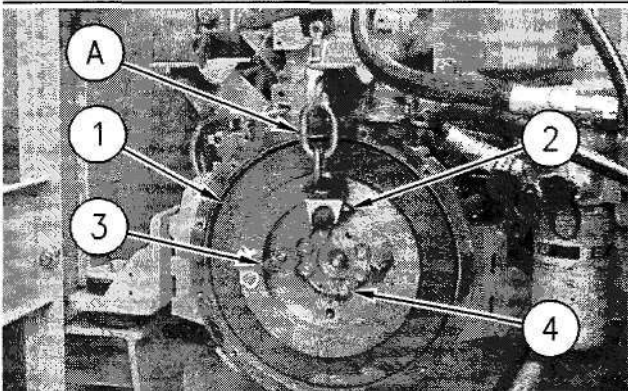


Illustration 472

1. Fasten Tooling (A) and a suitable lifting device to the flywheel, as shown.

Note: When you hook up Tooling (A) it will be necessary to use one of the inserts (2) from the drive coupling.

2. Remove six bolts (4) and the washers.
3. Check all bolts for stripped threads. Replace the bolts, if necessary.

4. Use two M16 X 2 forcing screws (3) in order to remove flywheel (1).
5. Remove flywheel (1). The weight of the flywheel is 41 kg (90 lb).
6. Perform the following procedure in order to remove the flywheel ring gear.

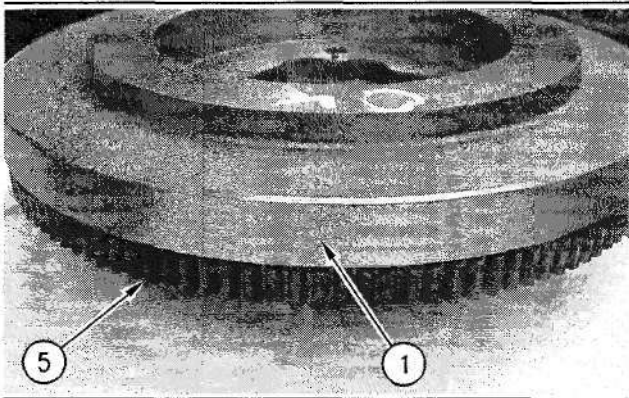


Illustration 473

- a. Place flywheel (1) and ring gear (5) on a suitable support.

Note: Check the flywheel ring gear for the following conditions:cracks, damaged dowel holes, worn ring gear, and damaged ring gear.

Note: Identify the orientation of the old ring gear on the flywheel for proper positioning, when the new ring gear is installed.

WARNING

Always wear protective gloves when handling parts that have been heated.

- b. Heat ring gear (5) uniformly.
- c. Remove the ring gear (5) by applying slight pressure with a screwdriver all the way around the flywheel (1).

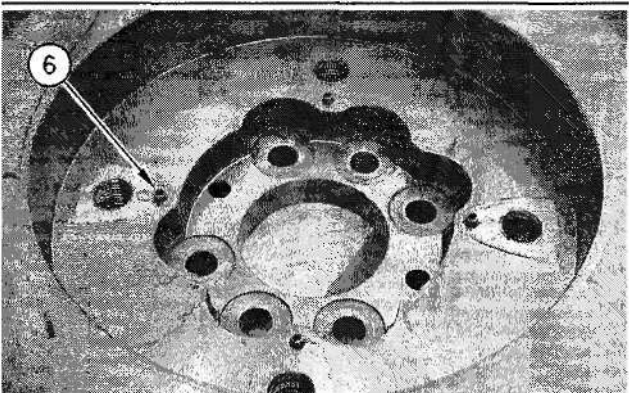


Illustration 474

7. Remove four spring pins (6).

Installation Procedure

Table 20

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	6V-2082	Hook assembly	1
	138-7574	Link Bracket	1
	8T-0358	Bolt	1
	8T-3282	Washer	1

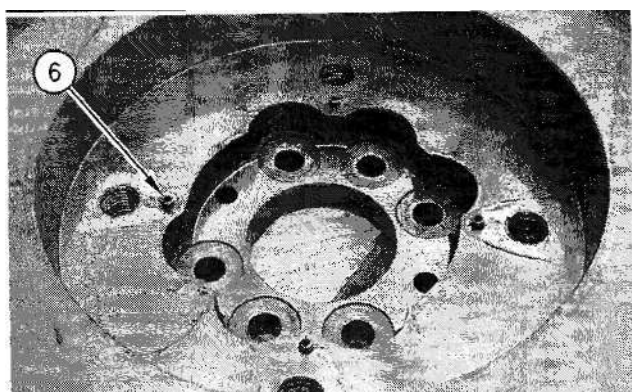


Illustration 475

1. Install four spring pins (6).

WARNING

Always wear protective gloves when handling parts that have been heated.

2. Perform the following procedure, if the ring gear was removed from the flywheel:

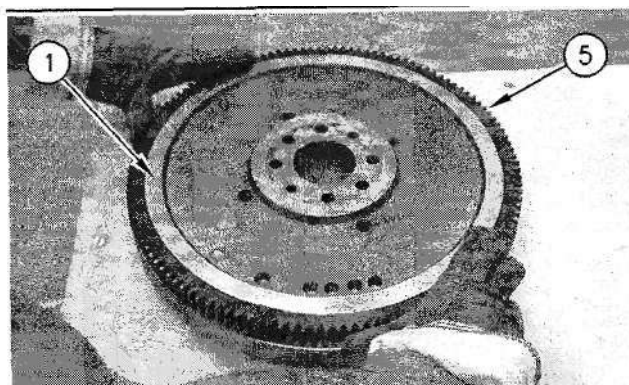


Illustration 476

- Heat the ring gear to 150 °C (302 °F) in an oven.
- Position ring gear (5) so the part number is facing toward the crankshaft.
- Press ring gear (5) onto flywheel (1).

Note: Prior to the installation of the flywheel, refer to the Specifications Module, "Flywheel" for information on checking the flywheel assembly for flatness.

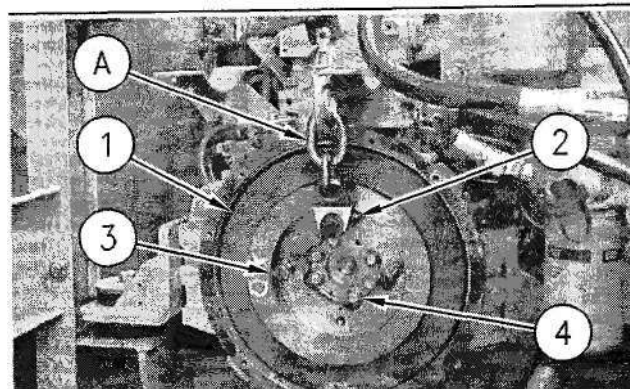


Illustration 477

- Fasten Tooling (A) and a suitable lifting device to the flywheel, as shown. The weight of the flywheel is 41 kg (90 lb).
- Install flywheel (1). Put the flywheel in the original position on the crankshaft.
- Install the washers and six bolts (4).
- Tighten six bolts (4) evenly to a torque of 220 ± 10 N.m (160 ± 5 lb ft).
- Remove Tooling (A) from the flywheel.
- Check the flywheel runout.

Reference: Refer to Disassembly and Assembly, "Flywheel Runout" in the specifications manual for the correct procedure.

End By:

- Install the muffler. Refer to Disassembly and Assembly, "Muffler - Remove and Install".
- Install the main hydraulic pump and the pump drive coupling. Refer to Disassembly and Assembly, "Main Hydraulic Pump and Pump Drive Coupling - Install".

Crankshaft Rear Seal - Remove

SMCS Code: 1161-011

Removal Procedure

Table 21

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	1U-7600	Slide Hammer Puller	1
(B)	5P-7409	Sleeve Distorter	1
	5P-7338	Distorter Ring	2

Start By:

- a. Remove the flywheel. Refer to Disassembly and Assembly, "Flywheel - 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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

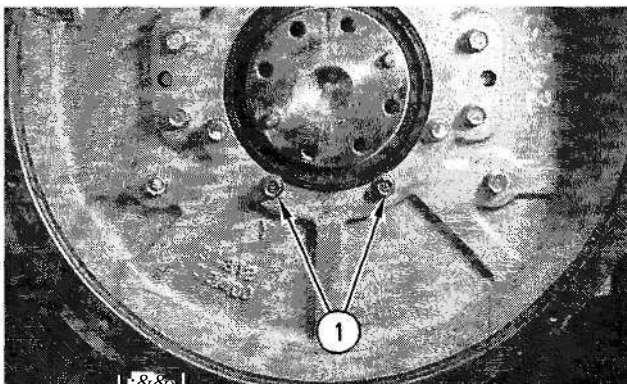


Illustration 478

1. Remove two bolts (1) and washers from the flywheel housing.

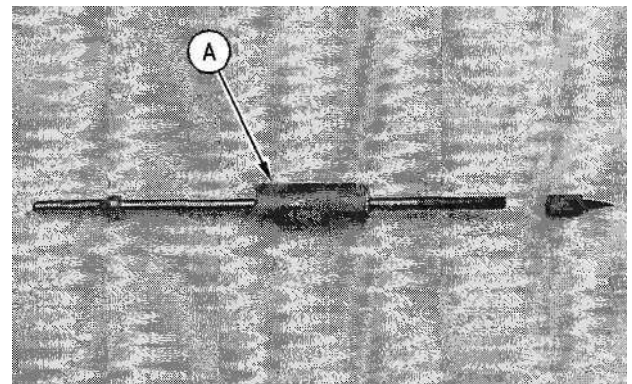
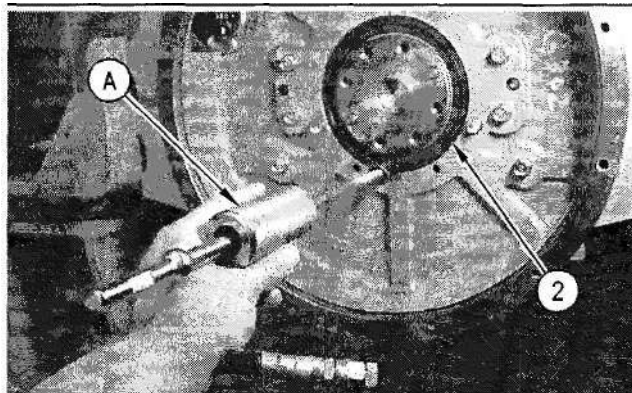


Illustration 479

Tooling (A)



Note: If the oil seal shows a sign of oil leaks, remove the wear sleeve and the oil seal.

2. Drill three evenly spaced 3 mm (0.12 inch) holes in crankshaft rear seal (2).
3. Use Tooling (A) to remove the crankshaft rear seal.

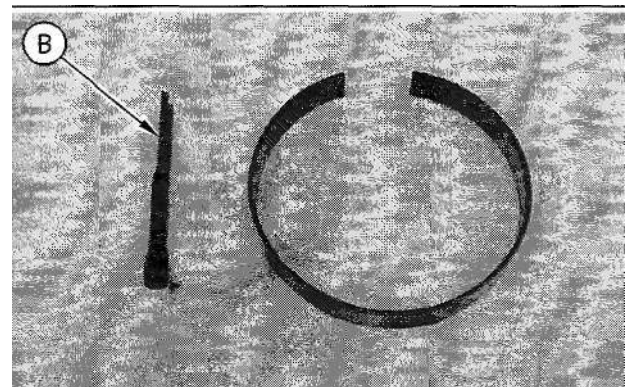


Illustration 481

Tooling (B)

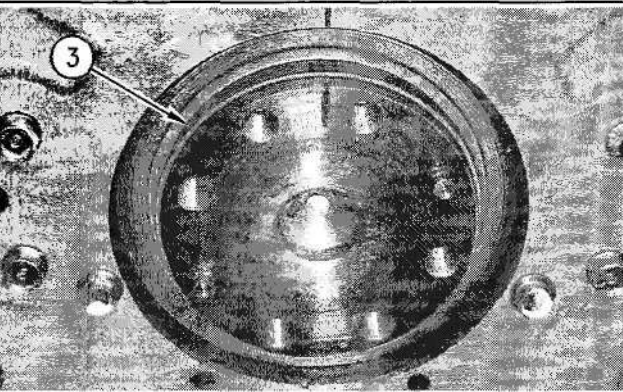


Illustration 482

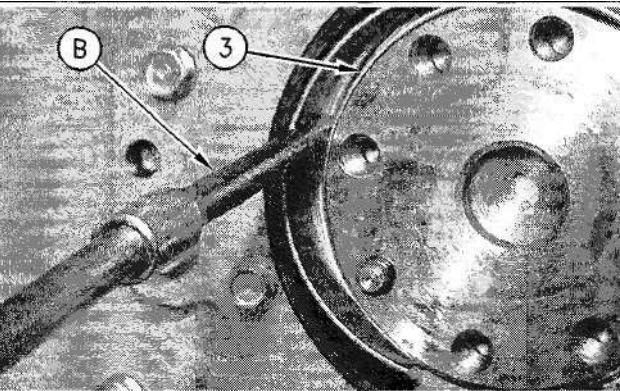


Illustration 483

4. Install two **5P-7338** Distorter Rings.
 5. Slide **5P-7409** Sleeve Distorter in between the distorter rings and the wear sleeve (3).
 6. Twist **5P-7409** Sleeve Distorter in order to distort wear sleeve (3).
- Note:** Distort the wear sleeve (3) in several locations.
7. Grab the lip on the wear sleeve with a pair of pliers and remove the wear sleeve (3).

Note: When you are removing the wear sleeve, take extreme care not to damage the crankshaft.

101342162

Crankshaft Rear Seal - Install

SMCSCode: 1161-012

Installation Procedure

Table 22

Required Tools			
Tool	Part Number	Part Description	Qty
(A)	9U-6169	Installer	1
	9U-6171	Locator	1
	9U-6172	Bolts	2
	5P-8247	Hard Washer	1
	6V-3303	Bolt	1

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. To install a new wear sleeve that is complete with a seal, use 40-9500 Quick Cure Primer to clean the outer diameter of the crankshaft and the inside diameter of the wear sleeve. Apply **4C-9507** Compound on all mating surfaces.

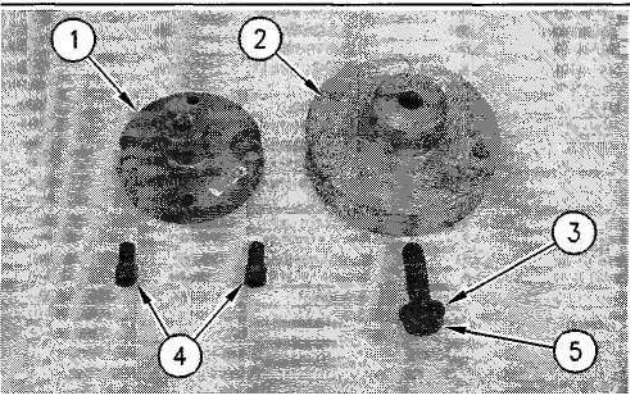


Illustration 484

Tooling (A)

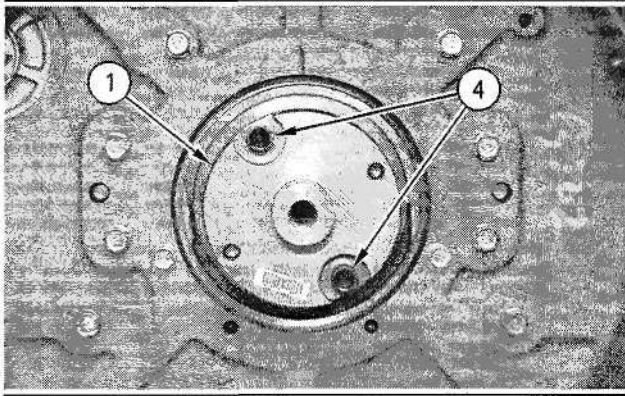


Illustration 485

2. Install 9U-6171 Locator (1) onto the crankshaft with 9U-6172 Bolts (4).

Note: Locator (1) fits one way onto the crankshaft.

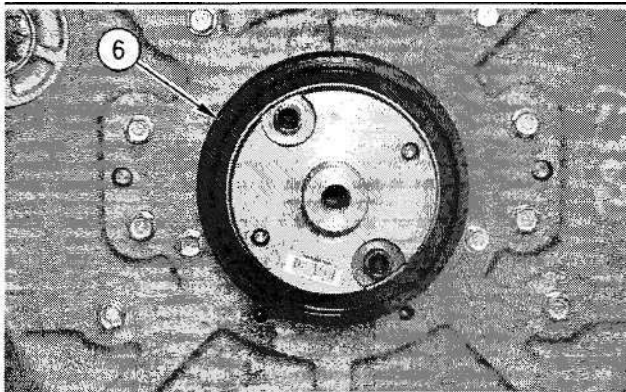


Illustration 486

3. Install a new wear sleeve that is complete with a seal (6) over the locator.

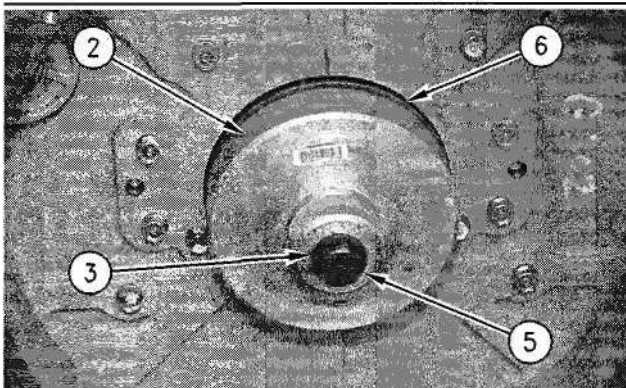


Illustration 487

4. Place 9U-6169 Installer (2) over the locator and seal assembly (6).
5. Put 6V-3303 Bolt (5) through 5P-8247 Hard Washer (3) and 9U-6169 Installer (2) and thread into 9U-6171 Locator (1).

6. Push the wear sleeve that is complete with a seal onto the crankshaft until 9U-6169 Installer (2) bottoms out.
7. Remove Tooling (A) and check crankshaft rear seal (1) for correct installation.

End By:

- a. Install the flywheel. Refer to Disassembly and Assembly, "Flywheel - Install".

Index

A

Air Cleaner- Remove and Install.....	30
Installation Procedure.....	32
Removal Procedure.....	30
Air Inlet Heater- Remove and Install.....	36
Installation Procedure.....	37
Removal Procedure.....	36
Air Inlet Manifold - Install.....	35
Installation Procedure.....	35
Air Inlet Manifold - Remove.....	33
Removal Procedure.....	33
Alternator- Remove and Install.....	6
Installation Procedure.....	7
Removal Procedure.....	6

C

Crankshaft Front Seal - Install.....	86
Installation Procedure.....	86
Crankshaft Front Seal - Remove.....	85
Removal Procedure.....	85
Crankshaft Pulley - Remove and Install.....	78
Installation Procedure.....	79
Removal Procedure.....	78
Crankshaft Rear Seal - Install.....	122
Installation Procedure.....	122
Crankshaft Rear Seal - Remove.....	121
Removal Procedure.....	121
Cylinder Head - Install.....	63
Installation Procedure.....	63
Cylinder Head - Remove.....	61
Removal Procedure.....	61

D

Disassembly and Assembly Section.....	4
---------------------------------------	---

E

Electric Starting Motor - Remove and Install.....	8
Installation Procedure.....	8
Removal Procedure.....	8
Engine and Main Hydraulic Pump - Install.....	109
Installation Procedure.....	109
Engine and Main Hydraulic Pump - Remove.....	99
Removal Procedure.....	99
Engine Oil Cooler - Remove and Install.....	23
Installation Procedure.....	24
Removal Procedure.....	23
Engine Oil Filter and Oil Filter Base - Remove and Install.....	17
Installation Procedure.....	18
Removal Procedure.....	17

Engine Oil Filter Base - Assemble.....	21
Assembly Procedure.....	21
Engine Oil Filter Base - Disassemble.....	19
Disassembly Procedure.....	19
Engine Oil Level Gauge (Dipstick) - Remove and Install.....	16
Installation Procedure.....	16
Removal Procedure.....	16
Exhaust Manifold - Remove and Install.....	40
Installation Procedure.....	41
Removal Procedure.....	40

F

Fan - Remove and Install.....	70
Installation Procedure.....	71
Removal Procedure.....	70
Flywheel and Ring Gear - Remove and Install....	119
Installation Procedure.....	120
Removal Procedure.....	119
Fuel Filter (Primary) and Fuel Filter Base - Remove and Install.....	13
Installation Procedure.....	14
Removal Procedure.....	13
Fuel Injection Lines - Remove and Install.....	47
Installation Procedure.....	49
Removal Procedure.....	47
Fuel Injection Nozzles - Install.....	57
Installation Procedure.....	57
Fuel Injection Nozzles - Remove.....	56
Removal Procedure.....	56
Fuel Injection Pump - Install.....	54
Installation Procedure.....	54
Fuel Injection Pump- Remove.....	51
Removal Procedure.....	51
Fuel Priming Pump - Remove and Install.....	12
Installation Procedure.....	12
Removal Procedure.....	12

G

Governor Control Motor - Remove and Install.....	9
Installation Procedure.....	10
Removal Procedure.....	9

H

Hood - Remove and Install.....	97
Installation Procedure.....	98
Removal Procedure.....	97
Housing (Front) - Install.....	82
Installation Procedure.....	82
Housing (Front) - Remove.....	80
Removal Procedure.....	80

Hydraulic Oil Cooler - Install.....	27
Installation Procedure.....	27
Hydraulic Oil Cooler - Remove.....	25
Removal Procedure.....	25
Hydraulic System Pressure - Release.....	4
Pressure Release Procedure.....	4

I

Important Safety Information.....	2
-----------------------------------	---

M

Muffler- Remove and Install.....	38
Installation Procedure.....	39
Removal Procedure.....	38

O

Oil Pan - Remove and Install.....	87
Installation Procedure.....	89
Removal Procedure.....	87

R

Radiator- Install.....	67
Installation Procedure.....	67
Radiator- Remove.....	64
Removal Procedure.....	64
Refrigerant Compressor - Remove and Install . . .	91
Installation Procedure.....	93
Removal Procedure.....	91
Refrigerant Condenser - Remove and Install . . .	94
Installation Procedure.....	96
Removal Procedure.....	95
Rocker Shaft and Push Rod - Install.....	61
Installation Procedure.....	61
Rocker Shaft and Push Rod - Remove.....	60
Removal Procedure.....	60

T

Table of Contents.....	3
Turbocharger - Install.....	43
Installation Procedure.....	43
Turbocharger- Remove.....	41
Removal Procedure.....	41

V

V-Belts - Remove and Install.....	69
Installation Procedure.....	69
Removal Procedure.....	69
Valve Mechanism Cover - Remove and Install . . .	57
Installation Procedure.....	58
Removal Procedure.....	57

W

Water Outlet Manifold - Install.....	77
Installation Procedure.....	77
Water Outlet Manifold - Remove.....	76
Removal Procedure.....	76
Water Pump - Assemble.....	74
Assembly Procedure.....	74
Water Pump - Disassemble.....	73
Disassembly Procedure.....	73
Water Pump - Install.....	75
Installation Procedure.....	75
Water Pump - Remove.....	72
Removal Procedure.....	72
Water Separator- Remove and Install.....	14
Installation Procedure.....	15
Removal Procedure.....	14
Water Temperature Regulator - Remove and Install.....	45
Installation Procedure.....	46
Removal Procedure.....	45