



# SERVICE MANUAL

LOADER  
427, 435S, 437

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This manual contains original instructions, verified by the manufacturer (or their authorized representative).

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## Foreword

### The Operator's Manual

 You and others can be killed or seriously injured if you operate or maintain the machine without first studying the Operator's Manual. You must understand and follow the instructions in the Operator's Manual. If you do not understand anything, ask your employer or JCB dealer to explain it.

Do not operate the machine without an Operator's Manual, or if there is anything on the machine you do not understand.

Treat the Operator's Manual as part of the machine. Keep it clean and in good condition. Replace the Operator's Manual immediately if it is lost, damaged or becomes unreadable.

### Contents

**01 - Machine**

**03 - Attachments, Couplings and Load Handling**

**06 - Body and Framework**

**09 - Operator Station**

**12 - Heating, Ventilating and Air-Conditioning (HVAC)**

**15 - Engine**

**18 - Fuel and Exhaust System**

**21 - Cooling System**

**24 - Brake System**

**25 - Steering System**

**27 - Driveline**

**30 - Hydraulic System**

**33 - Electrical System**

**72 - Fasteners and Fixings**

**75 - Consumable Products**

**78 - After Sales**

## 27 - Damper

### Remove and Install

#### Remove

1. Make the machine safe. Refer to (PIL 01-03).
2. Make sure that the engine is safe to work on. If the engine has been running, make sure the engine has cooled sufficiently before you start the removal.
3. Remove the engine drive belt. Refer to (PIL 15-18).
4. Support the damper.
5. Remove the screws (x6).
6. Remove the damper from the engine.

Figure 165.

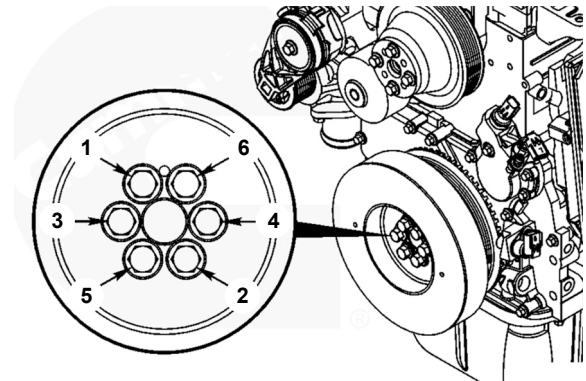
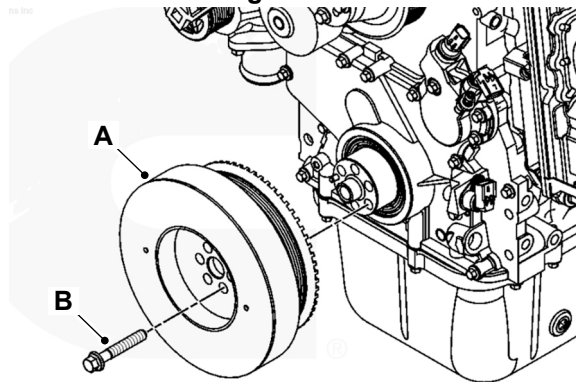


Table 69. Torque Values

Description	Torque Values
- first stage torque	50N·m
- second stage torque	90°

Figure 164.



- A Damper
- B Screws (x6)

#### Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following step.
2. Tighten the screws to the correct torque value.
  - 2.1. Use the torque and angle tightening procedure. Refer to (PIL 72-00).
  - 2.2. Make sure that you follow the correct tightening sequence. Refer to Figure 165.



## 00 - General

Introduction .....	15-33
Health and Safety .....	15-34
Component Identification .....	15-34

## Introduction

A crankshaft pulley is used to drive a FEAD (Front End Accessory Drive) belt. The belt drives the coolant pump. Depending on the machine application, the belt is configured to drive engine mounted accessories, such as the alternator, cooling fan and air conditioning compressor.

Some applications have a second pulley on the crankshaft which drives a dedicated fan belt. The belt drives an engine mounted cooling fan.

## Health and Safety

### Turning the Engine

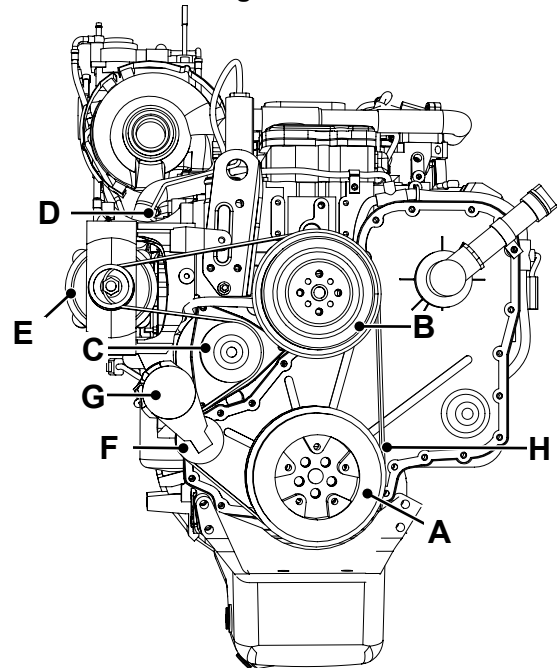
Do not try to turn the engine by pulling the fan or fan belt. This could cause injury or premature component failure.

**WARNING!** The engine has exposed rotating parts. Switch off the engine before working in the engine compartment. Do not use the machine with the engine cover open.

**Notice:** A drive belt that is loose can cause damage to itself and/or other engine parts.

## Component Identification

Figure 166.



- A Crankshaft pulley
- B Fan pulley
- C Water pump pulley
- D Compressor installation location
- E Alternator pulley
- F Belt tensioner pulley
- G Belt tensioner
- H Vibration rubber damper



## 03 - Drive Belt

Introduction .....	15-35
Health and Safety .....	15-36
Check (Condition) .....	15-36
Adjust .....	15-37
Remove and Install .....	15-37

## Introduction

The crankshaft pulley is used to drive the coolant pump via a FEAD (Front End Accessory Drive) belt. In addition to the coolant pump the drive belt can also be configured to drive the engine mounted accessories.

The belt is maintained at a constant tension by a spring loaded tensioner. To achieve the necessary belt/pulley contact area the belt is routed around idler wheels as required. The configuration varies depending on the accessories installed.

## Health and Safety

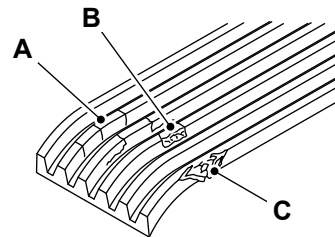
▲ **Notice:** A drive belt that is loose can cause damage to itself and/or other engine parts.

## Check (Condition)

At the recommended service interval, visually inspect the drive belt for damage.

1. Make the machine safe.  
[Refer to: PIL 01-03.](#)
2. Stop the engine and let it cool down.
3. Renew the drive belt if it has cracks or if it is frayed or has pieces of material missing.

**Figure 167.**



- A** Crack in belt
- B** Missing piece of belt
- C** Frayed belt

## Adjust

Adjustment is not possible with this drive belt. A spring loaded tensioning unit ensures that the FEAD (Front End Accessory Drive) belt is kept at the correct tension.

## Remove and Install

There are a number of drive belt routes. This procedure does not include all of the routes. Do a diagram of the drive belt route before removal to help installation.

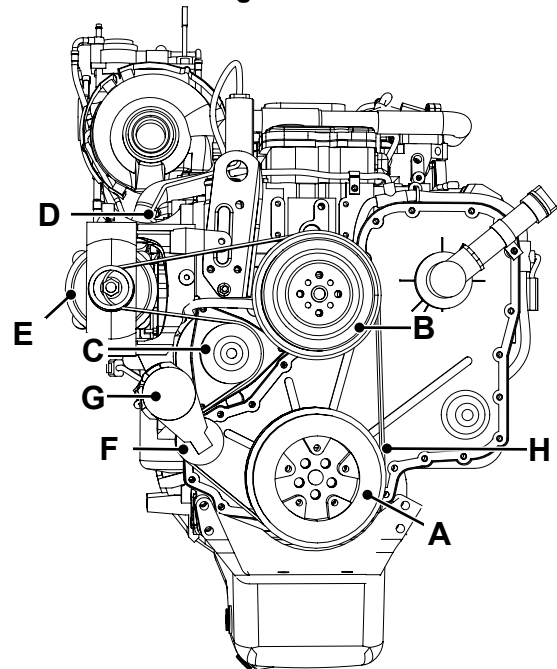
The belt tensioner is spring-loaded, it must be pivoted away from the drive belt. Do not pivot the belt tensioner in the wrong direction, this can cause damage.

Make a note that too much force in the opposite direction of wind-up or when the belt tensioner is wound-up to the positive-stop, can cause the tensioner arm to crack or break.

### Remove

1. Make the machine safe. Refer to (PIL 01-03).
2. Isolate the battery. Refer to (PIL 33-03).
3. Open the engine compartment cover. Refer to (PIL 06-06).
4. Hold the tensioner against the spring force and lift the belt off the drive tensioner pulley.

**Figure 168.**



- A** Crankshaft pulley
- B** Fan pulley
- C** Water pump pulley
- D** Compressor installation location
- E** Alternator pulley
- F** Belt tensioner pulley
- G** Belt tensioner
- H** Vibration rubber damper

## Install

1. Use the diagram to correctly route the new drive belt on the pulleys.
2. Pivot the belt tensioner in the direction of the spring tang.
3. Install the new drive belt. Put the drive belt over the water pump pulley last.
4. If it is difficult to install the drive belt, do as follows:
  - 4.1. Put the drive belt over the grooved pulleys first.
  - 4.2. Hold the belt tensioner up and slide the drive belt over the water pump pulley.
5. Slowly release the belt tensioner to apply tension to the drive belt.
6. Check the alignment of the drive belt with the belt tensioner and the other components.
7. Use the deflection method to measure the tension in the drive belt.
  - 7.1. Apply the specified force between the pulleys on the drive belt.  
Force: 110N
  - 7.2. If the deflection is more than the thickness of one drive belt per foot of pulley centre distance, adjust the drive belt tension.
  - 7.3. If there is too much movement of the drive belt, replace it.
8. Close the engine compartment cover. Refer to (PIL 06-06).
9. Run the engine and listen to hear if the drive belt squeals.
  - 9.1. Too much squeal indicates that the drive belt is slipping too much.
  - 9.2. Check the route of the drive belt to make sure it is correctly installed over each pulley.



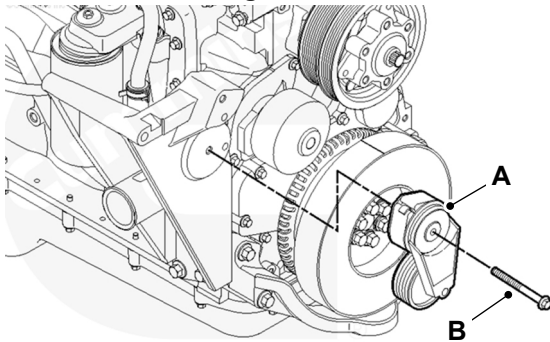
## 21 - Tensioner

### Remove and Install

#### Remove

1. Make the machine safe. Refer to (PIL 01-03).
2. Open the engine compartment cover. Refer to (PIL 06-06).
3. Remove the engine drive belt. Refer to (PIL 15-18).
4. Remove the capscrew.
5. Remove the belt tensioner from the engine.
6. If necessary, remove the bracket.

**Figure 169.**



- A** Belt tensioner  
**B** Capscrew

#### Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following step.
2. Tighten the capscrew to the correct torque value.

**Table 70. Torque Values**

Item	Nm
B	43

## Health and Safety

### Oil

Oil is toxic. If you swallow any oil, do not induce vomiting, seek medical advice. Used engine oil contains harmful contaminants which can cause skin cancer. Do not handle used engine oil more than necessary. Always use barrier cream or wear gloves to prevent skin contact. Wash skin contaminated with oil thoroughly in warm soapy water. Do not use petrol, diesel fuel or paraffin to clean your skin.

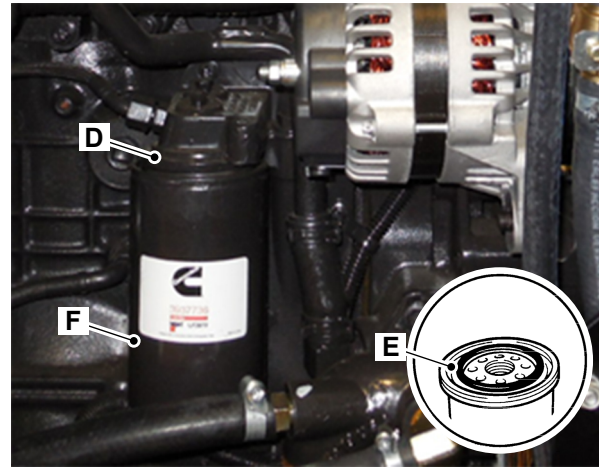
**CAUTION!** It is illegal to pollute drains, sewers or the ground. Clean up all spilt fluids and/or lubricants. Used fluids and/or lubricants, filters and contaminated materials must be disposed of in accordance with local regulations. Use authorised waste disposal sites.

**CAUTION!** Oil will gush from the hole when the drain plug is removed. Keep to one side when you remove the plug.

**CAUTION!** The oil filter canister will contain some oil which could spill out when you remove the canister.

## Component Identification

Figure 170.



- D Filter head
- E Seal
- F Filter canister

## Operation

### At Engine Running

The oil pump delivers oil at pressure to the oil filter via a port. The anti-drain seal is forced off its seat and oil flows through a large area paper element. Filtered oil enters the inner part filter before leaving the filter head via a port.

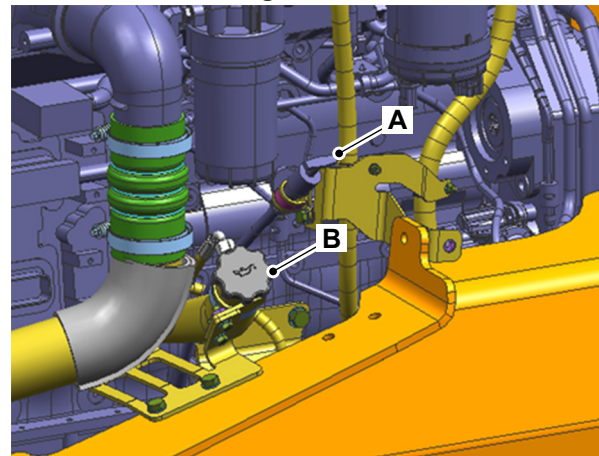
### At Engine Stopped

With the engine stopped oil pressure in the galleries and filter decays. The anti-drain seal falls on its seat and oil is prevented from draining from the filter assembly. The anti-drain pipe prevents approximately half the filter's oil capacity from draining. These features help protect the engine from oil starvation on start up.

## Check (Level)

1. Make the machine safe. Refer to (PIL 01-03).
2. Wait for the specified duration after the engine has stopped before you check the oil level. This gives time for the oil to drain into the oil sump.  
 Duration: 15min
3. Open the engine compartment cover. Refer to (PIL 06-06).
4. Remove the dipstick. Refer to Figure 171.

**Figure 171.**



- A** Dipstick
- B** Filler cap

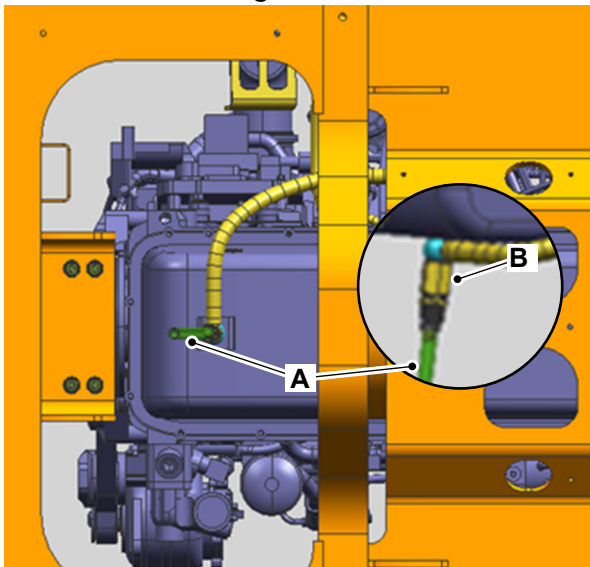
5. Check that the oil level is between the two marks on the dipstick.
6. Never operate the engine with the oil level below the low mark or above the high mark. Poor engine performance or damage can occur.
7. If necessary, add oil as follows:
  - 7.1. Remove the filler cap. Refer to Figure 171.
  - 7.2. Add the recommended oil through the filler point until it is at the correct level on the dipstick.
8. Install the dipstick.
9. Install the filler cap.
10. Close the engine compartment cover. Refer to (PIL 06-06).

## Remove and Install

### Remove

1. Make the machine safe with the lift arm lowered. Refer to PIL (01-03).
2. Open the engine compartment cover. Refer to PIL (06-06).
3. Remove the filler cap.
4. Drain the engine oil as follows:
  - 4.1. Make sure that the engine is warm.
  - 4.2. Put a suitable container underneath of the drain hose.
  - 4.3. Connect the drain hose to the quick release coupling.
  - 4.4. Allow oil to drain.
  - 4.5. Disconnect the drain hose from the quick release coupling.

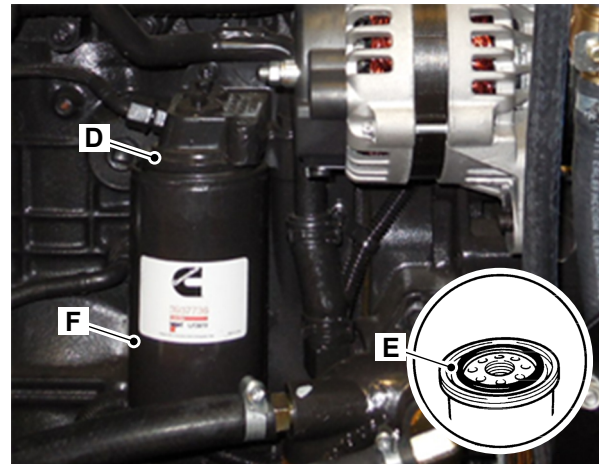
**Figure 172.**



**A** Quick release coupling  
**B** Drain hose

5. Remove the filter canister.
6. Make a note that the filter canister will be full of oil.
7. Clean the surface of the gasket on the filter head.

**Figure 173.**

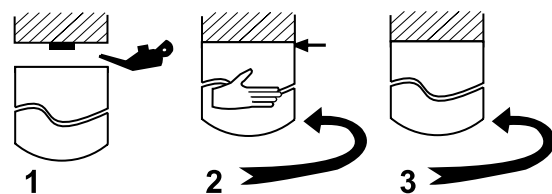


**D** Filter head  
**E** Seal  
**F** Filter canister

### Install

1. Fill the new filter canister with the correct grade of oil. Refer to (PIL 75-03).
2. Make sure that the oil filters are installed with a filter bypass valve.
3. Apply a thin layer clean oil to the seal.
4. Install the seal on the new filter canister.
5. Install the new filter canister until it just touches the filter head.
6. Rotate the filter canister to further 3/4 of a turn. Refer to Figure 174.

**Figure 174.**



7. Top up the correct grade of oil through the filler neck. Refer to (PIL 75-03).
8. Install the filler cap.
9. Close the engine compartment cover. Refer to PIL (06-06).
10. Start the engine.
  - 10.1. If there is no oil pressure within the specified duration after the engine is

started, stop the engine to decrease the risk of engine damage.

Duration: 15s

11. Check the system for leaks.
12. Stop the engine.
13. Let the engine cool for specified duration.

Duration: 10min

14. Check the oil level again.

## Health and Safety

▲ **Notice:** Do not run the engine when the element has been removed.

**Notice:** The outer element must be renewed immediately if the warning light on the instrument panel illuminates.

## Check (Condition)

The air filter element (s) should be changed at the recommended service interval, refer to the Maintenance Schedules. Refer to (PIL 78-24).

Check all the hose connections for loose installations and damaged hose clamps, look specifically for splits or cracks in the hoses. Pay particular attention to the connections on the air intake to turbo compressor and on the crossover tube.

Renew any damaged components.

In addition, most air filter housings will be installed with a vacuum switch. The switch will detect if there is a restriction on the air intake, and activate warning indicators such as an audible alarm and/or a visual indicator.

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