

SECTION 2 ENGINE

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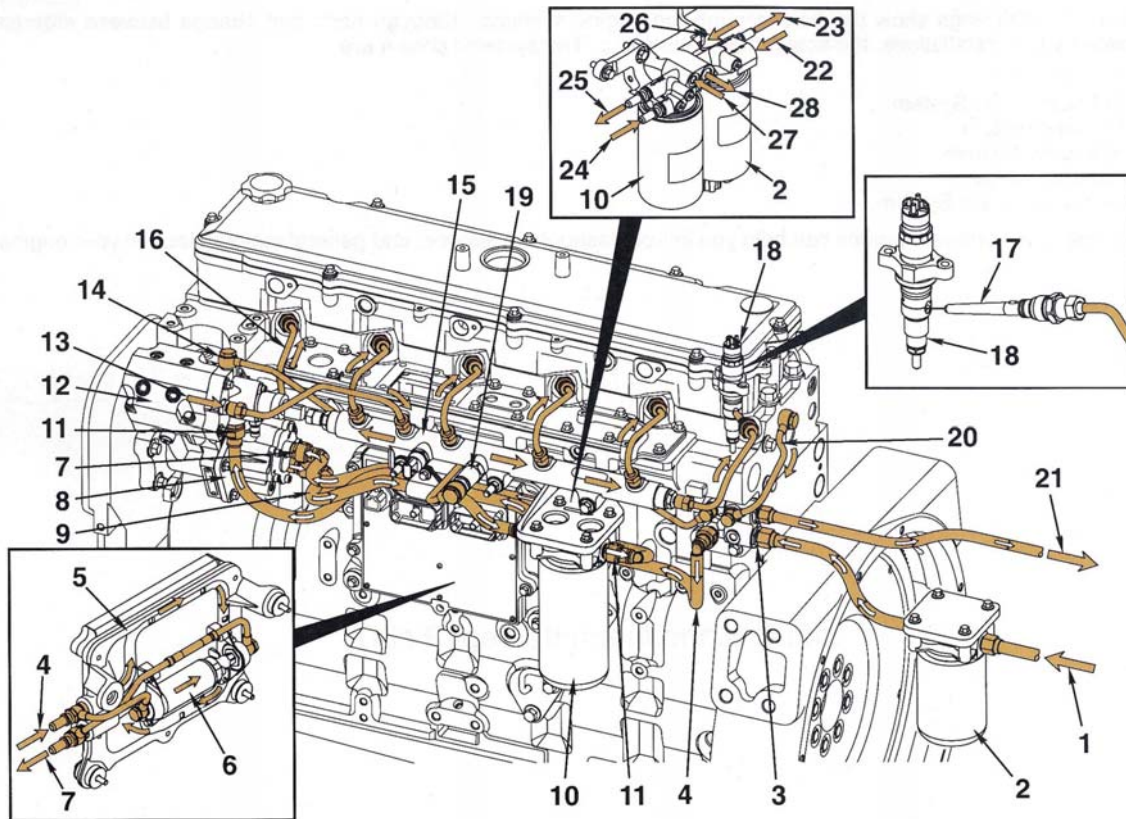
SECTION 2 ENGINE

GROUP 1 STRUCTURE AND FUNCTION

1. SYSTEM DIAGRAMS

The following drawings show the flow through the engine systems.

1) FUEL SYSTEM

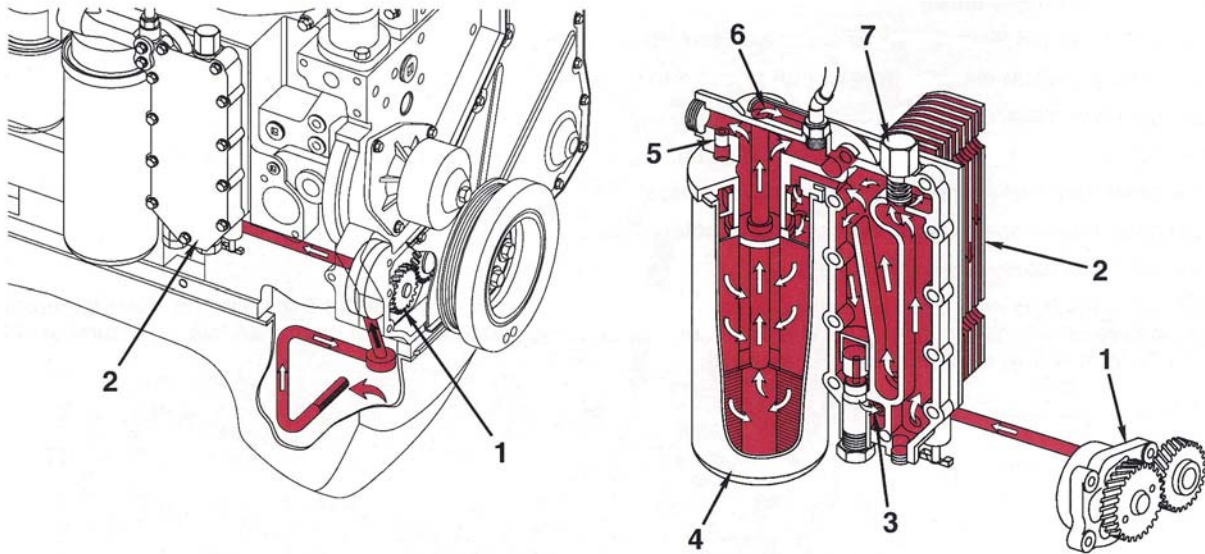


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- | | |
|---|---|
| 1 Fuel from supply tank | 15 Fuel rail |
| 2 Fuel filter and water separator | 16 High-pressure injector supply lines |
| 3 Fuel supply connection | 17 High-pressure fuel connector |
| 4 Fuel supply to ECM mounted fuel lift pump | 18 Fuel injector |
| 5 ECM cooling plate | 19 Fuel pressure relief valve |
| 6 ECM mounted fuel lift pump | 20 Fuel injector drain flow line |
| 7 Fuel outlet from ECM mounted fuel lift pump/fuel to gear pump | 21 Fuel return to supply tanks |
| 8 Fuel gear pump | 22 Fuel supply to fuel filter and water separator |
| 9 Fuel from gear pump to fuel filter | 23 Fuel supply to ECM mounted fuel lift pump |
| 10 Pressure-side fuel filter | 24 Fuel supply to pressure-side fuel filter |
| 11 Fuel to fuel pump actuator | 25 Fuel supply to high-pressure fuel pump |
| 12 High-pressure fuel pump | 26 Fuel drain from fuel rail and injector drains |
| 13 Fuel outlet from high-pressure pump | 27 Fuel drain from high-pressure fuel pump |
| 14 High-pressure pump drain flow connection | 28 Fuel return to supply tanks |

2) LUBRICATING OIL SYSTEM

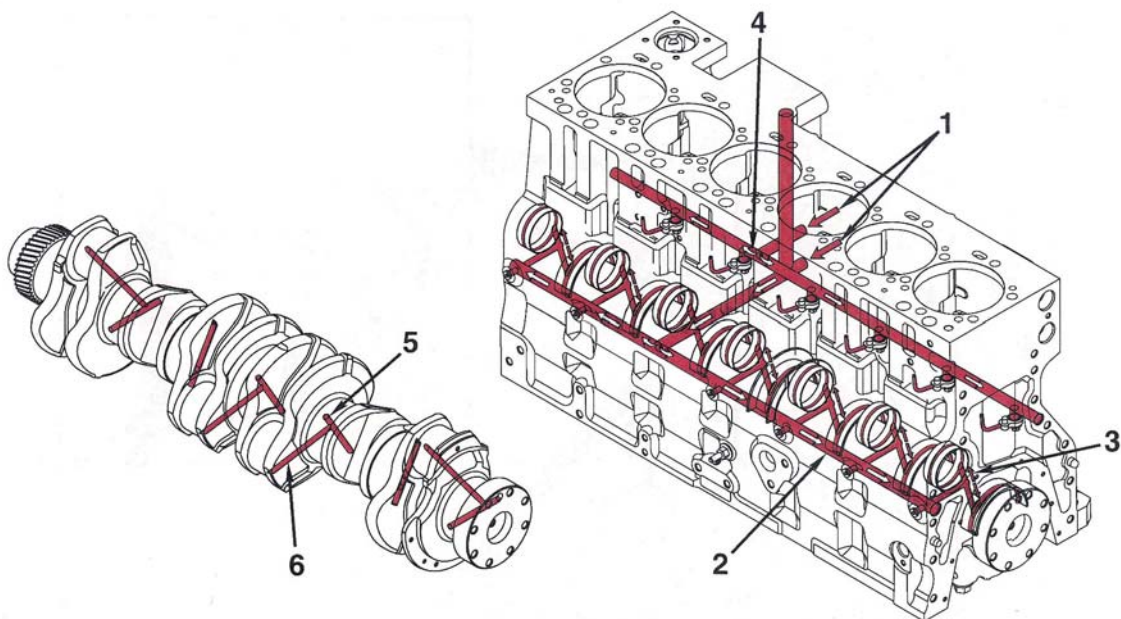
(1) Lubricating oil cooler flow



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|-------------------------------------|---|
| 1 Gerotor lubricating oil pump | 5 Filter bypass valve |
| 2 Lubricating oil cooler | 6 From lubricating oil filter to main oil rifle |
| 3 Bypass oil to lubricating oil pan | 7 Oil thermostat |
| 4 Full flow lubricating oil filter | |

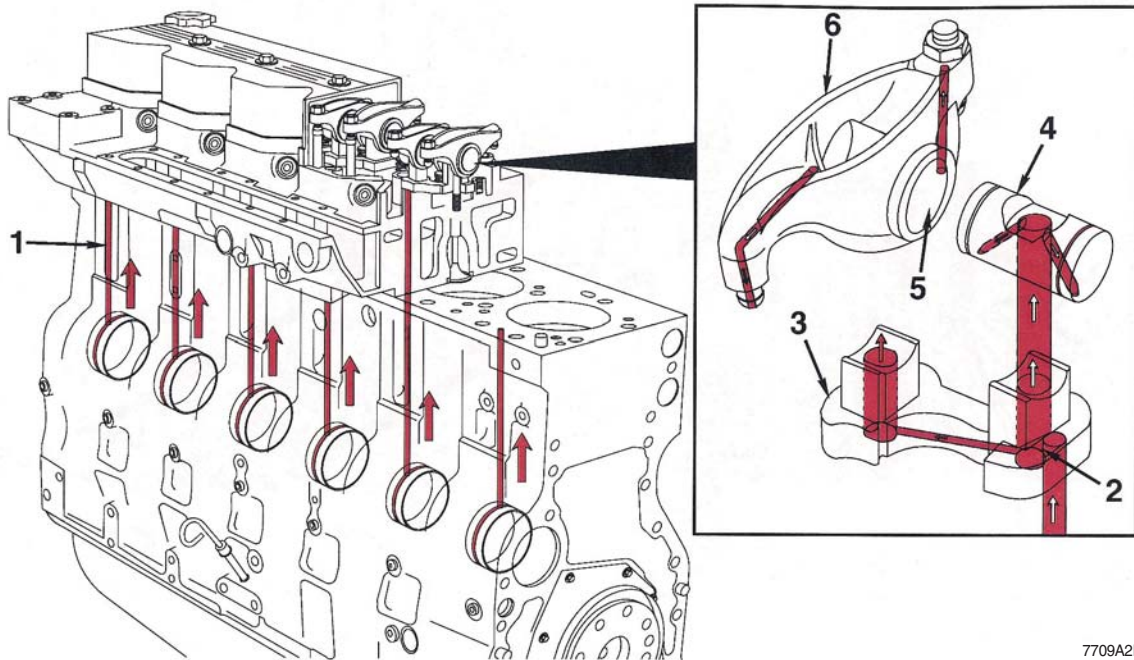
(2) Lubrication for power components



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|-------------------------------|-----------------------------------|
| 1 From lubricating oil filter | 4 To piston cooling nozzle |
| 2 Main lubricating oil rifle | 5 From main lubricating oil rifle |
| 3 To camshaft | 6 To connecting rod bearing |

(3) Lubrication for the overhead

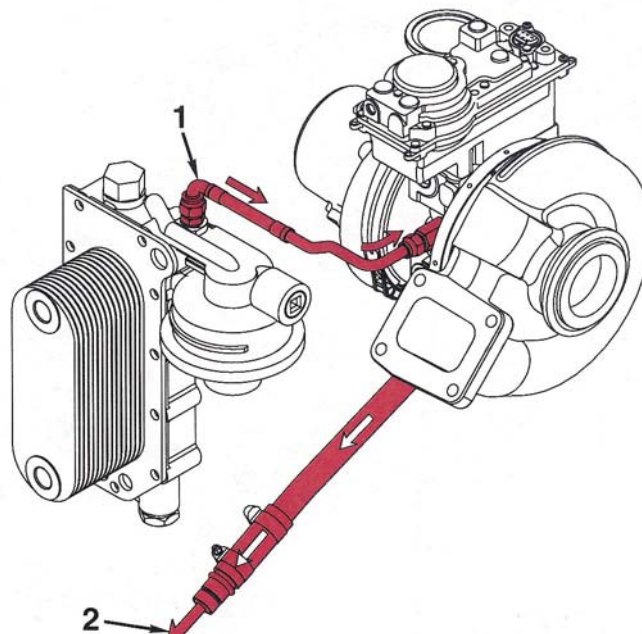


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- 1 From cam bushings
- 2 Transfer slot
- 3 Rocker lever support

- 4 Rocker lever shaft
- 5 Rocker lever bore
- 6 Rocker lever

(4) Turbocharger oil flow

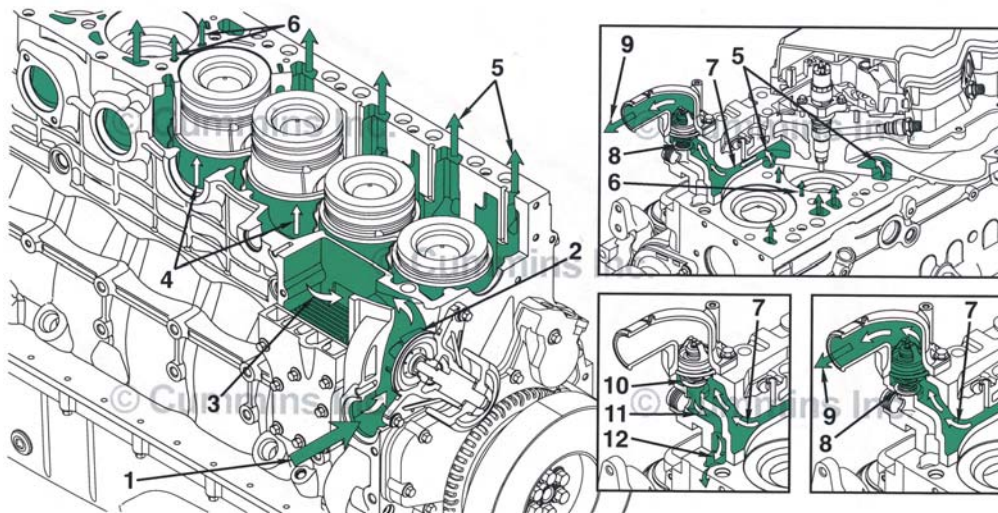


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- 1 Turbocharger oil supply from oil filter head

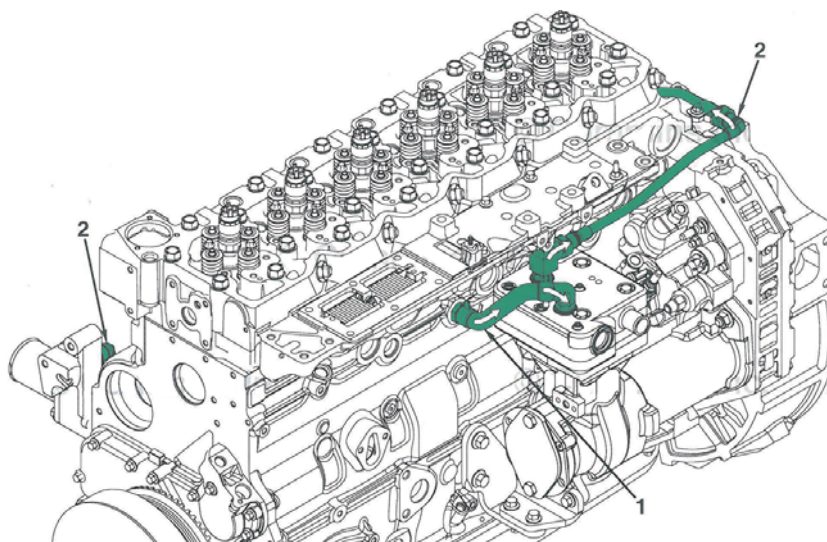
- 2 Turbocharger oil drain to cylinder block

3) COOLING SYSTEM



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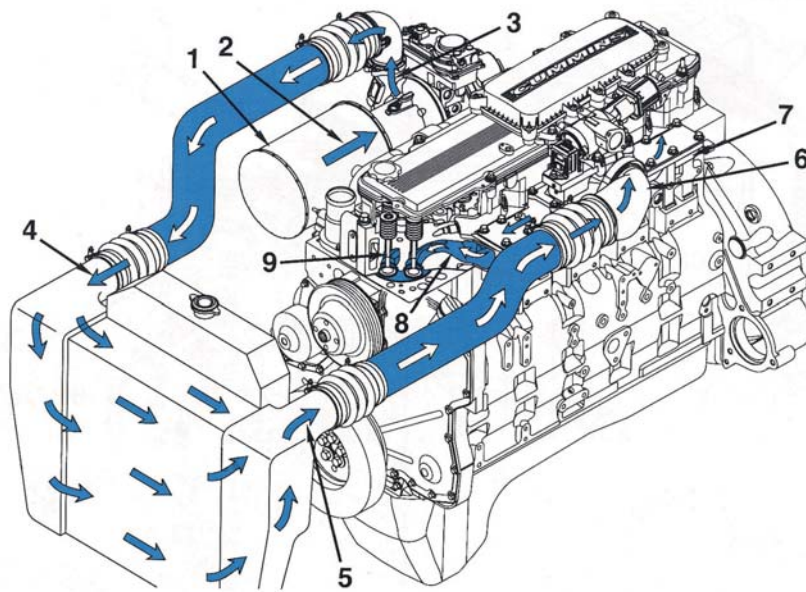
- | | | | |
|---|---|----|---|
| 1 | Coolant inlet from radiator and aftertreatment diesel exhaust fluid (DEF) dosing valve and DEF tank | 7 | Coolant flow to thermostat housing |
| 2 | Water pump Impeller | 8 | Thermostat open - bypass passage closed |
| 3 | Coolant flow past lubricating oil cooler | 9 | Coolant flow back to radiator |
| 4 | Coolant flow past cylinders | 10 | Thermostat closed - bypass passage open |
| 5 | Coolant flow from cylinder block to cylinder head | 11 | Coolant bypass passage in cylinder head |
| 6 | Coolant flow between cylinders | 12 | Coolant flow to water pump inlet |



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- | | |
|---|---|
| 1 | Air compressor coolant supply line |
| 2 | Air compressor coolant return to coolant inlet connection |

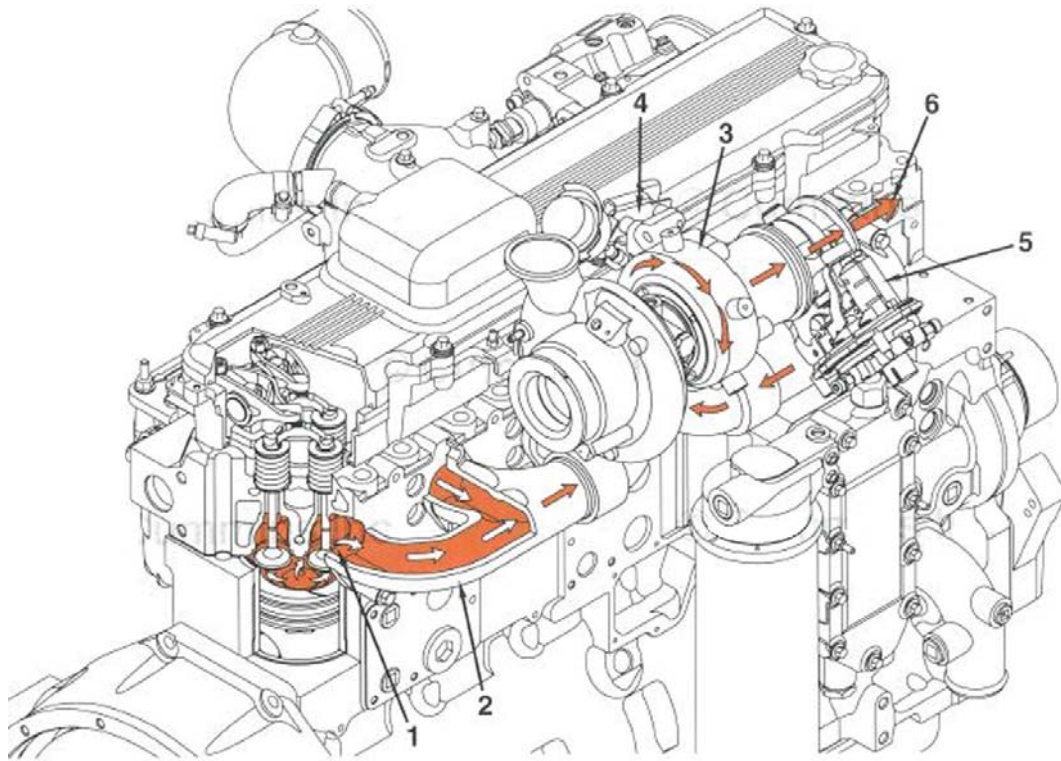
4) AIR INTAKE SYSTEM



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- | | | | |
|---|--------------------------------|---|---|
| 1 | Air cleaner | 6 | Air intake connection |
| 2 | Turbocharger compressor inlet | 7 | Intake manifold
(Integral part of the cylinder head) |
| 3 | Turbocharger compressor outlet | 8 | Intake port |
| 4 | Charge air cooler inlet | 9 | Intake valve |
| 5 | Charge air cooler outlet | | |

5) EXHAUST SYSTEM



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- | | | | |
|---|----------------------|---|---|
| 1 | Exhaust valve port | 4 | Wastegate valve assembly |
| 2 | Exhaust manifold | 5 | Exhaust pressure regulator |
| 3 | Turbocharger turbine | 6 | Exhaust gas flow to aftertreatment system |

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 6-57.

2. SPECIFICATION

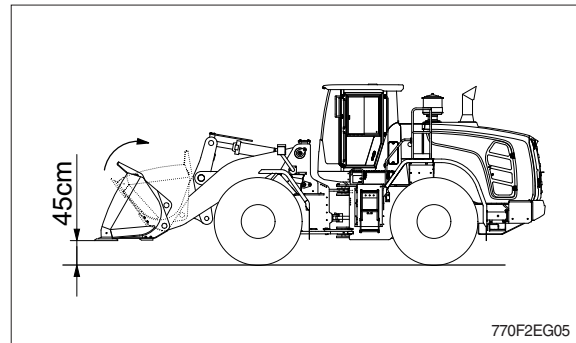
Engine speed, rpm (P mode)						Remark
Low idle	High idle	Pump stall	Converter stall	Full stall	Fan motor	
800 ± 25	2130 ± 50	2140 ± 70	1850 ± 70 (4-speed) 1830 ± 70 (5-speed)	1810 ± 70 (4-speed) 1790 ± 70 (5-speed)	950 ± 50	

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 6-57.

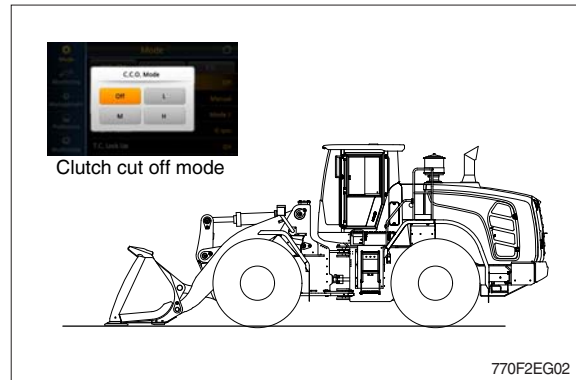
1) Pump stall rpm

- 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.



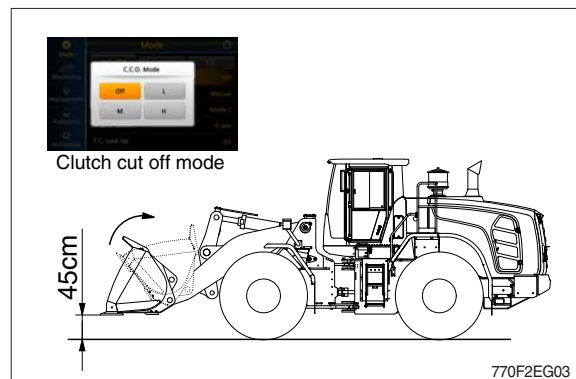
2) Converter stall rpm

- 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.



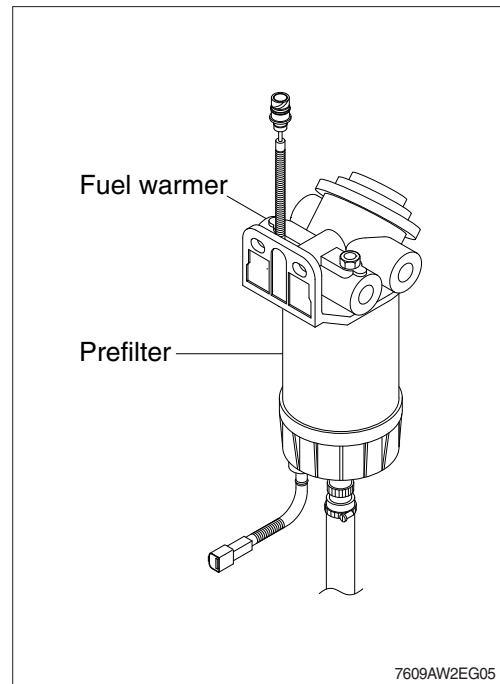
GROUP 3 FUEL WARMER SYSTEM

1. SPECIFICATION

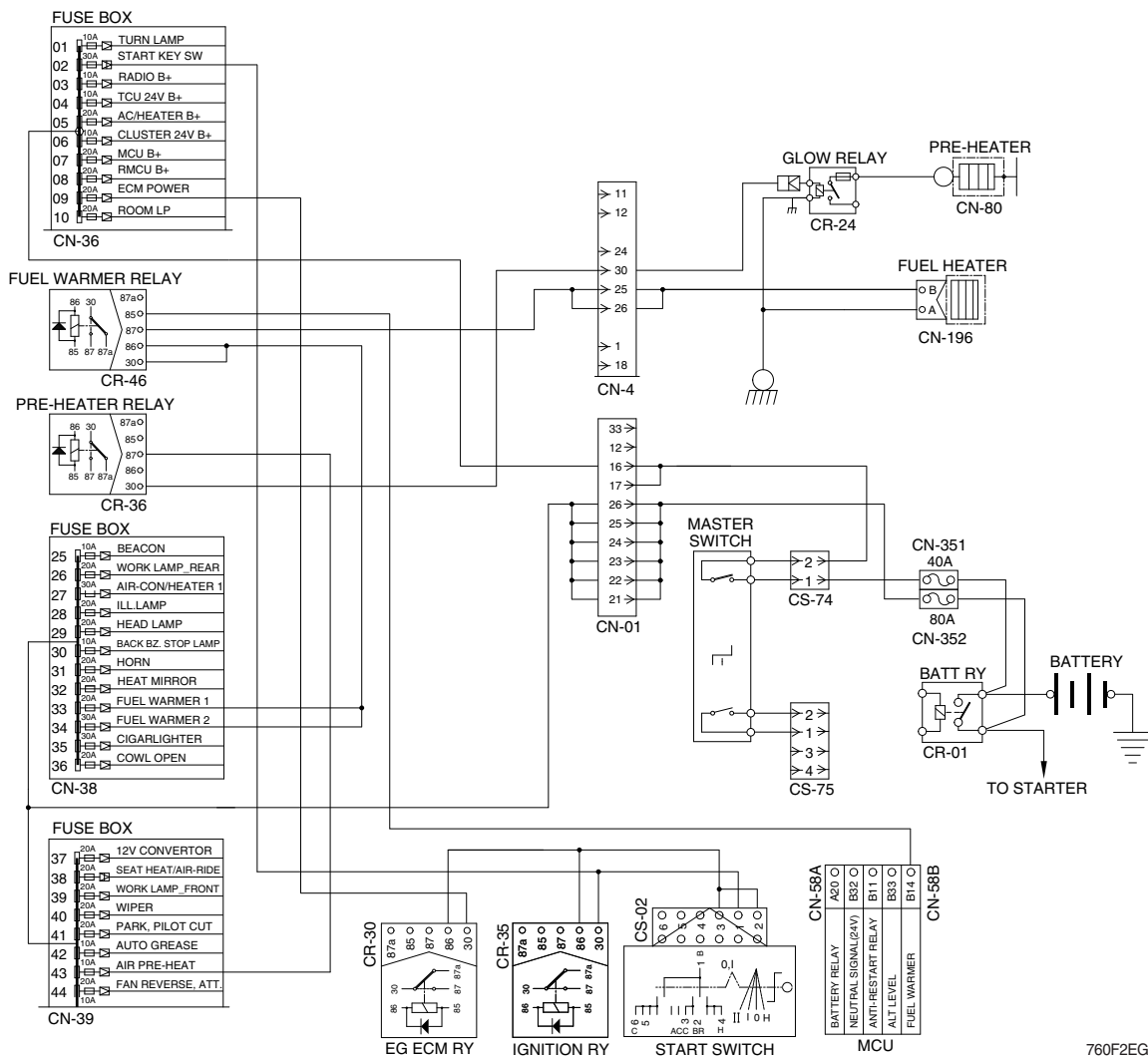
- 1) Operating voltage : $24 \pm 4V$
- 2) Power : $350 \pm 50W$
- 3) Current : 15A

2. OPERATION

- 1) The current of fuel warmer system is automatically controlled without thermostat according to fuel temperature.
- 2) At the first state, the 15A current flows to the fuel warmer and engine may be started in 1~2 minutes.
- 3) If the fuel starts to flow, ceramic-disk in the fuel warmer heater senses the fuel temperature to reduce the current as low as 1.5A.
So, fuel is protected from overheating by this mechanism.



3. ELECTRIC CIRCUIT



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