

## SECTION 2 ENGINE

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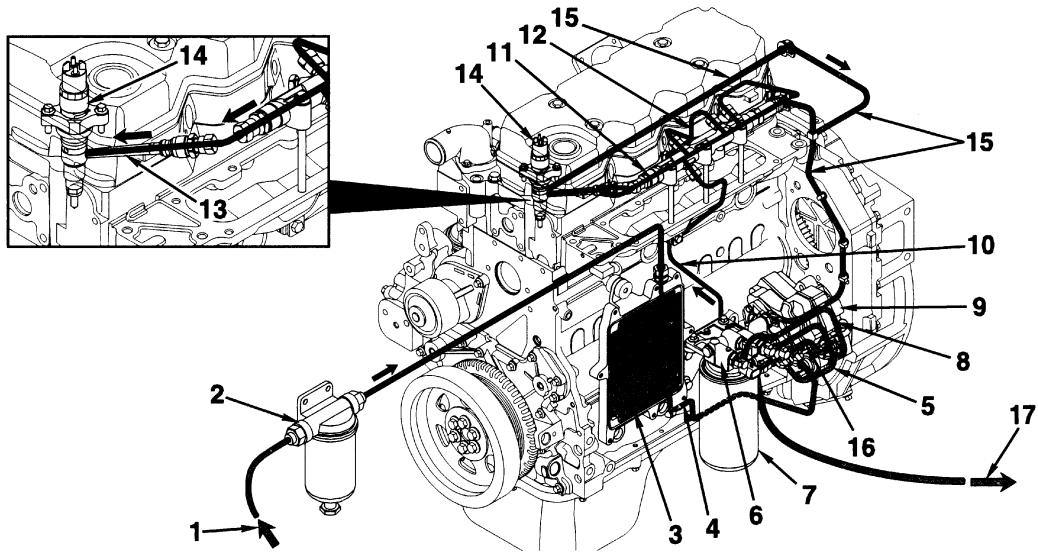
# SECTION 2 ENGINE

## GROUP 1 STRUCTURE AND FUNCTION

### 1. SYSTEM DIAGRAMS

The following drawings show the flow through the engine systems.

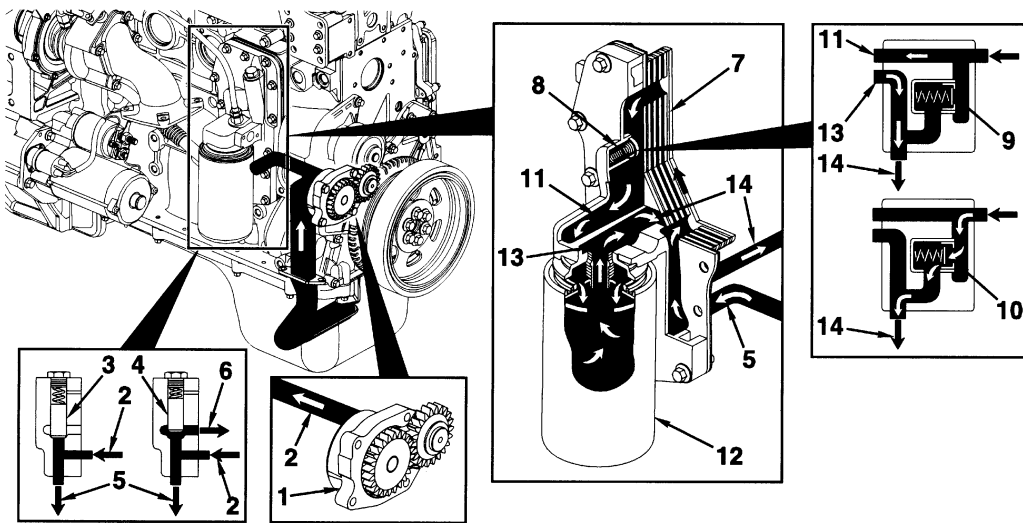
#### 1) FUEL SYSTEM



7607AEG02

- |    |  |    |  |
|----|--|----|--|
| 1  | From fuel tank                               | 11 | Fuel rail  |
| 2  | Water/fuel separator (not mounted on engine) | 12 | To injectors   |
| 3  | ECM cooling plate                            | 13 | High-pressure connector                                      |
| 4  | To fuel gear pump                            | 14 | Injector   |
| 5  | To fuel filter                               | 15 | Fuel return from injectors and fuel rail to fuel filter head |
| 6  | Fuel filter head                             | 16 | Fuel return from high-pressure pump to fuel filter head      |
| 7  | Fuel filter                                  | 17 | To fuel tank   |
| 8  | To high-pressure pump                        |    |  |
| 9  | High-pressure pump                           |    |  |
| 10 | To fuel rail                                 |    |  |

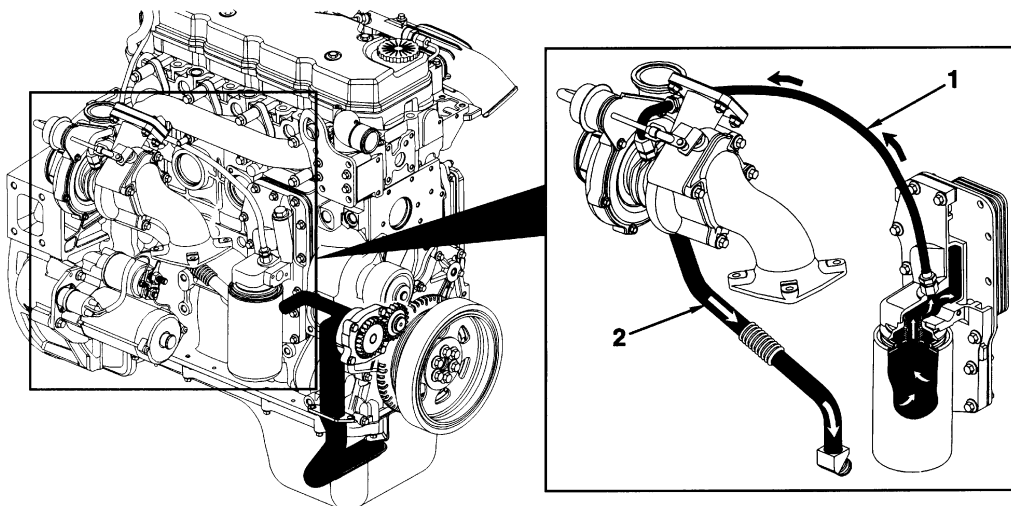
## 2) LUBRICATING OIL SYSTEM



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- |                                    |                                     |
|------------------------------------|-------------------------------------|
| 1 Gerotor lubricating oil pump     | 8 Filter bypass valve               |
| 2 From lubricating oil pump        | 9 Filter bypass valve closed        |
| 3 Pressure regulating valve closed | 10 Filter bypass valve open         |
| 4 Pressure regulating valve open   | 11 To lubricating oil filter        |
| 5 To lubricating oil cooler        | 12 Full-flow lubricating oil filter |
| 6 To lubricating oil pump supply   | 13 From lubricating oil filter      |
| 7 Lubricating oil cooler           | 14 Main lubricating oil rifle       |

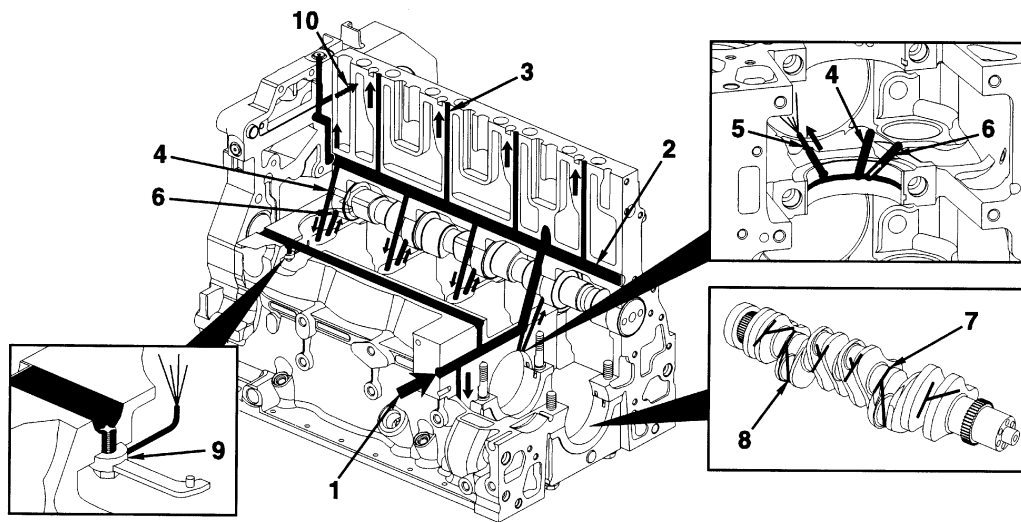
### (1) Lubrication for the turbocharger



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- |                                       |                                      |
|---------------------------------------|--------------------------------------|
| 1 Turbocharger lubricating oil supply | 2 Turbocharger lubricating oil drain |
|---------------------------------------|--------------------------------------|

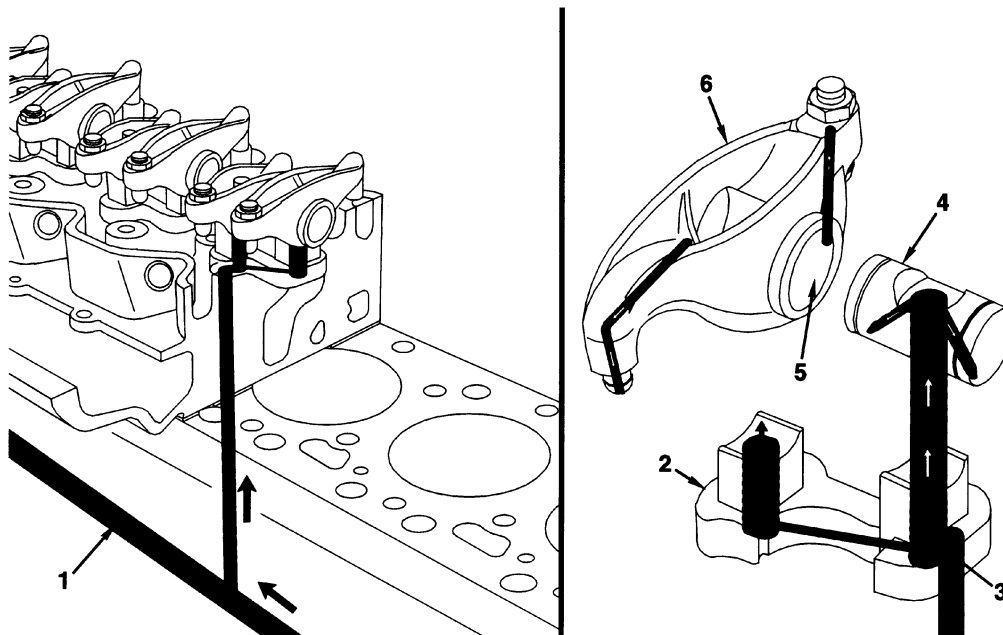
## (2) Lubrication for the power components



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- |   |                                 |    |   |
|---|---------------------------------|----|---|
| 1 | From lubricating oil cooler     | 6  | To camshaft                               |
| 2 | Main lubricating oil rifle      | 7  | Crankshaft main journal                   |
| 3 | To valve train                  | 8  | Oil supply to rod bearings                |
| 4 | From main lubricating oil rifle | 9  | Directed piston-cooling nozzle            |
| 5 | To piston-cooling nozzle        | 10 | To internal lubrication of air compressor |

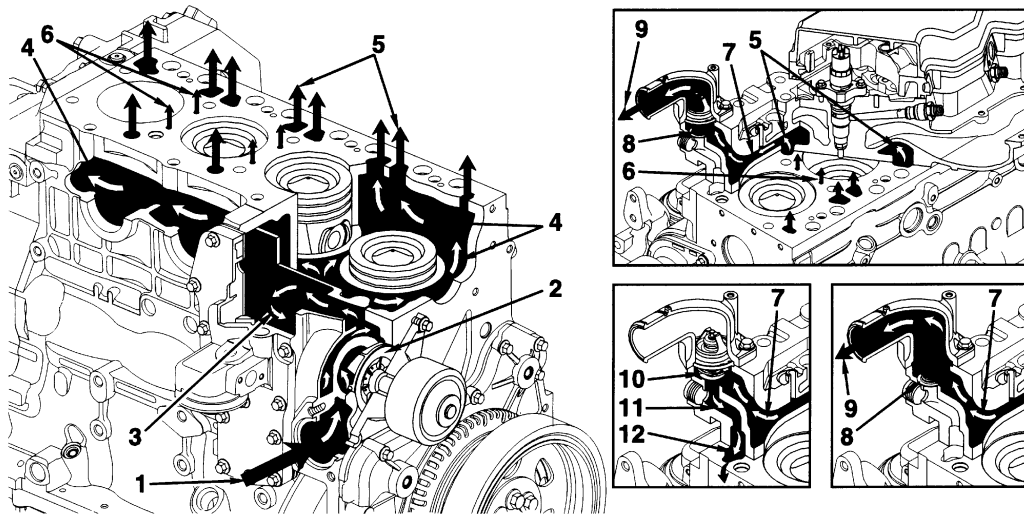
## (3) Lubrication for the overhead



7607AEG06

- |   |                            |   |                    |
|---|----------------------------|---|--------------------|
| 1 | Main lubricating oil rifle | 4 | Rocker lever shaft |
| 2 | Rocker lever support       | 5 | Rocker lever bore  |
| 3 | Transfer slot              | 6 | Rocker lever       |

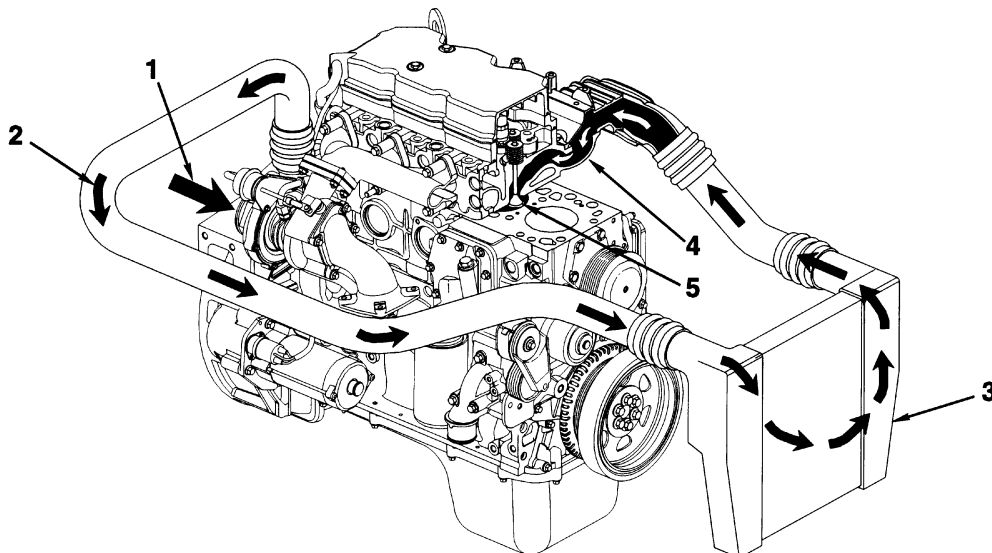
### 3) COOLING SYSTEM



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- |   |   |    |                                    |
|---|---|----|------------------------------------|
| 1 | Coolant inlet                                     | 7  | Coolant flow to thermostat housing |
| 2 | Pump Impeller                                     | 8  | Coolant bypass passage             |
| 3 | Coolant flow past lubricating oil cooler          | 9  | Coolant flow back to radiator      |
| 4 | Coolant flow past cylinders                       | 10 | Bypass closed                      |
| 5 | Coolant flow from cylinder block to cylinder head | 11 | Coolant bypass in cylinder head    |
| 6 | Coolant flow between cylinders                    | 12 | Coolant flow to water pump inlet   |

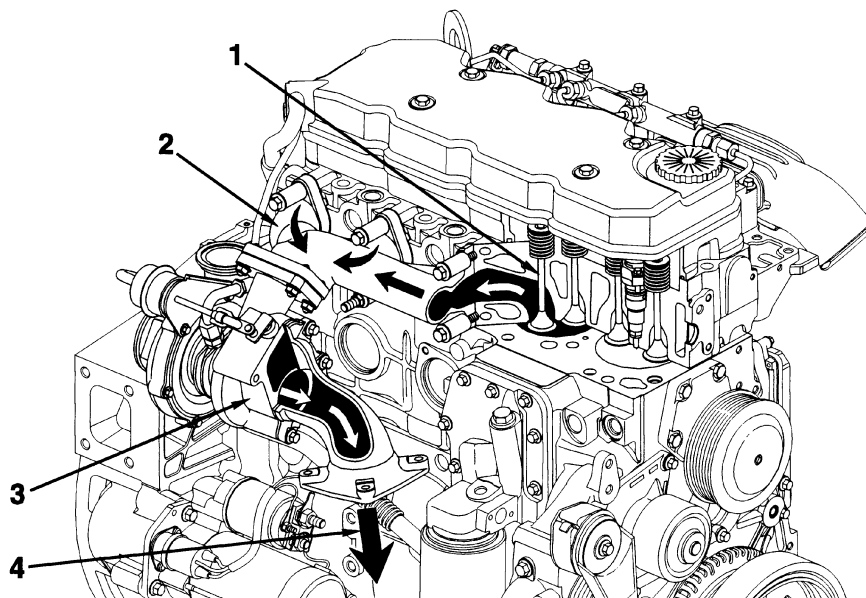
### 4) AIR INTAKE SYSTEM



7607AEG08

- |   |                                       |   |   |
|---|---------------------------------------|---|---|
| 1 | Intake air inlet to turbocharger      | 4 | Intake manifold<br>(Integral part of cylinder head) |
| 2 | Turbocharger air to charge air cooler | 5 | Intake valve  |
| 3 | Charge air cooler                     |   |   |

## 5) EXHAUST SYSTEM



7607AEG09

- |   |                  |   |                             |
|---|------------------|---|-----------------------------|
| 1 | Exhaust valve    | 3 | Turbocharger                |
| 2 | Exhaust manifold | 4 | Turbocharger exhaust outlet |

## GROUP 2 ENGINE SPEED & STALL RPM

### 1. TEST CONDITION

- 1) Normal temperature of the whole system
  - Coolant : Approx 80°C (176°F)
  - Hydraulic oil : 45 ± 5°C (113 ± 10°F)
  - Transmission oil : 75 ± 5°C (167 ± 10°F)
- 2) Normal operating pressure : See page 6-51.

### 2. SPECIFICATION

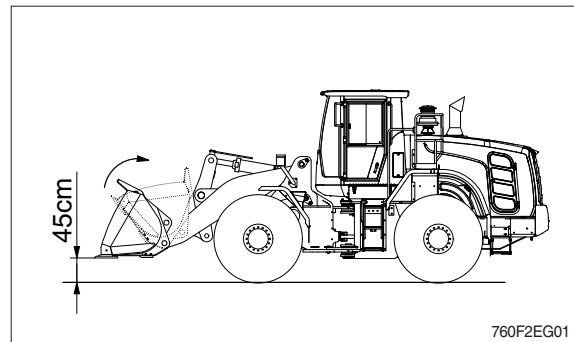
Engine speed, rpm (P mode)						Remark
Low idle	High idle	Pump stall	Converter stall	Full stall	Fan motor	
950±25	2150±50	2150±70	1960±70	1920±100	850±50	

### 3. ENGINE RPM CHECK

Remark : If the checked data is not normal, it indicates that the related system is not working properly. Therefore, it is required to check the related system pressure : See page 6-51.

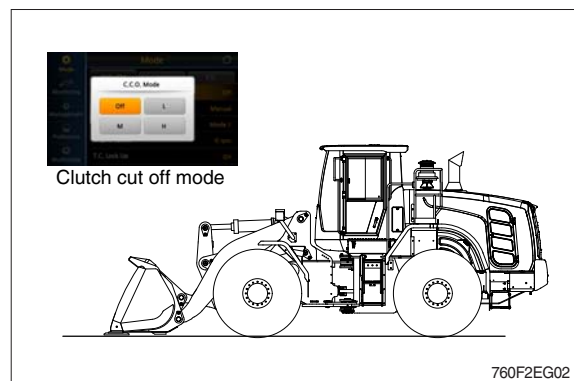
#### 1) Pump stall rpm

- Start the engine and raise the bucket approx 45 cm (1.5 ft) as the figure.
- Press the accelerator pedal fully and operate the bucket control lever to the retract position fully.
- Check the engine rpm at the above condition.



#### 2) Converter stall rpm

- Start the engine and lower the bucket on the ground as the figure.
- Set the clutch cut off mode at the OFF position.
- Press the brake pedal and accelerator pedal fully.
- Shift the transmission lever to the 4th forward position.
- Check the engine rpm at the above condition.



#### 3) Full stall rpm

- Start the engine and raise the bucket approx 45 cm (1.5 ft) as the figure.
- Set the clutch cut off mode at the OFF position.
- Press the brake pedal and accelerator pedal fully .
- Shift the transmission lever to the 4th forward position and operate the bucket lever to the retract position fully.
- Check the engine rpm at the above condition.

