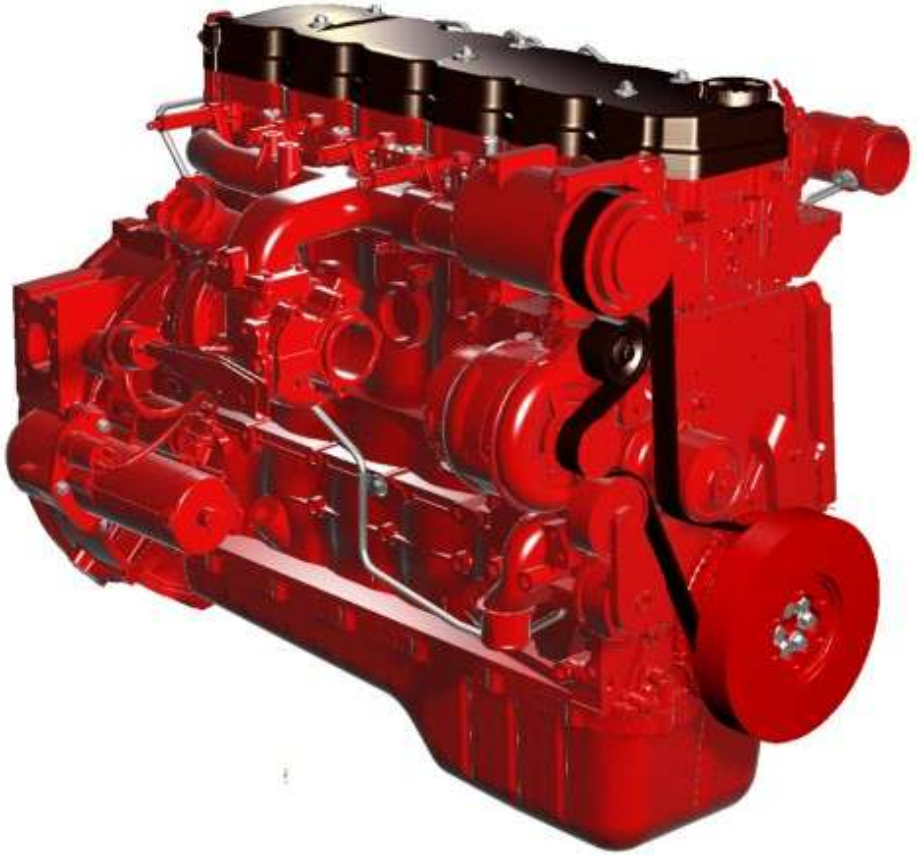
- **ISBe – ISLe Engine Overview Training at TCL**



General Engine Specifications

4 & 6 Cylinder versions

Common Bore and Stroke 4.21 in [107 mm] X 4.88 in [124 mm]

6 Cyl Displacement 409 C.I.D. [6.7 liters]

6 Cyl Firing Order 1 5 3 6 2 4

4 Cyl Displacement 275 C.I.D. [4.5 liters]

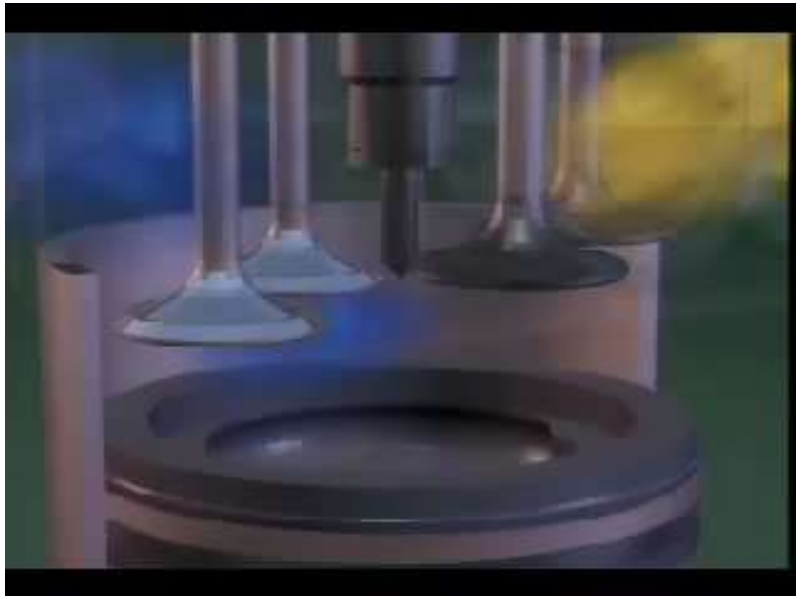
4 Cyl Firing Order 1 4 3 2

Intake Valve Clearance 0.010 in [0.254 mm]

Exhaust Valve Clearance 0.020 in [0.508 mm]

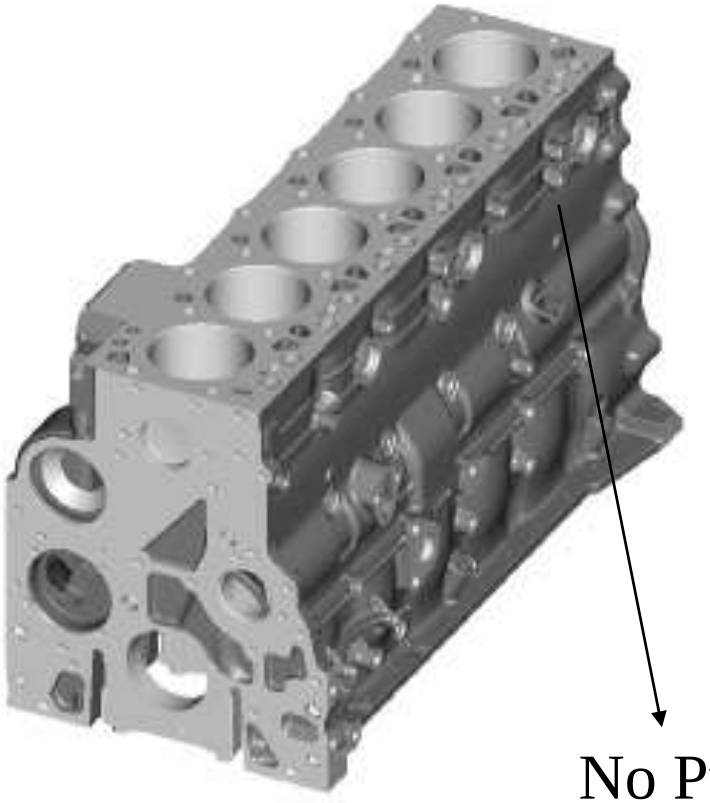
24 Valves and Centered Injection

- Improved combustion
  - Performance
  - Power density
  - Emissions
- Uniform ring temperature
  - Durability
  - Oil control
  - Emissions



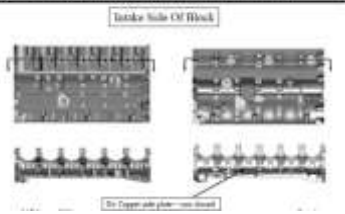
B Series Cylinder Block

ISB^{e} Cylinder Block



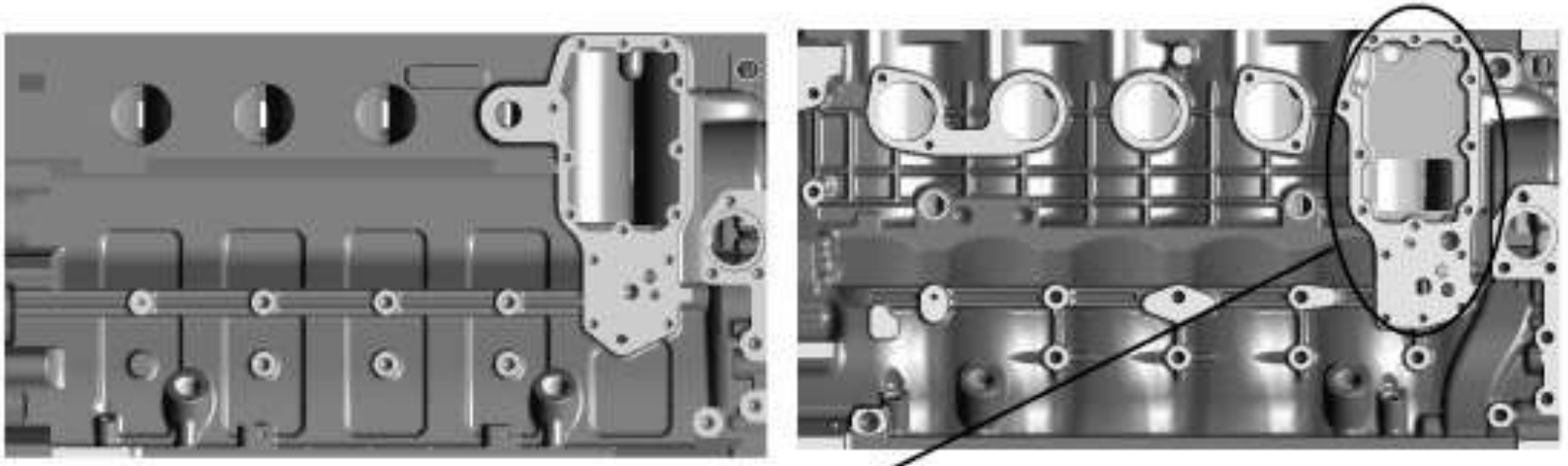
No Push Rod Cover

Cylinder Block Comparison B Series Vs ISB



Cylinder Block Comparison B Series Vs ISB^{e}

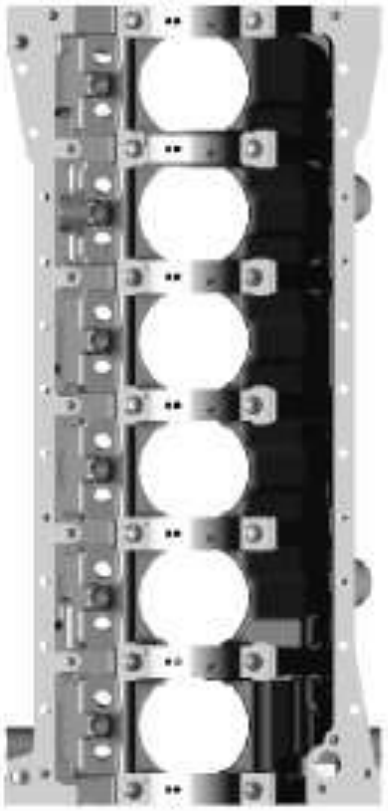
Exhaust Side Of Block

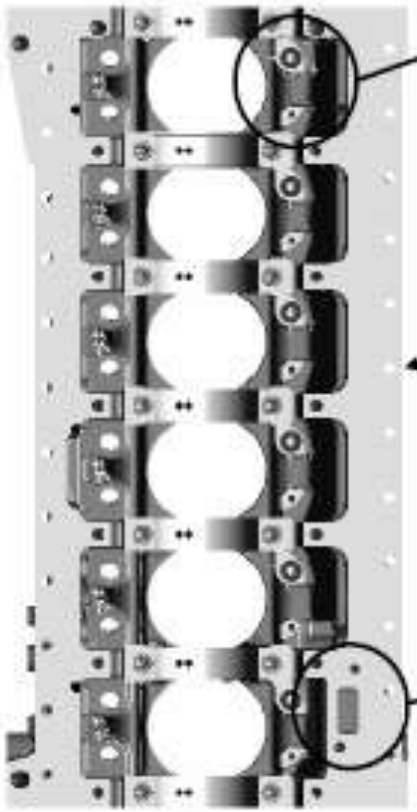


Improved sealing geometry; Closed window for improved coolant flow across 7 plate cooler; Dump to Pump; J-Jet feed

Cylinder Block Comparison B Series Vs ISB^{e}

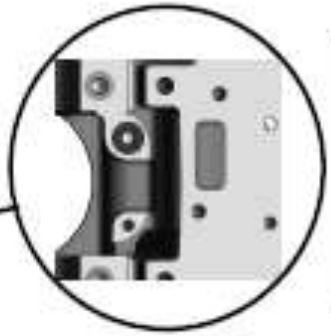
Bottom View Of Block





Piston Cooling Nozzle machining – must not clip bulkheads

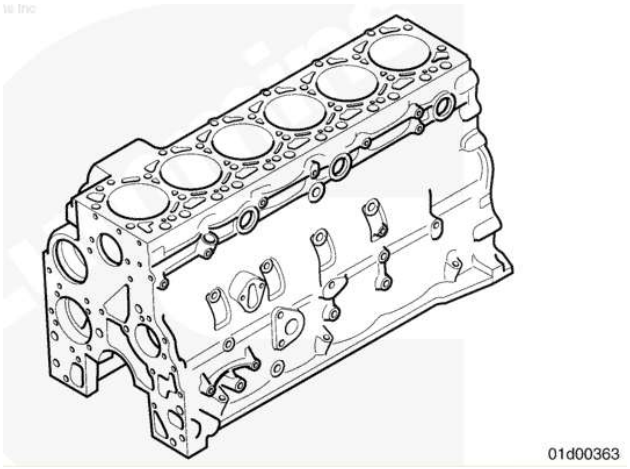
Block skirt width increased for suspended pan

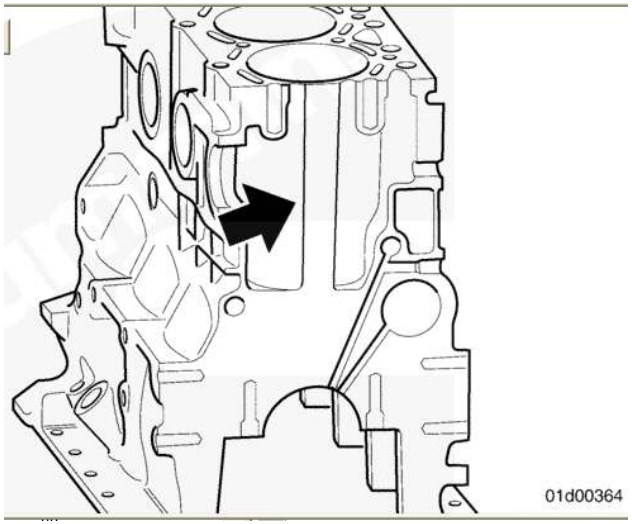


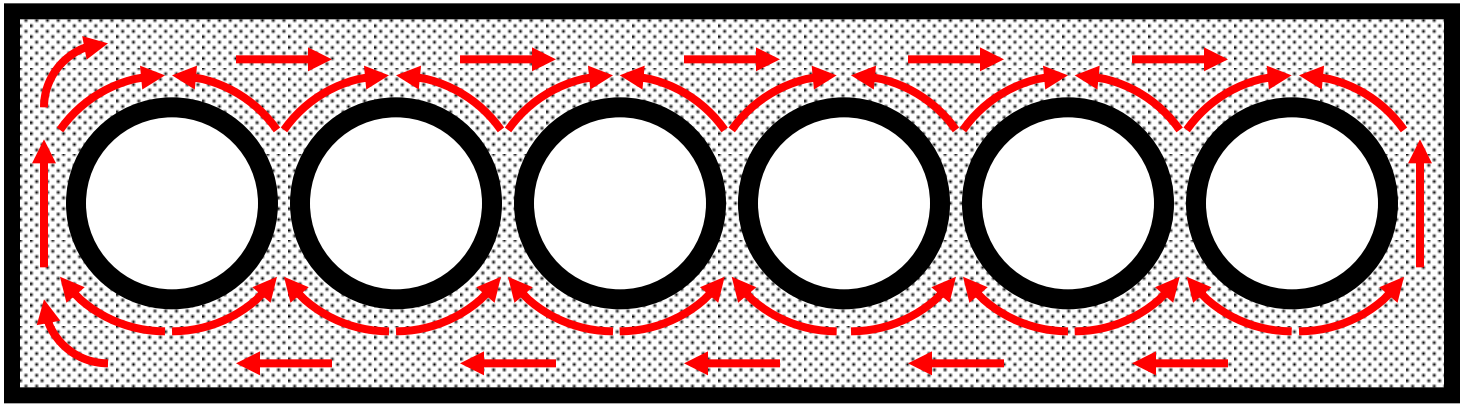
Increased diameter suction tube with rectangular flange profile and cored cavity in block

Cylinder Block

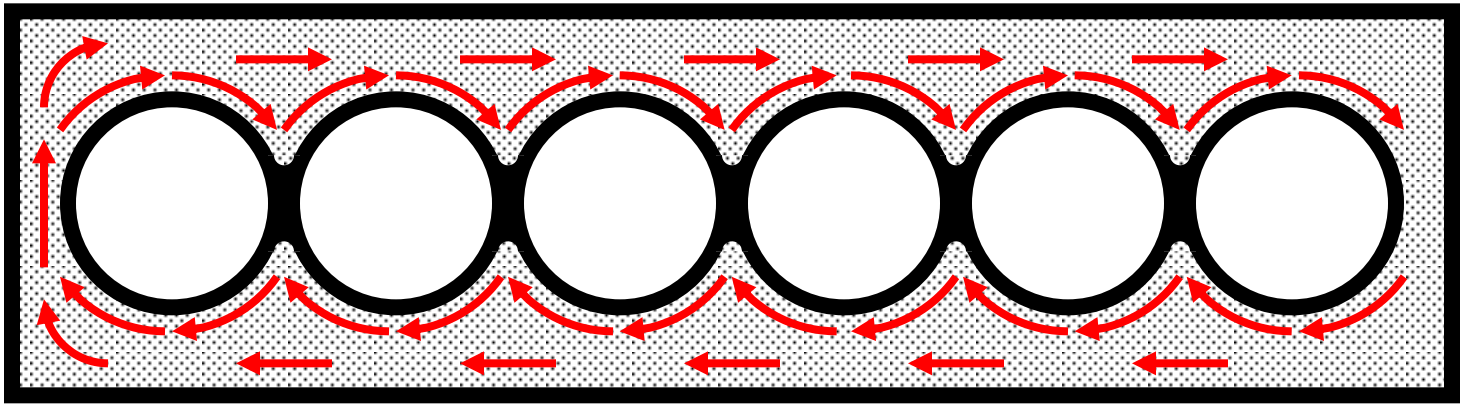
- The casting is a skirted design which incorporates ribs for superior strength and noise reduction
- The cylinder block uses bored cylinders as opposed to liners. In the event of damage or wear out, the cylinders may be able to be repaired.
- Unlike the majority of previous B series cylinder blocks, the cylinder block is of a conjoined bore design







Traditional Cylinder Block Design (ISB & B3.9/B5.9)



New Cylinder Block Design

(QSB4.5/6.7, ISBe4, ISB CM2150, ISBe CM2150, & ISDe4.5/6.7)

Cylinder Block Comparison B Series Vs ISB^{e}

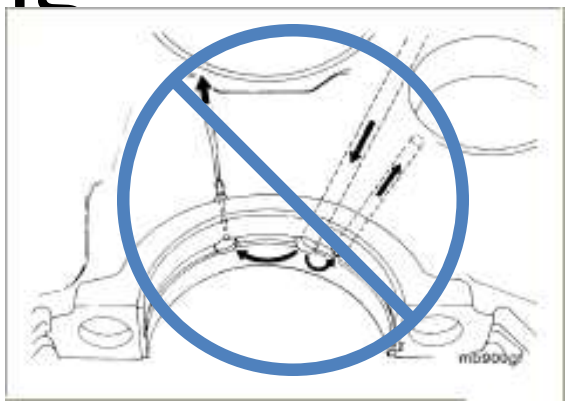
Gallery Cooled Pistons and piston cooling nozzles

Piston Nozzle in position

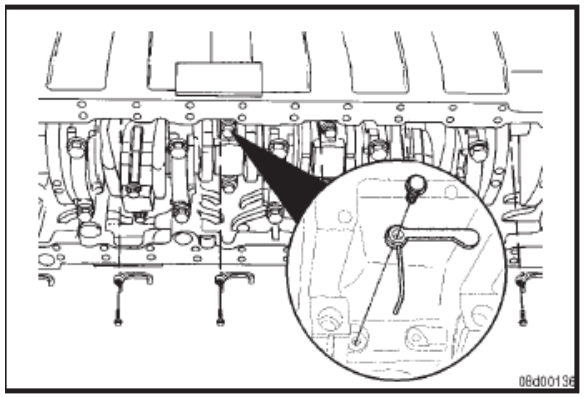
Piston at TDC

Piston Cooling

- Cylinder blocks are <u>not</u> machined for saddle jet piston cooling nozzles

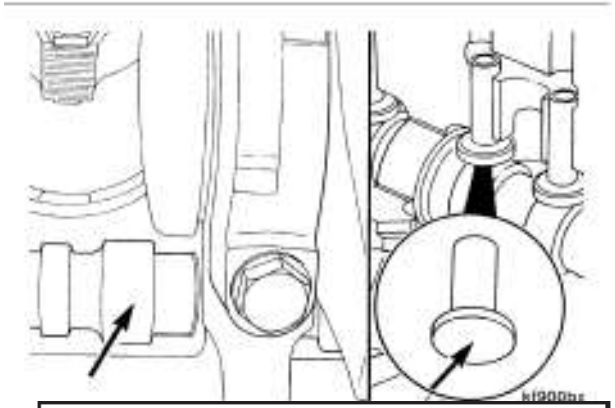


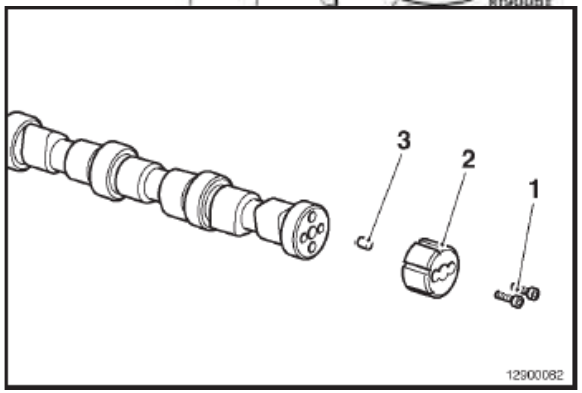
- Only J-Jet piston cooling nozzles are used

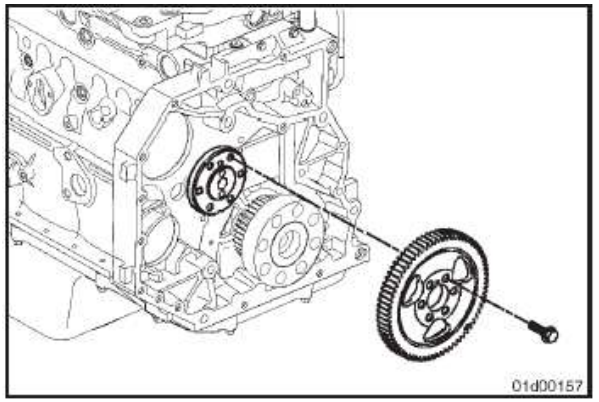


Camshaft, Tappets, Push Rods and Camshaft Gear

- Sliding Tappets
- Cast Iron Camshaft
- Camshaft speed indicator ring mounted to the end of the camshaft at the front of the engine
- Bolted Camshaft Gear
- Thrust plate between camshaft gear mounting flange and the cylinder block



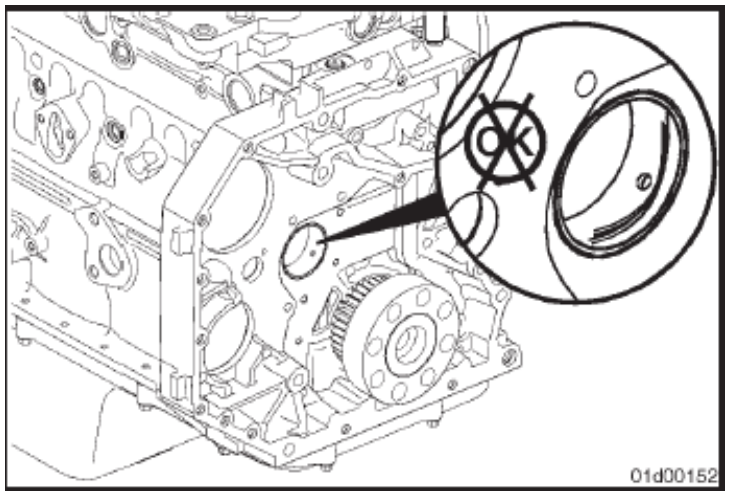


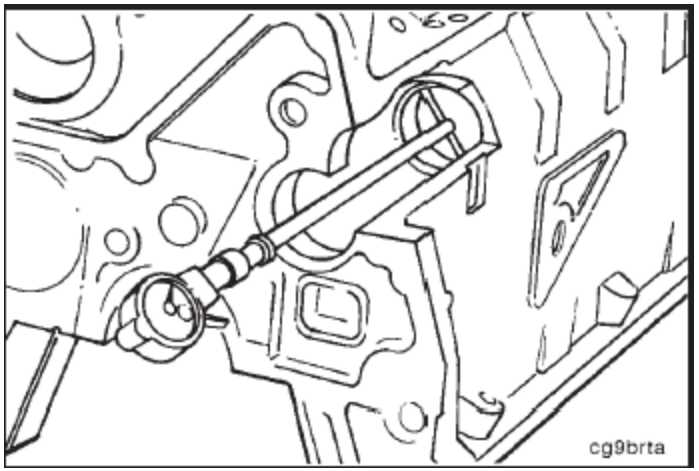


Camshaft Bushing

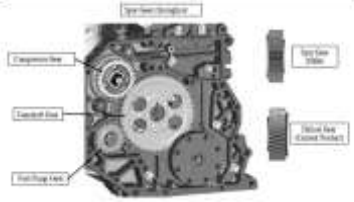
- Camshaft Bushings at rear bore

- No camshaft bushing installed in other bores (parent bore material)



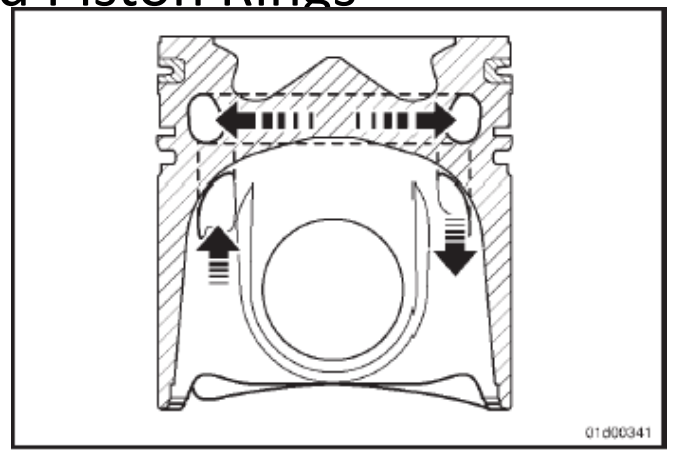


ISBe Rear Gear Train

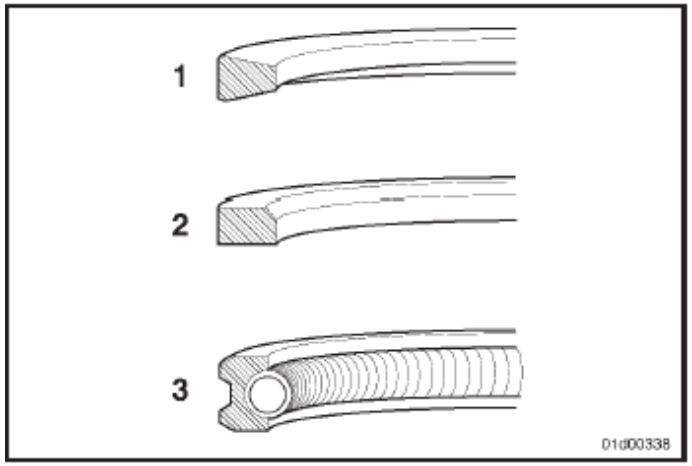


Piston, Piston Pin and Piston Rings

- All ratings will use gallery cooled pistons
  - Internal oil gallery in the piston for circulating oil sprayed by the J-jet piston cooling nozzle
- Piston pin is offset for noise reduction
  - Piston crown includes an insert for the upper ring



- Piston Rings
  1. Upper Ring, keystone cut
  2. Middle Ring, square cut
  3. Oil Control Ring with ring expander

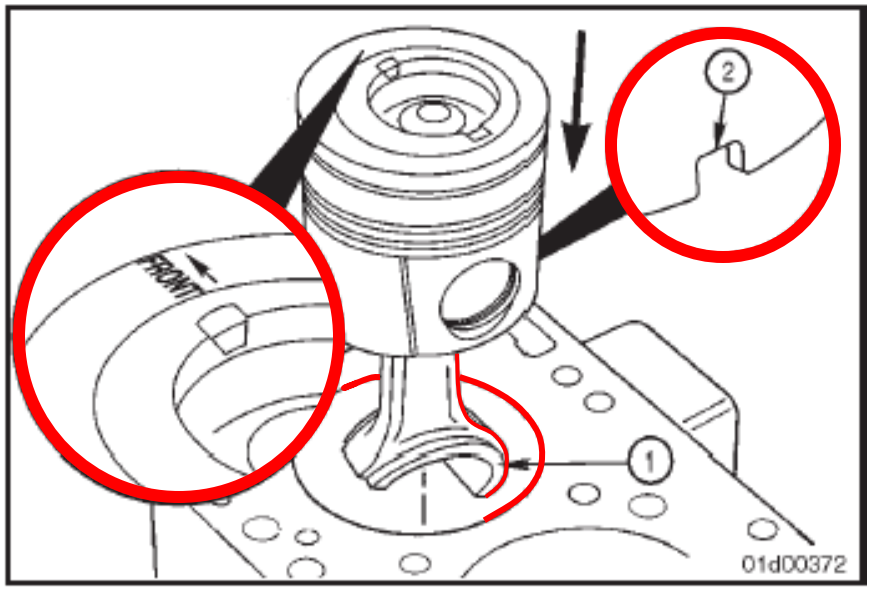


Design Features

New Fracture split connecting rod

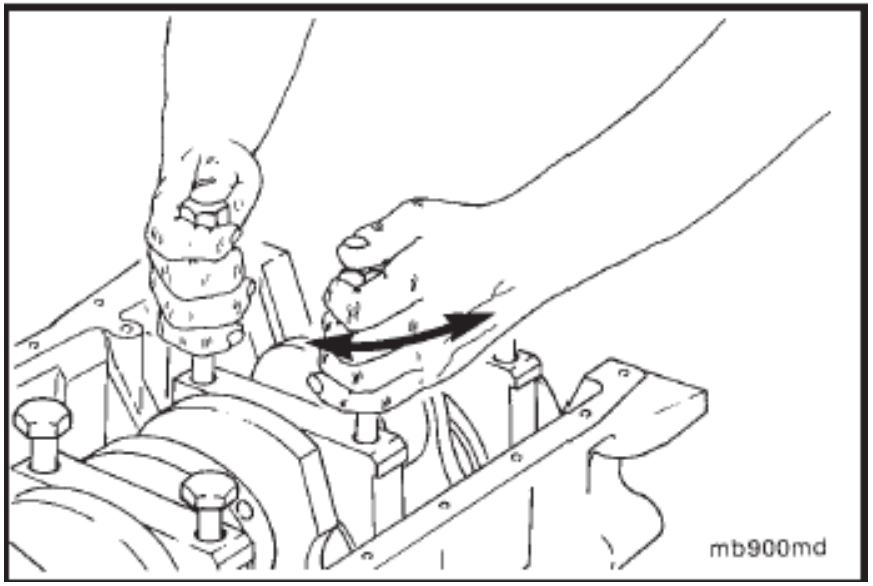
Piston and Connecting Rod Assembly

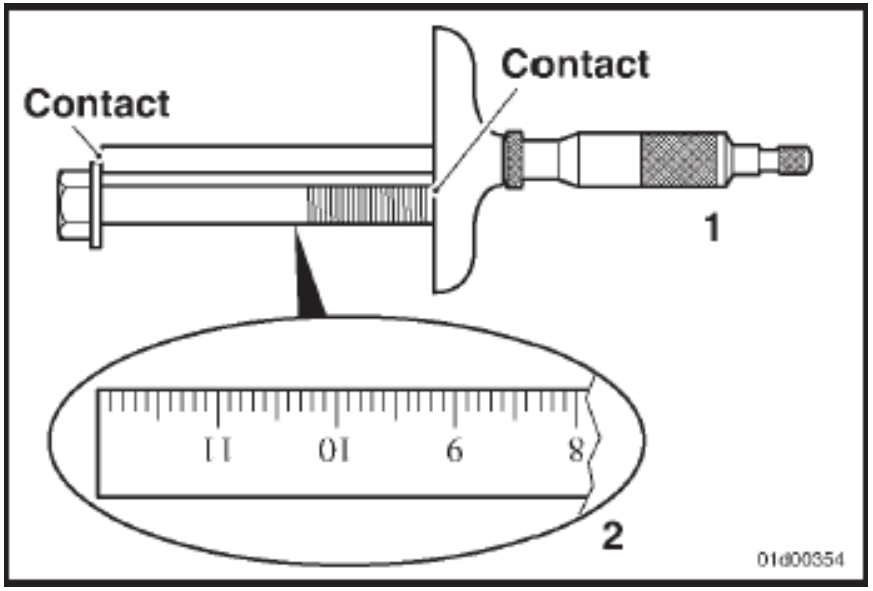
- Connecting rod orientation is different that ISB and ISBe engines due to increased displacement product
  - Make sure piston orientation is correct for offset piston pin
  - Make sure the orientation of the angled surface of the connecting rod correct



Main Bearing Capscrew

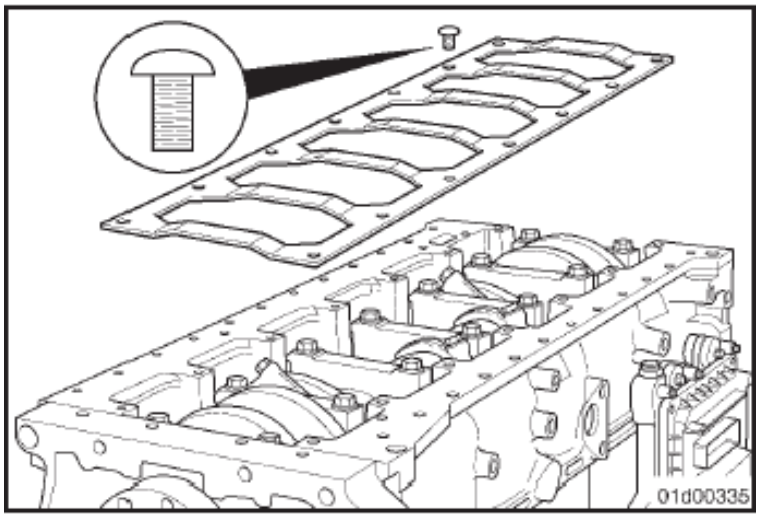
- The main bearing capscrew torque value is greater than torque used on ISB, ISBe engines.
  - This limits the number of times the main bearing capscrew can be reused
    - Each time the main capscrew bearing is removed, the length can be measured to determine if the capscrew is reusable





Block Stiffener Plate

- All engines use a block stiffener plate
  - Helps strengthen the cylinder block
  - Helps to reduce engine noise during engine operation.



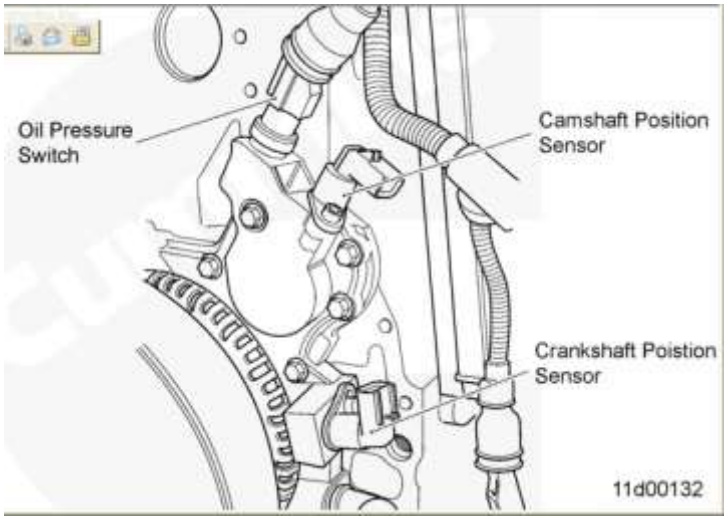
Vibration Da

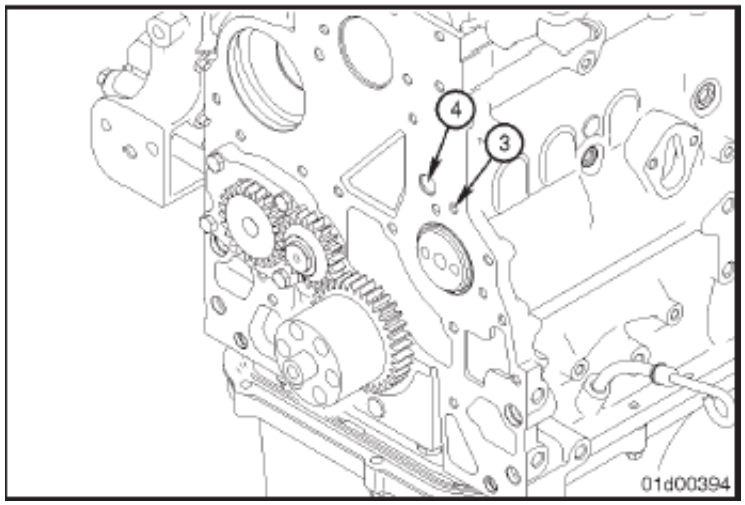
- ISBe 4.5 Liter engines may use a tone wheel only or a tone wheel with a rubber damper.
- ISBe 6.7 Liter engines are all equipped with a viscous damper and tone wheel assembly.
- The vibration damper and crankshaft speed indicator ring are a permanent assembly on the ISBe 6.7 liter engines.

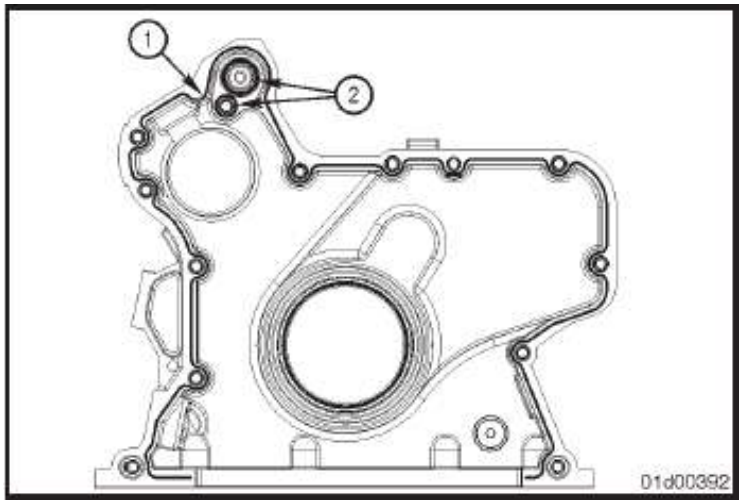
Front Gear Cover

- The front gear cover houses the lubricating oil pump, front crankshaft seal, and camshaft speed indicator ring.

- The front gear covers also contains the oil pressure switch, camshaft speed/position sensor, and crankshaft speed/position sensor.

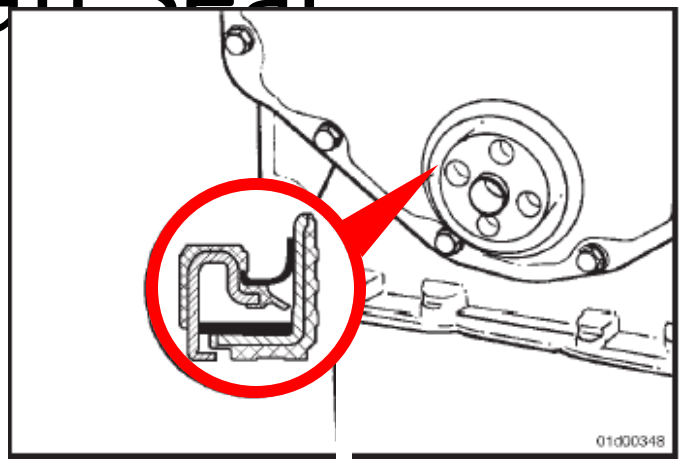


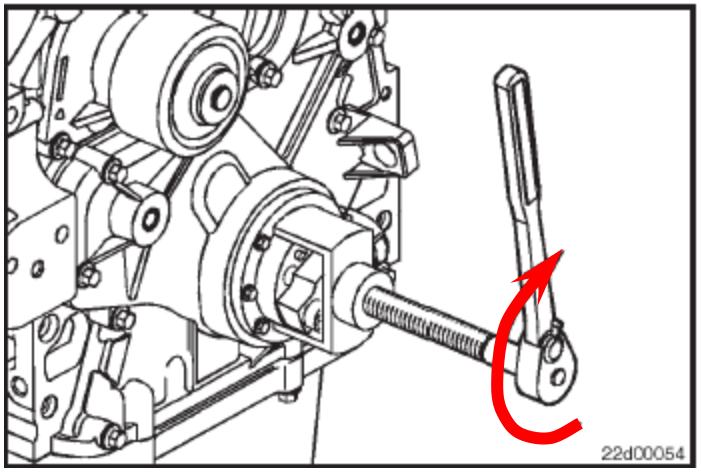




Front Crankshaft Seal

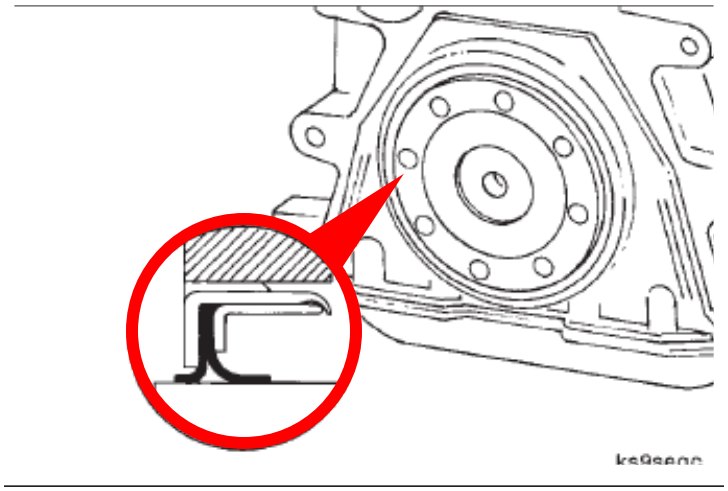
- The front crankshaft seal is a dual or non-lip style seal which utilize a built in wear sleeve and a concealed sealing lip.
- Because the rotating portion of the seal does not contact the crankshaft, wear will not occur at the crankshaft but instead internal to the seal.
- No wear sleeve or oversize front crankshaft seal is available.

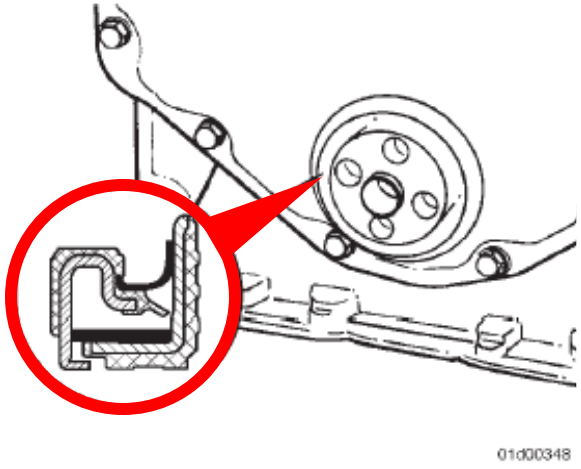




Rear Cranksh

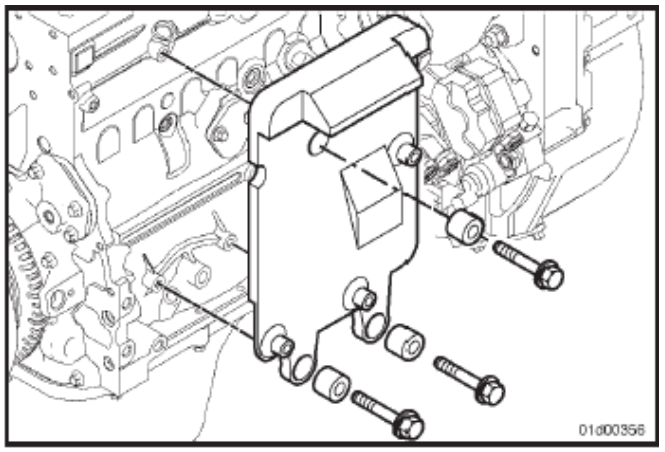
- ISBe engine uses a double dust lip-style rear crankshaft seal in which the rotating portion of the sealing occurs at the contact surface between the lip of the seal and the crankshaft.





Electronic Control Module (ECM) Mounting Plate

- The Electronic Control Module (ECM) mounting plate is air cooled design

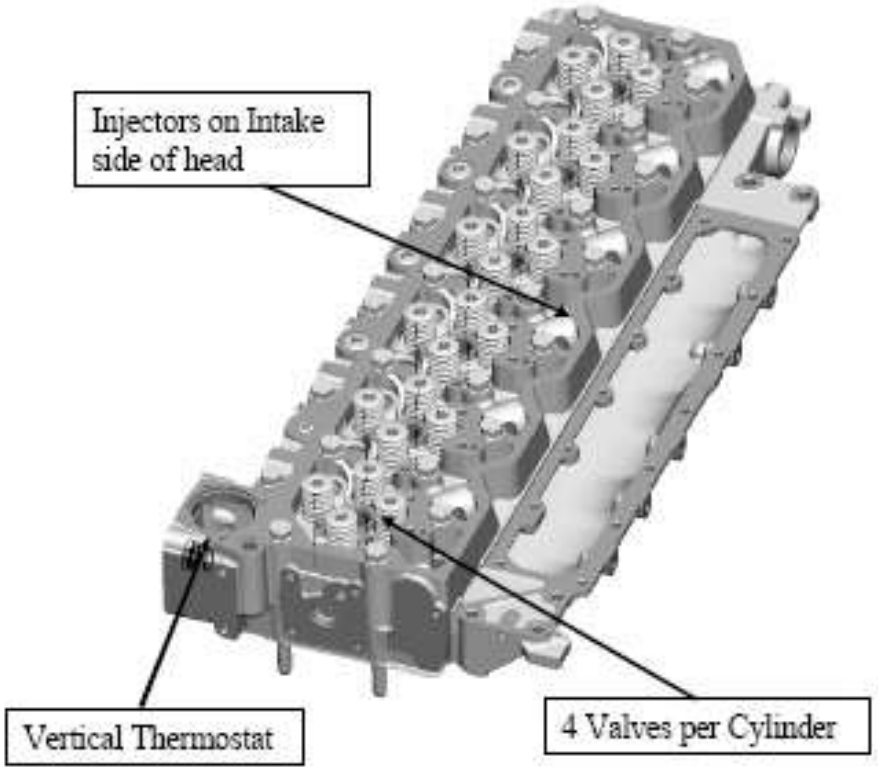


  - It is a nylon mounting plate, using rubber vibrations isolators to mount the Electronic Control Module (ECM) to the cylinder block.

Cylinder Head Comparison B Series Vs ISB^{e}

Current B |Head

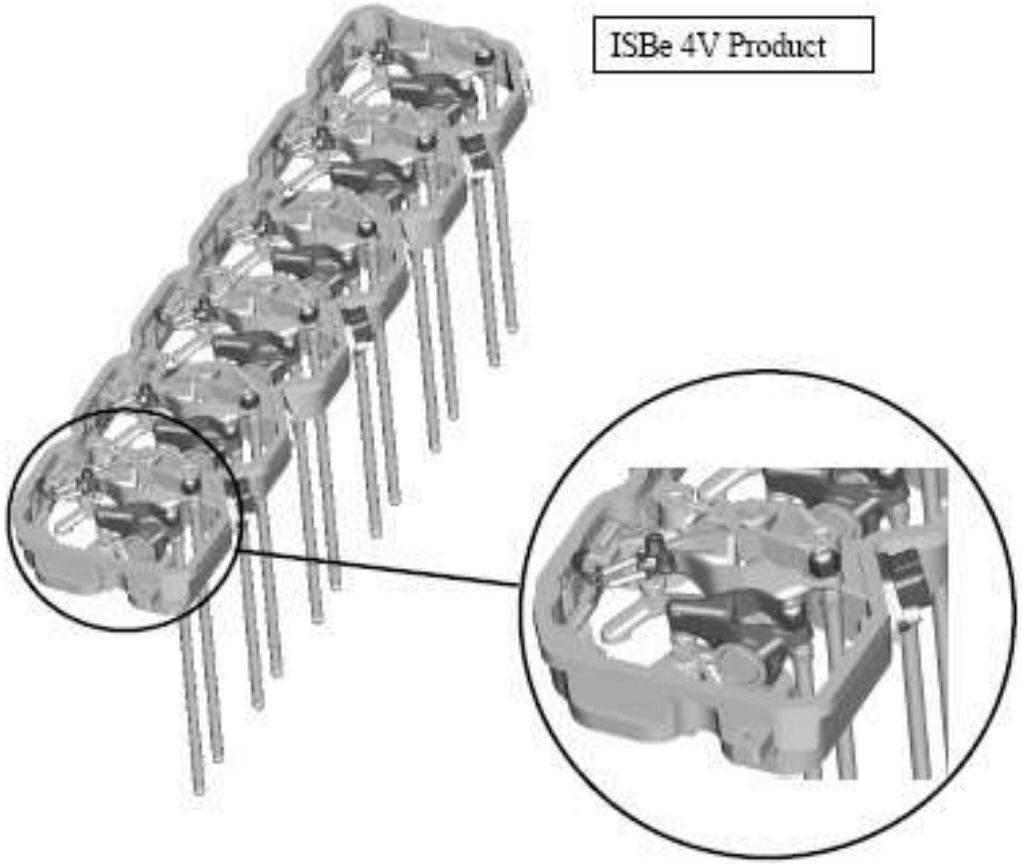
ISBe Head



Rocker Assemblies

Current 2V Product

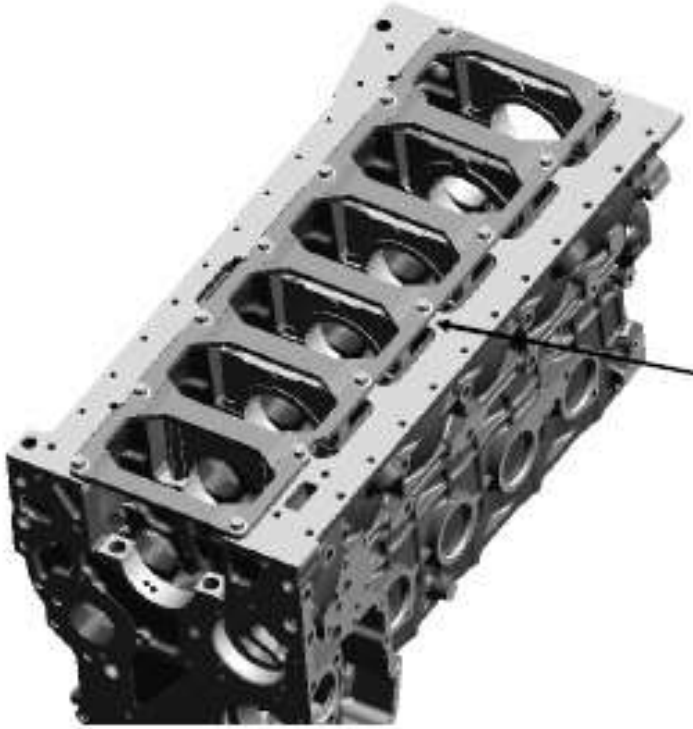
ISBe 4V Product



Suspended Oil Pan

Cylinder Block Comparison B Series Vs ISB^{e}

Block Stiffener / Noise Panel



Block Stiffener mounted on new fixings incorporated into bulkheads – totally internal to engine, i.e. not sandwiched between pan and block

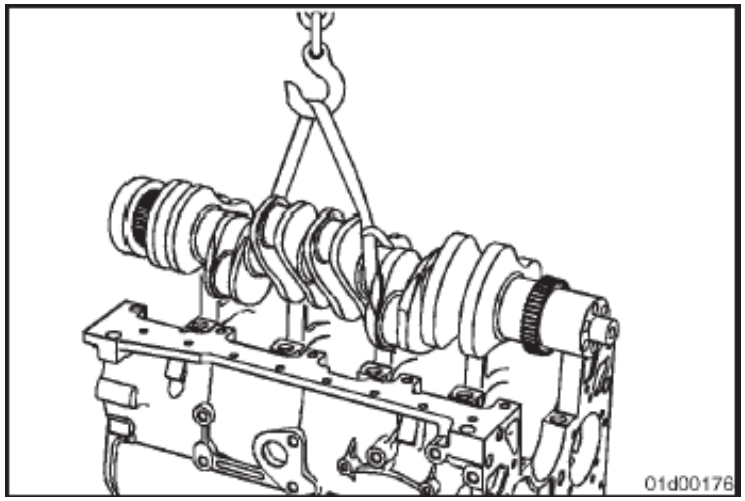
Crankshaft Comparison B Series Vs ISB^{e}

Current Product

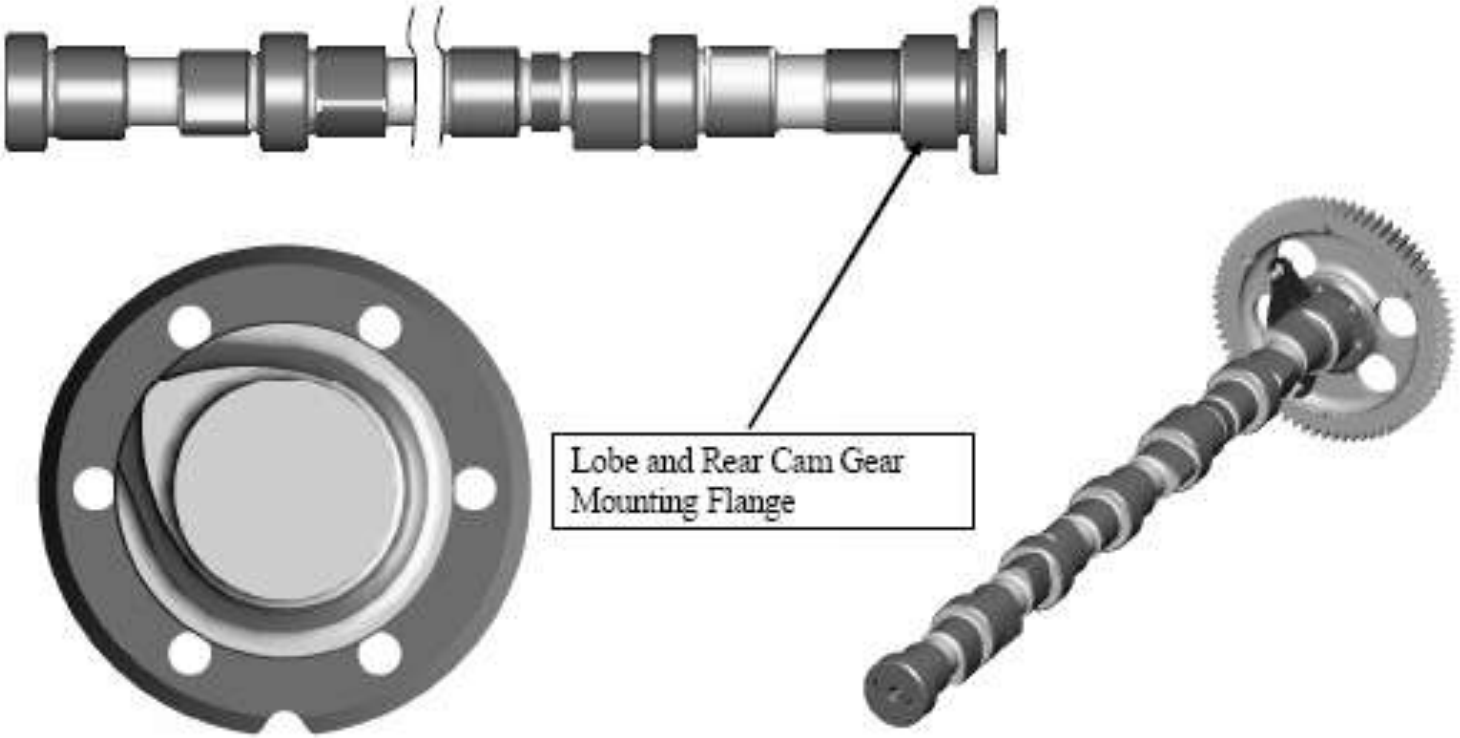
ISB^{e}

Crankshaft and Crankshaft Gear

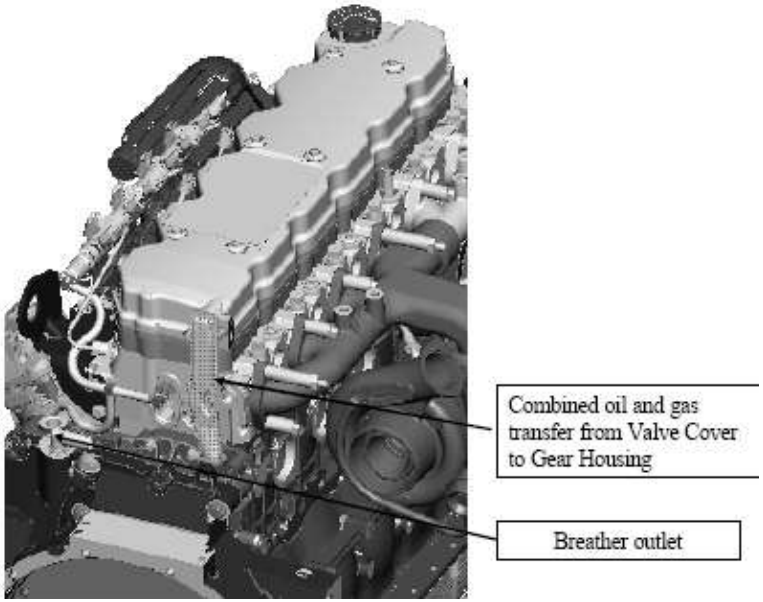
- Rear gear train crankshafts
  - Increase stroke for increased displacement
- Front crankshaft gear only drives the lubricating oil pump
- Rear gear drives the camshaft gear



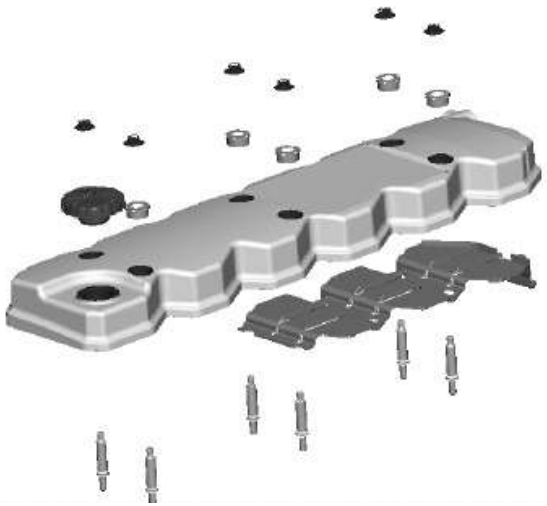
Camshaft ISB^{e}



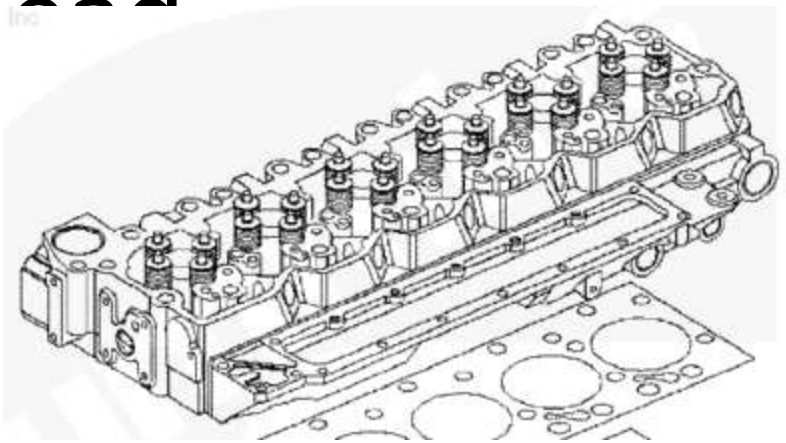
ISBe Breather and Valve Cover



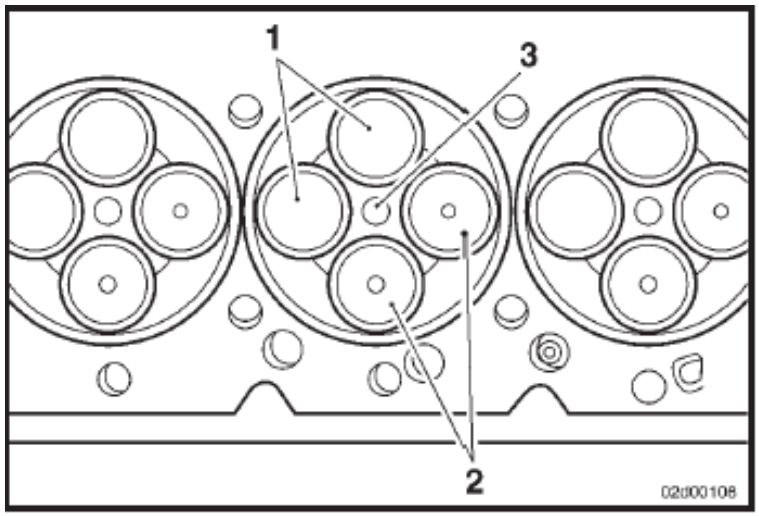
Valve Cover Baffle Arrangement



Cylinder Head



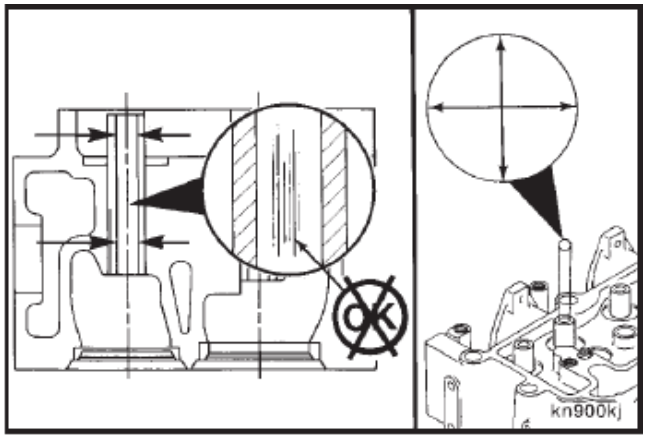
- As with previous 24 valve B series engines, the cylinder head is one-piece cast iron, cross flow design with four valves per cylinder.
  - The cylinder head has an integral
    - Intake manifold
    - Thermostat housing
  - The four valve per cylinder design allows for a centered injector in the cylinder head (3).

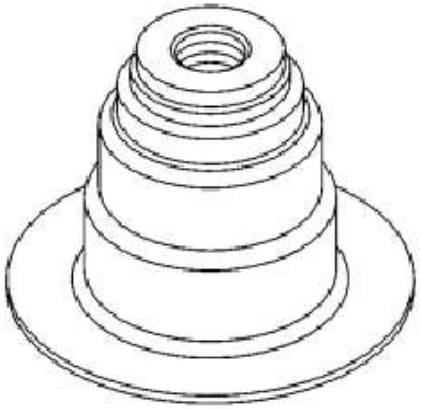


Valve Guides and Valve Stem Seals

If the valve guides are damaged, the cylinder head must be replaced

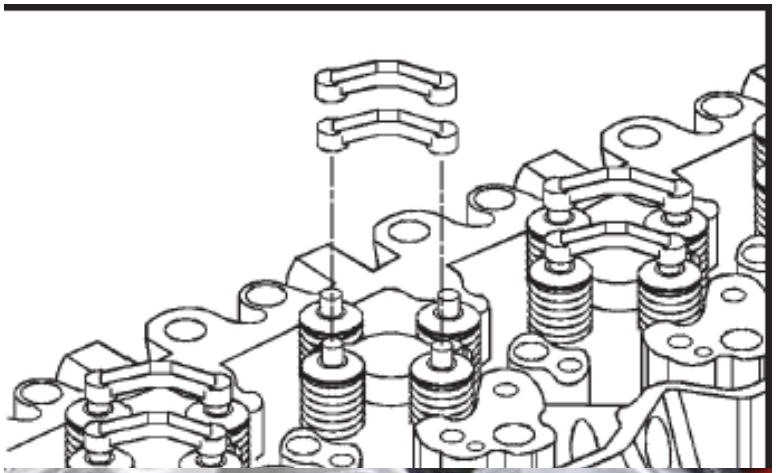
- The same valve stem seal is used for both intake an exhaust





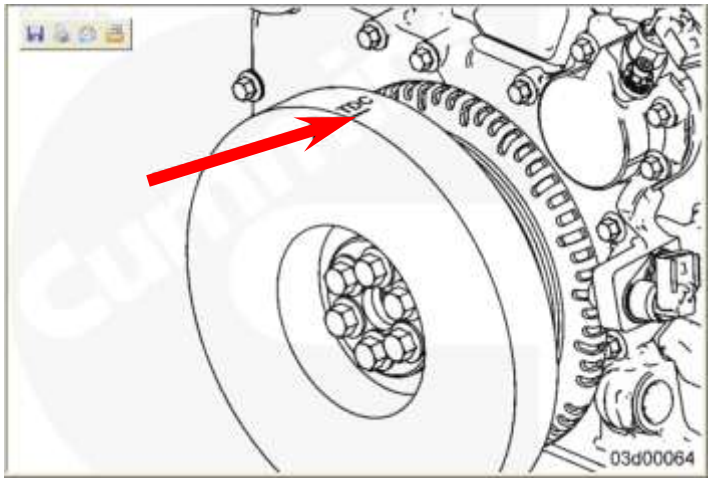
Crosshead

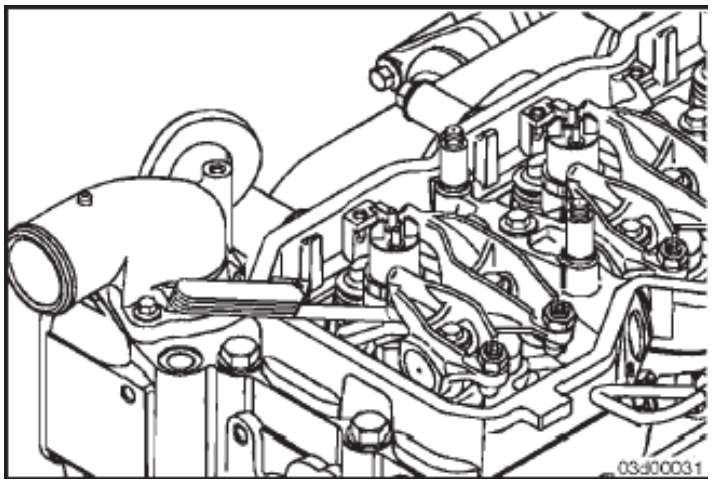
- Same as used on all 4 valve per cylinder “B” product
- The crosshead allows the rocker lever to move both exhaust or intake valves at the same time.
- The crosshead receives its lubrication from a drilling in the rocker lever and rocker shaft



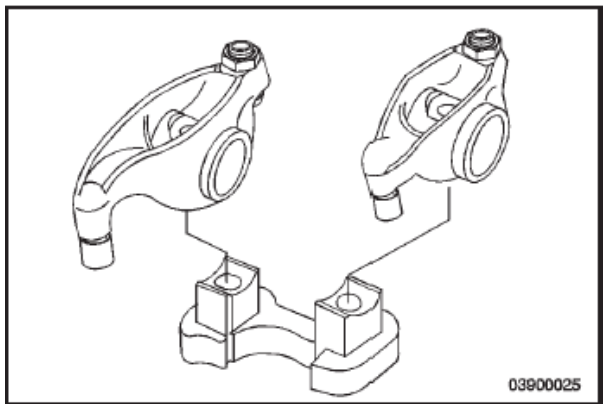
Overhead Set

- TDC mark remains on the vibration damper for 6 cyl engine
- TDC mark on 4 cyl engine is on the tone wheel
- Intake valve setting .010 in [0.254 mm]
- Exhaust valve setting .020 in [0.508 mm]





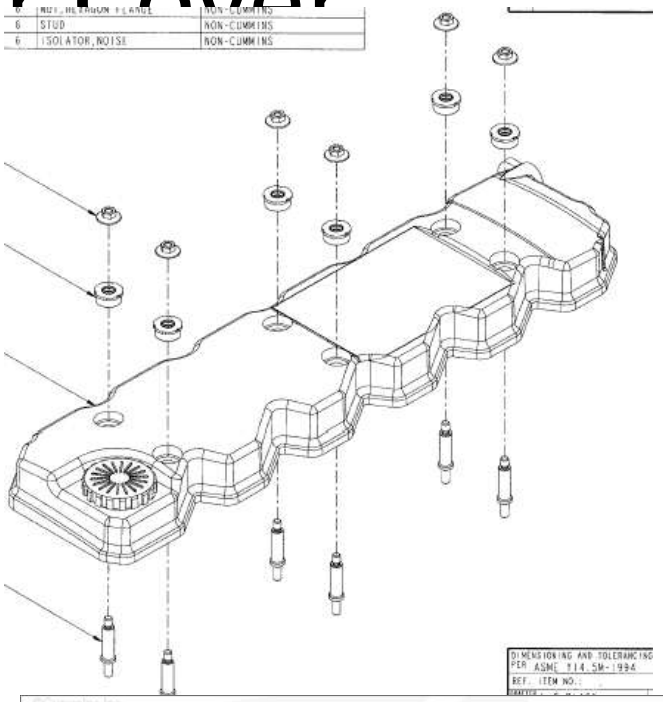
Rocker Levers

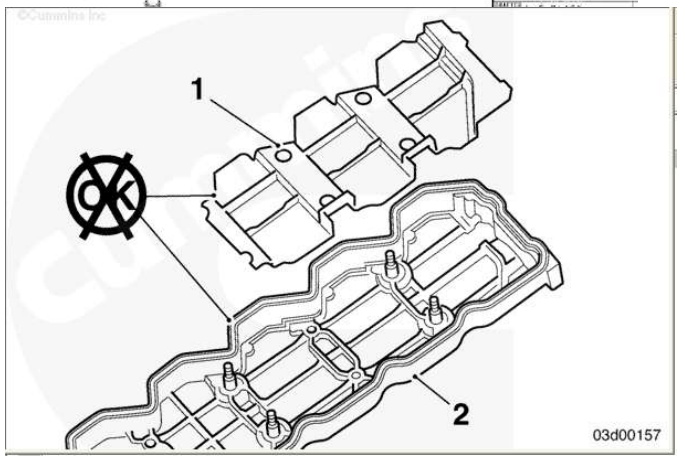


- Mounted on a common rocker shaft
- Receives pressurized oil for lubrication from a drilling in the rocker shaft
- Each rocker lever actuates two valves by the crosshead
- Each rocker lever has two drillings:
- One drilling supplies lubrication oil to the push rod

Rocker Lever Cover

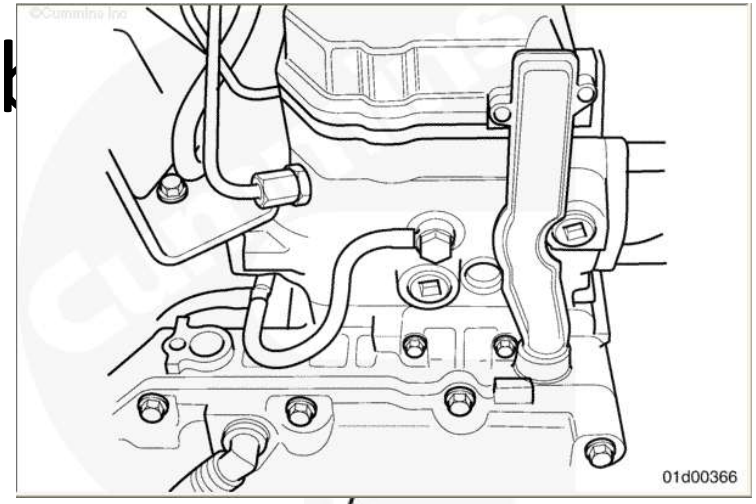
- Crankcase Breather mounted in the rocker cover (2)
  - Has a permanently attached breather baffle (1)
    - Crankcase gases exist at the rear of the rocker lever cover and enter the crankcase breather tube
    - Solids/liquids drain back into the crankcase through a tube connecting the breather to the top of the rear-gear housing

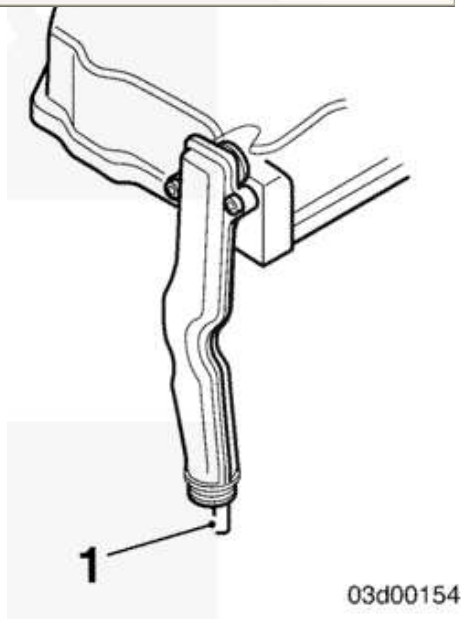




Crankcase Breather Tub

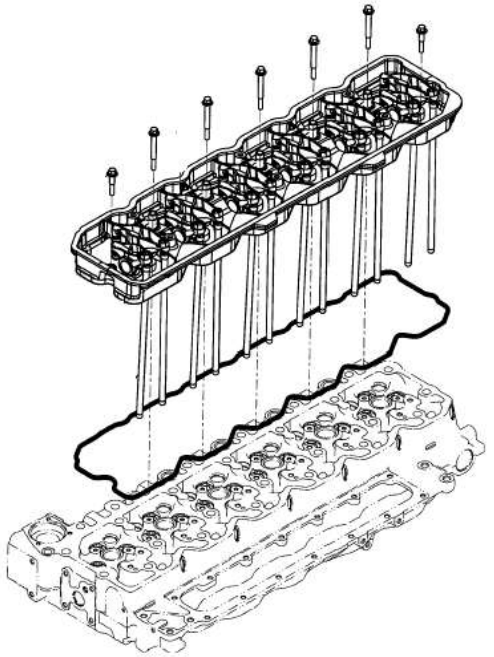
- Crankcase Breather Tube
  - Same as used on current increased displacement B series product
  - Connects the rocker lever cover to the rear gear housing
    - Has an internal oil separator/drain tube (1)

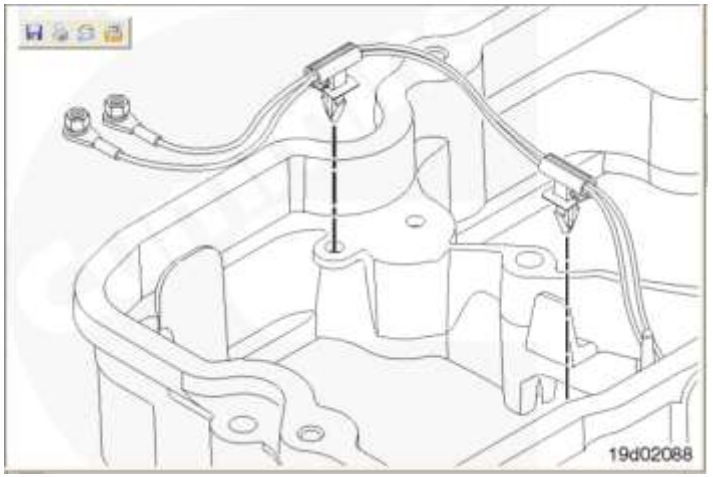




Rocker Lever Housing

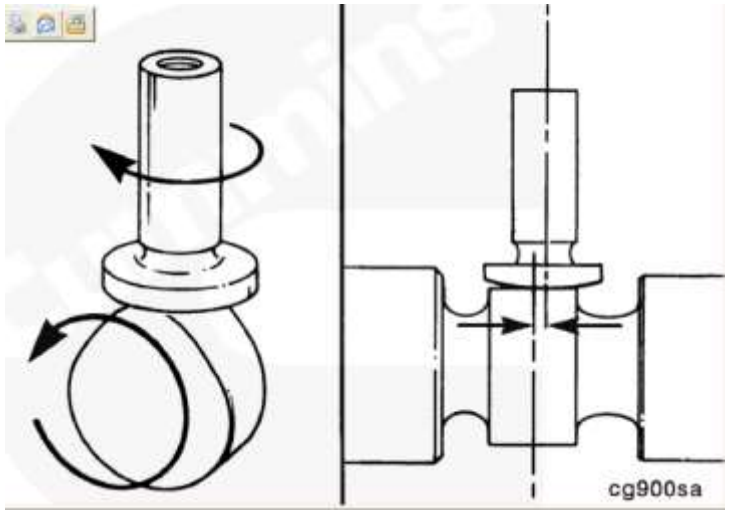
- The Housing
  - The housing is between the cylinder head and the rocker cover
  - Pass through connectors (2 for the 4 cyl & 3 for the 6 cyl) engine supply voltage and a ground source for the fuel injector solenoids.
  - Sealed to the cylinder head with a molded gasket.

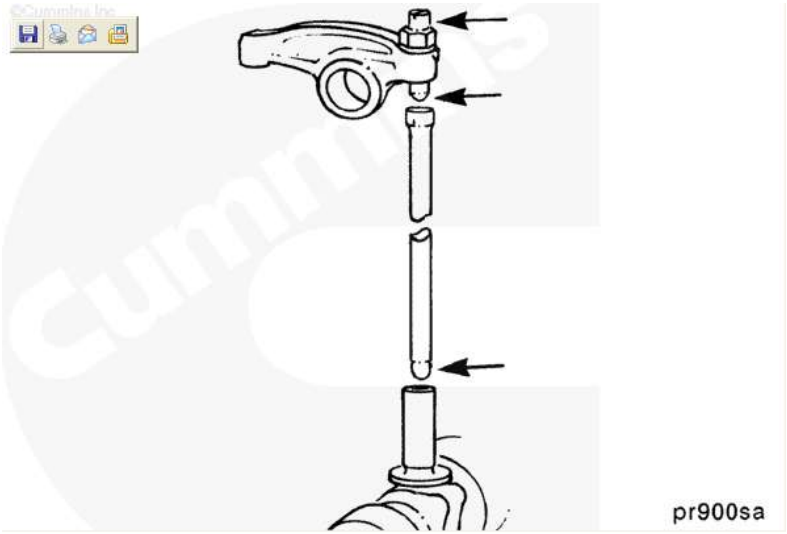


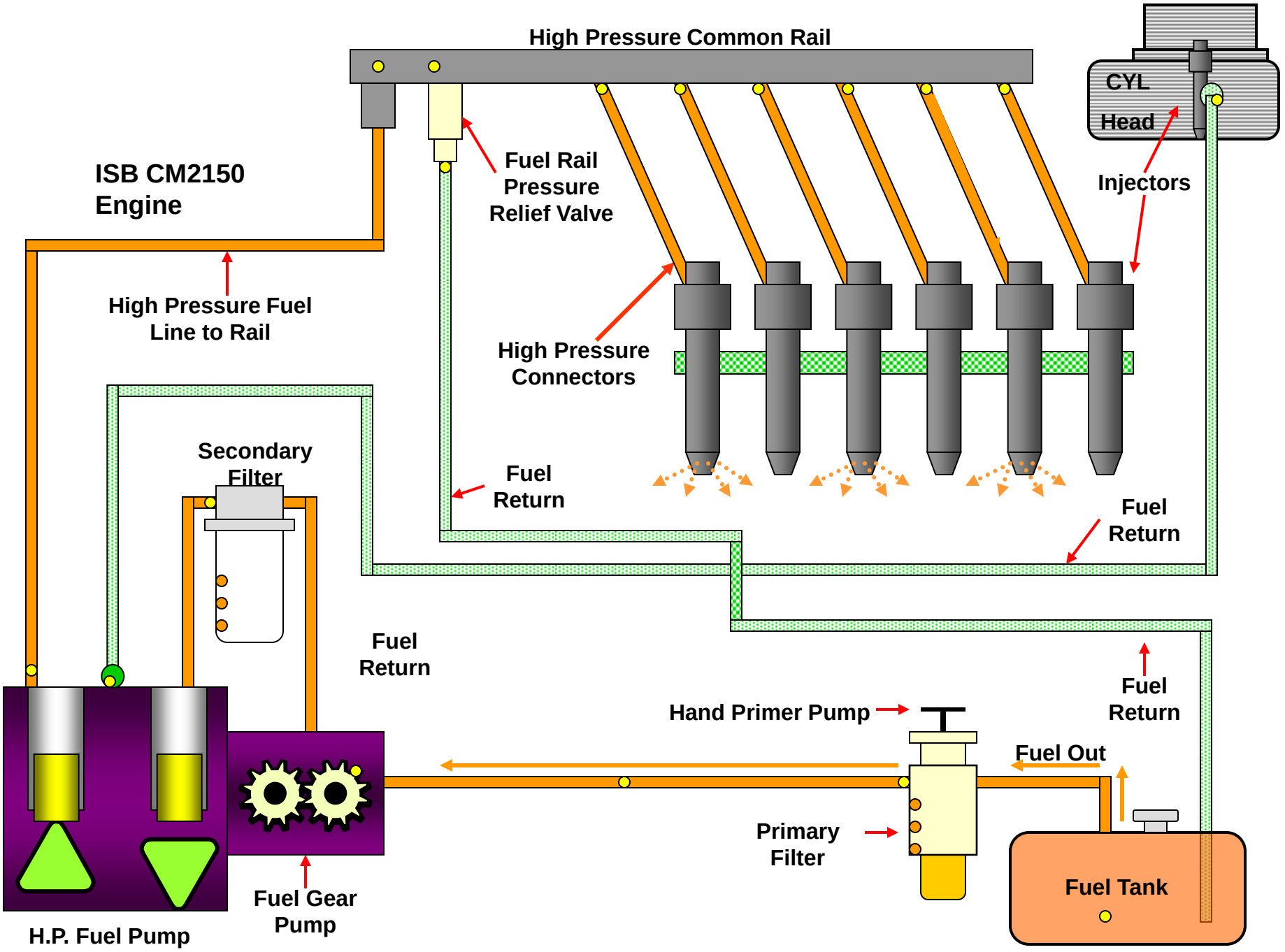


Tappets and Push Rods

– Sliding tappet

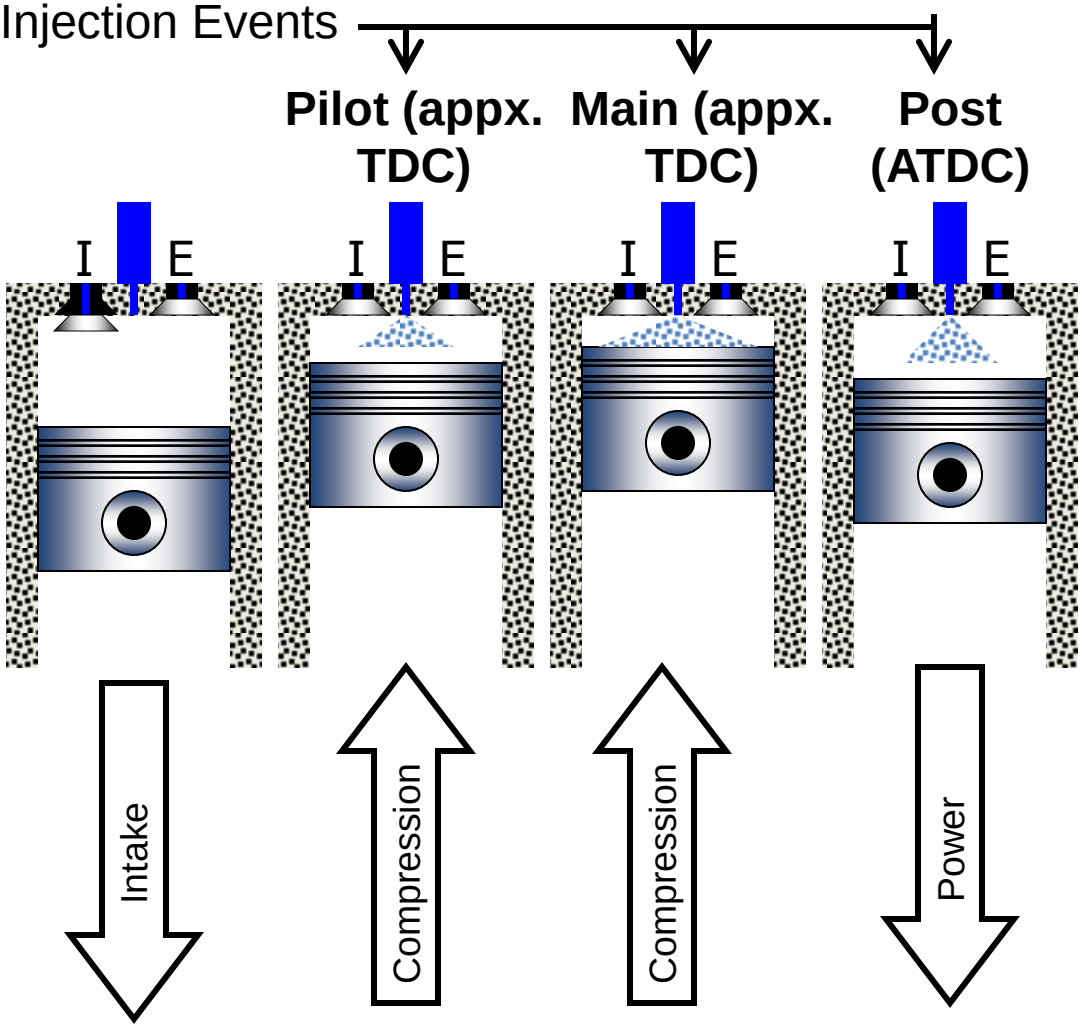




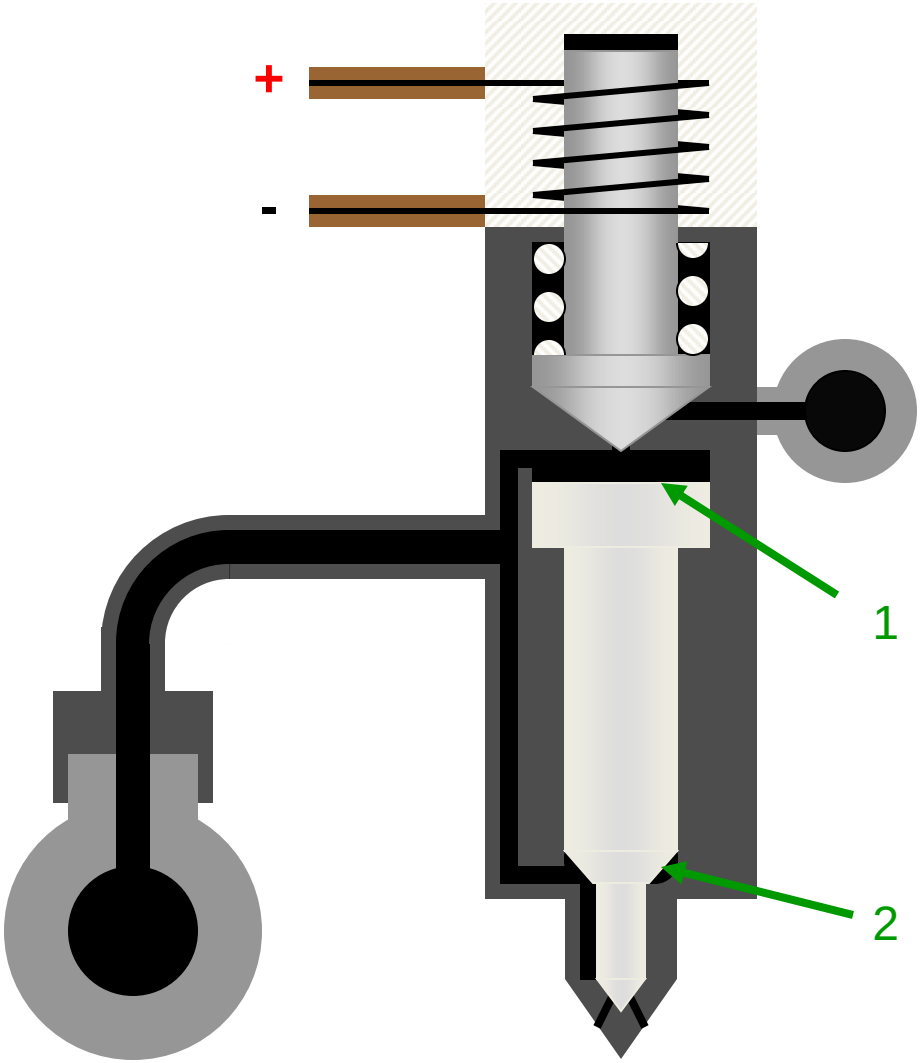

High Pressure Common Rail
CYL
Head
ISB CM2150
Engine
Fuel Rail
Pressure
Relief Valve
Injectors
High Pressure Fuel
Line to Rail
High Pressure
Connectors
Secondary
Filter
Fuel
Return
Fuel
Return
Fuel
Return
Fuel
Return
Hand Primer Pump
Fuel Out
Primary
Filter
Fuel Tank
Fuel Gear
Pump
H.P. Fuel Pump

Fuel Injection Events

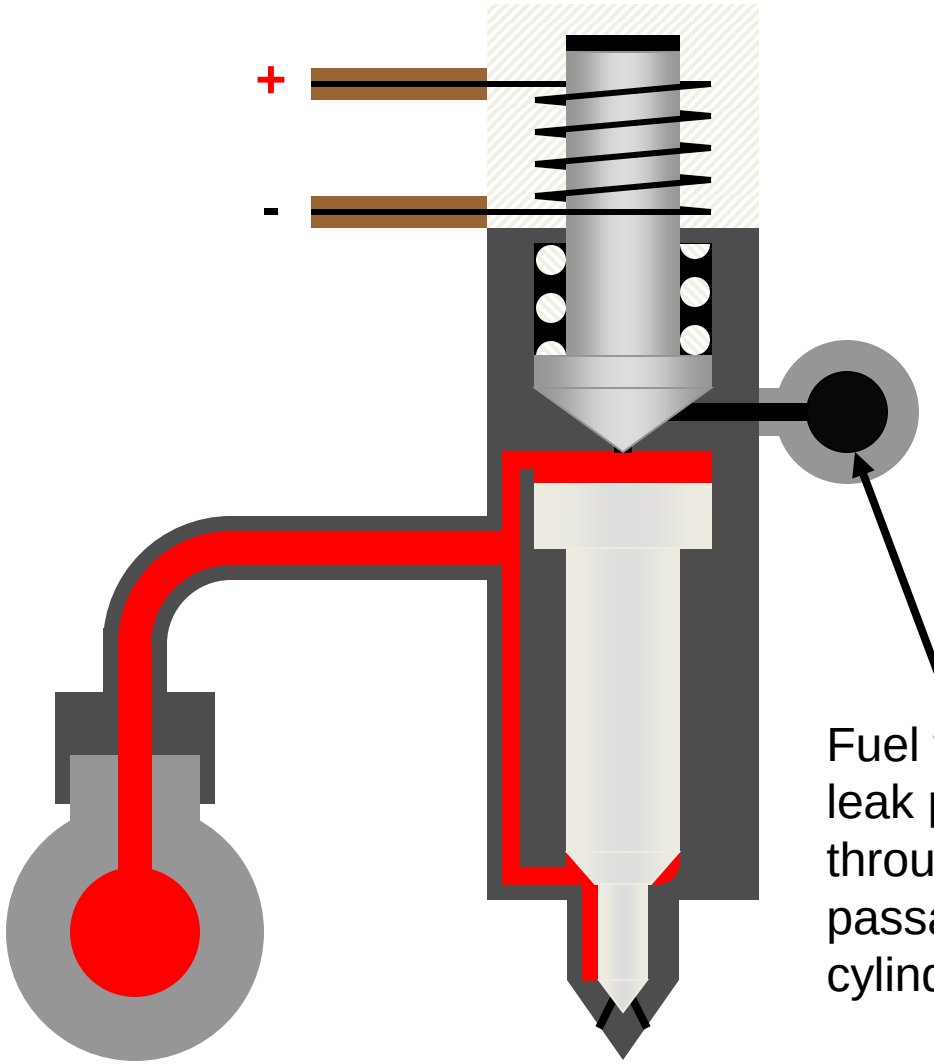
Power/Combustion Injection Events



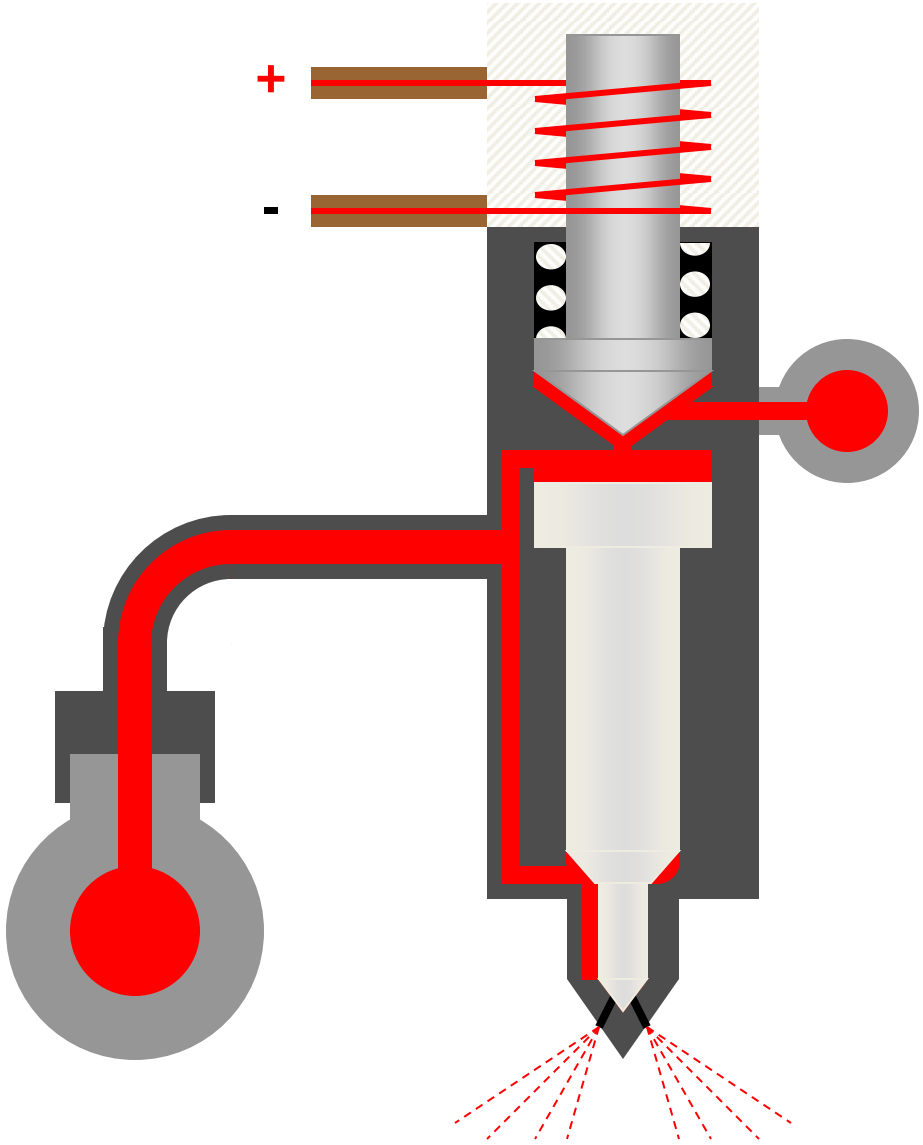
- Injector Solenoid is not energized. The solenoid spring forces the solenoid in the closed position
- Equal fuel pressure is exerted on both the plunger (1) and shoulder area (2) of the needle
- The greater surface area of the plunger (2) results in more hydraulic advantage keeping the injector in the closed position



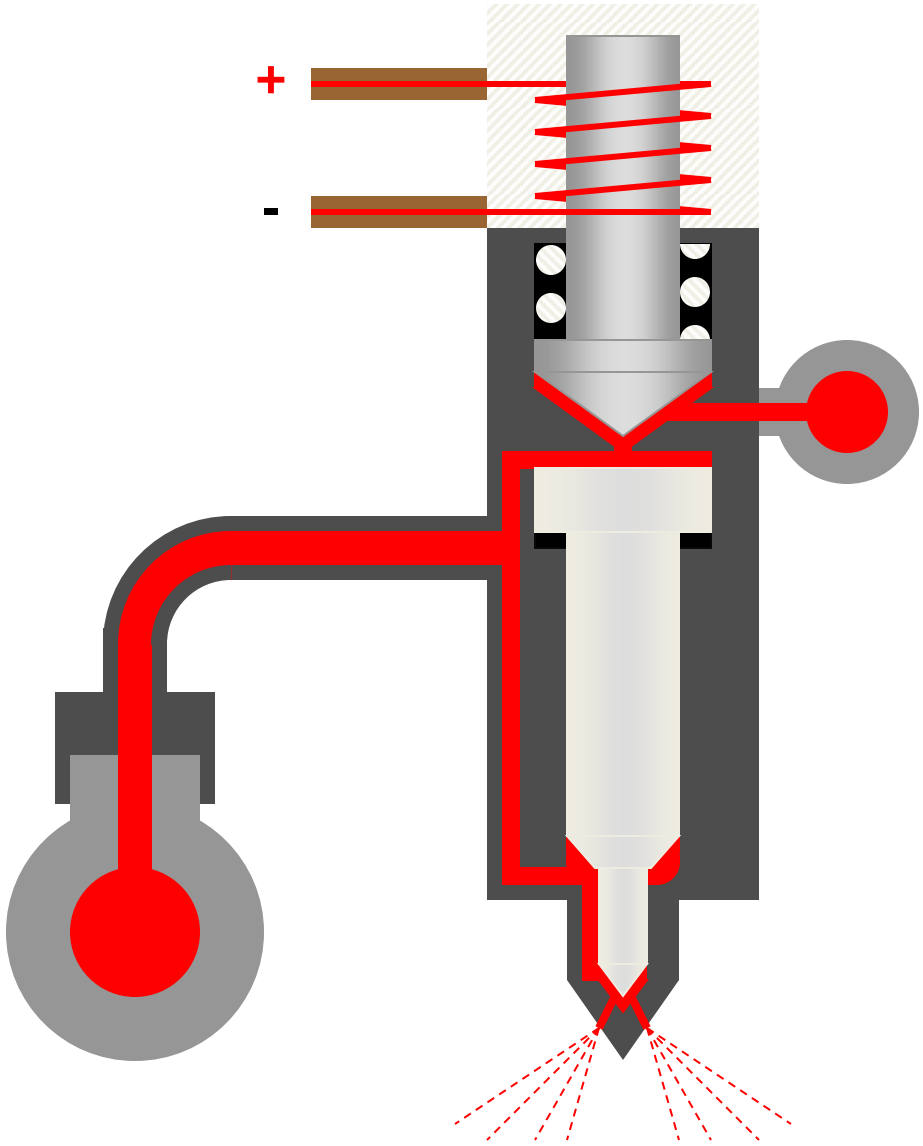
- When the ECM requires fuel for a cylinder a voltage is driven to the injector solenoid
- This creates an electromagnetic force that is greater than the force of the spring
- This forces the solenoids metal core to move upward
- As the solenoid lifts a leak path is opened in the fuel injector



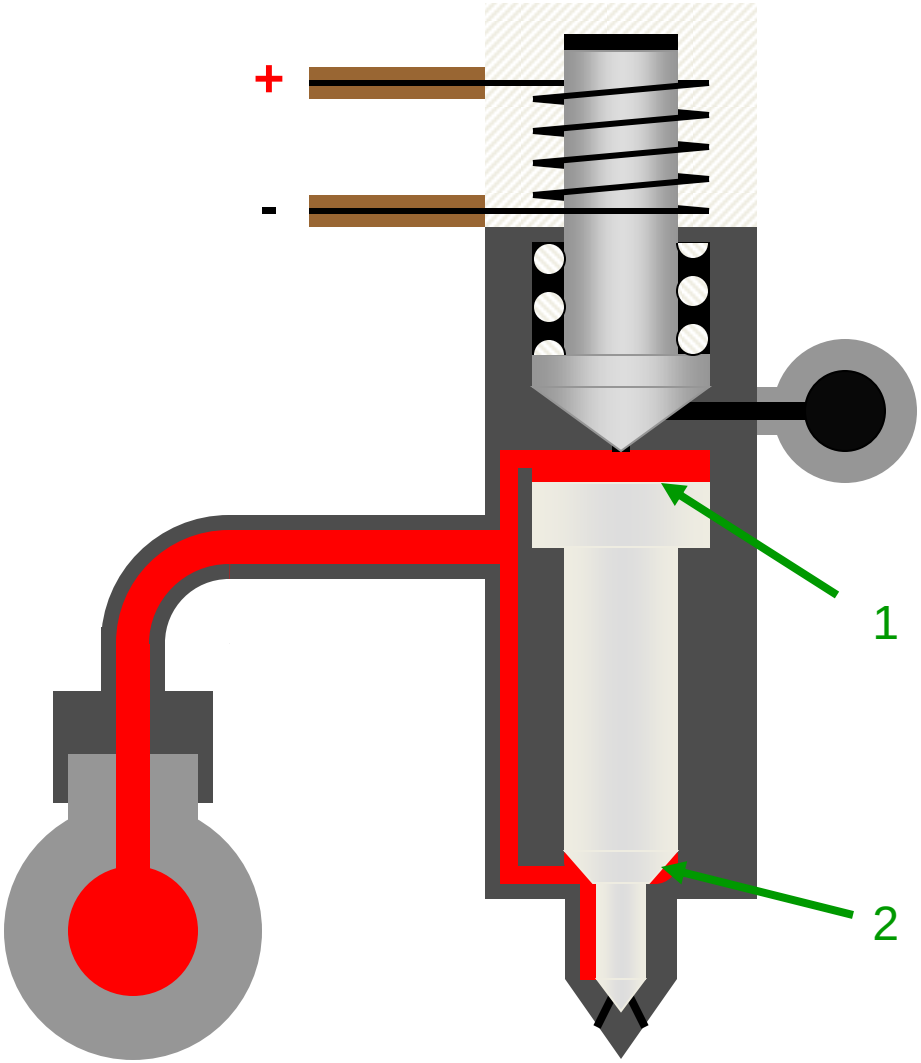
- The leak results in the shoulder of the injector needle now seeing a greater hydraulic force than the plunger (due to the leak path)
- This allows the needle to lift from the closed position
- Fuel is then injected into the cylinder through the nozzles



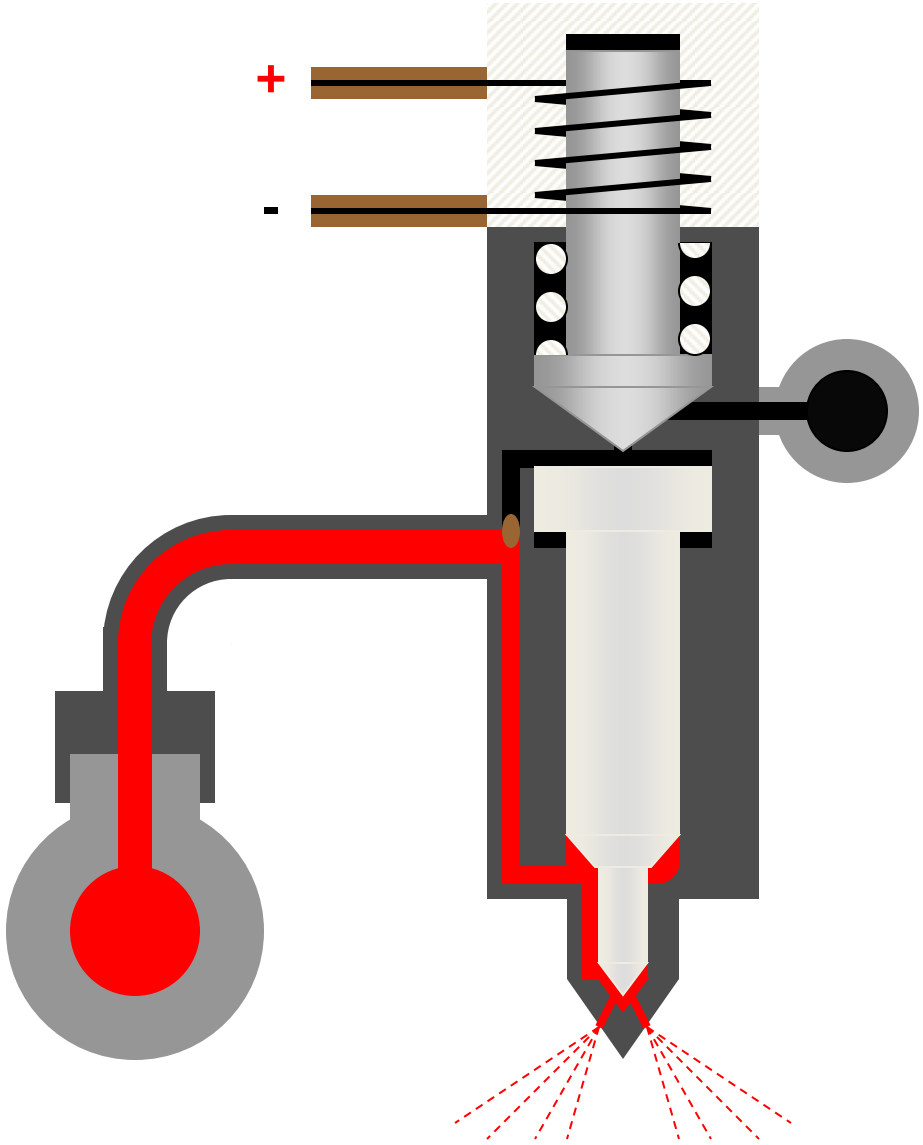
- When fuel is no longer needed the injector solenoid is de-energized by the ECM
- The electromagnetic force is removed allowing the spring to force the solenoid to the closed position
- When the solenoid is in the closed position the leak path is removed
- With the leak path removed the greater surface area of the plunger causes the plunger/needle to reseat and end fuel injection



- Equal fuel pressure is again sent to both the plunger (1) and shoulder of the needle (2)
- The greater surface area of the plunger (1) results in more hydraulic force keeping the injector in the closed position until the ECM determines fueling is again needed



- Fuel System cleanliness is very important for High Pressure Common Rail Systems
- Contaminants can lodge in the small passages in the injector preventing critical flows
- If the contaminate particle lodges in the passage to the plunger area
- The result is the injector will remain in the open position and cause engine damage due to uncontrolled fueling of the cylinder

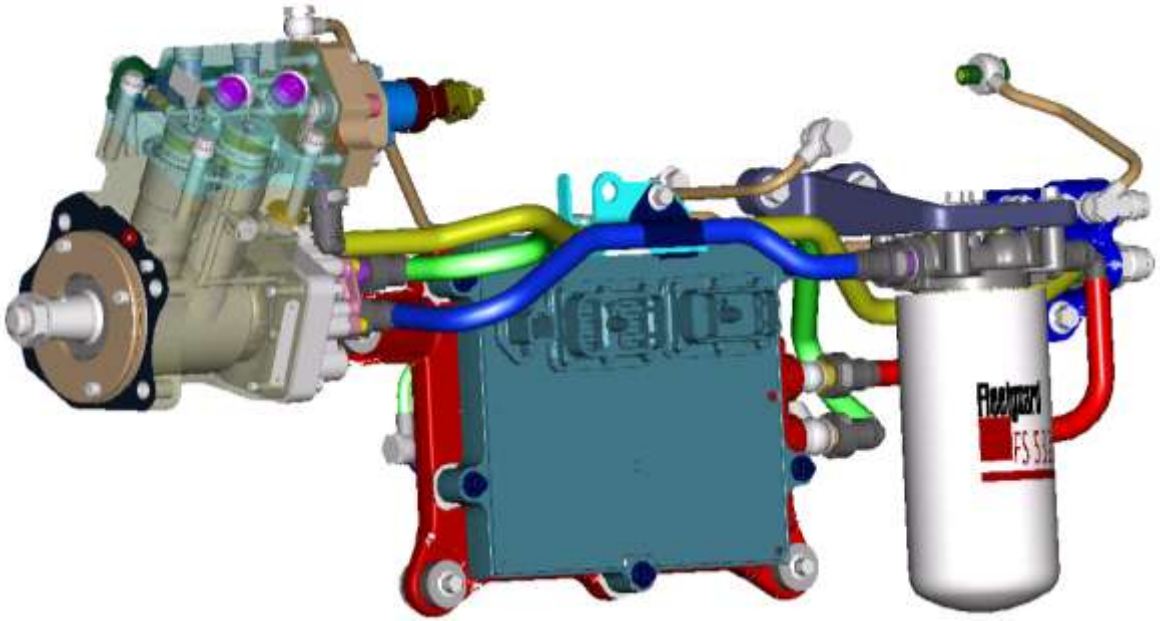


ISL Engine Specifications

Displacement	**8.9 L (540 in^3)**
Configuration	**In-line 6 cylinder**
Bore mm (in)	**114 (4.49)**
Stroke mm (in)	**144.5 (5.69)**
Weight Kg (lbs)	**706 (1555) (Dry)**
Rated Power (hp)	**310-400**
Rated Speed (rpm)	**2200**
Firing Order	**1-5-3-6-2-4**
Crankshaft Rotation	**CLOCKWISE**
(viewed from front of engine)	
Overhead Adjustment	
- Intake valve	**0.305 mm(0.012 in)**
- Exhaust valve	**0.559 mm(0.022 in)**
Engine brake adjustment	**2.286 mm (0.090 in)**

P

- 310 - 400 Horsepower



- Fuel Pump – Cummins H
- Turbocharger – Variable Geometry - Holset HYV 40
- Fuel Lift Pump – Electric Lift pump
- Fracture Split Connecting Rod
- CM 850

Design Features

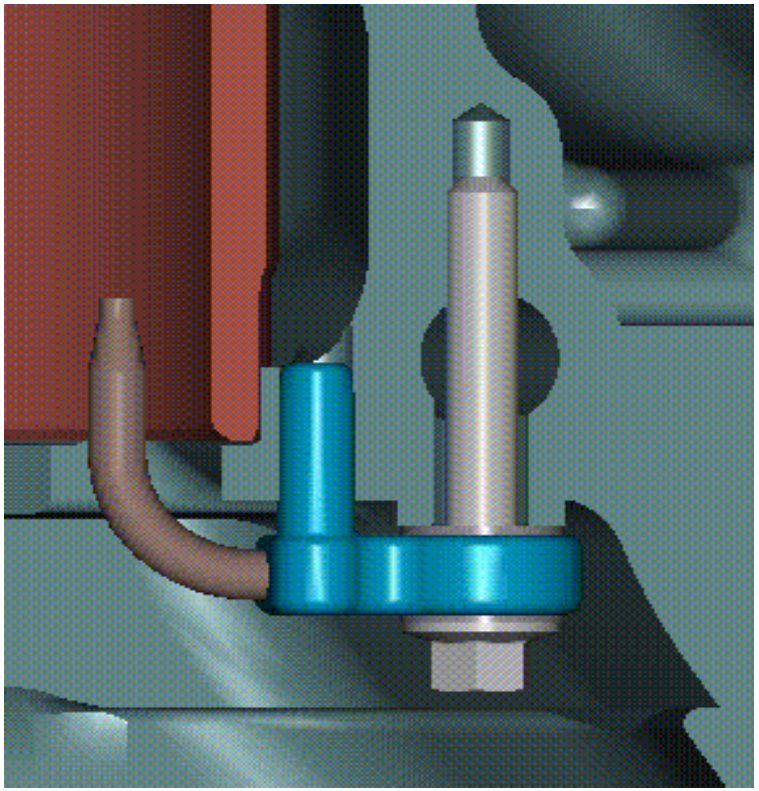
Mid-Stop Cylinder Liners

Design Features

Articulated Pistons

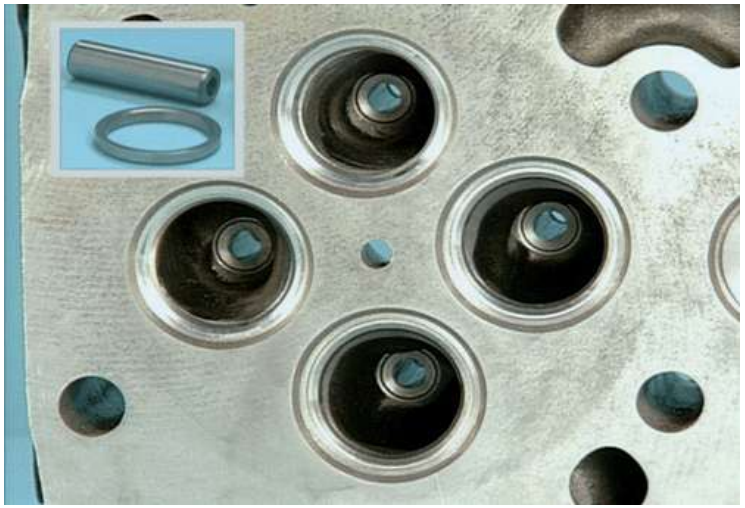
Design Features

Targeted Piston Cooling



Design Features

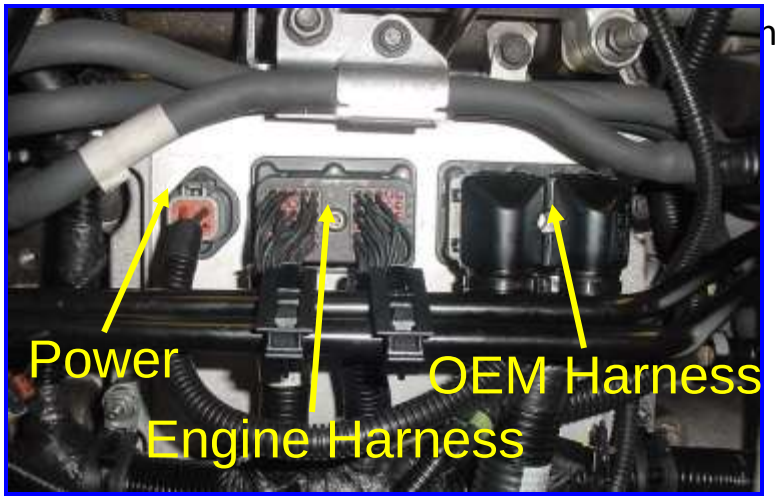
4 Valves per Cylinder

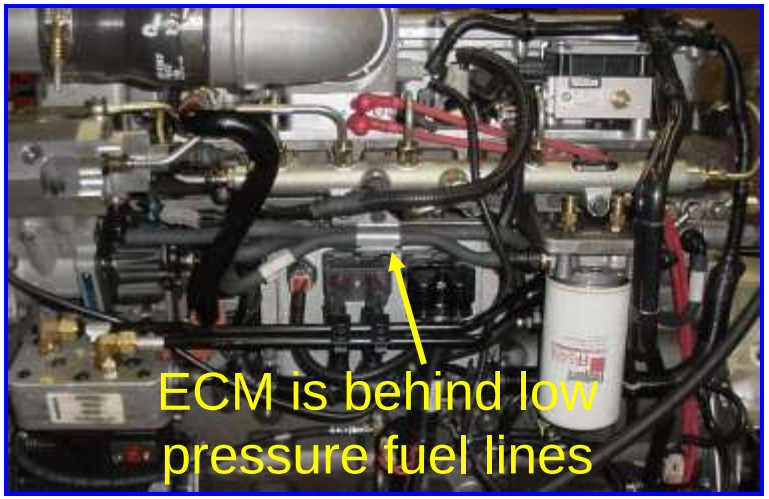


Design Features

Electronics

- Electronic Control Module (ECM) - Model CM850
- Three connectors on the ECM
  - 50-pin OEM connector
  - 60-pin engine harness connector

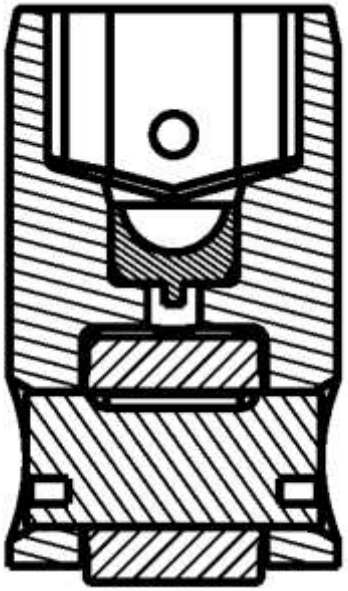


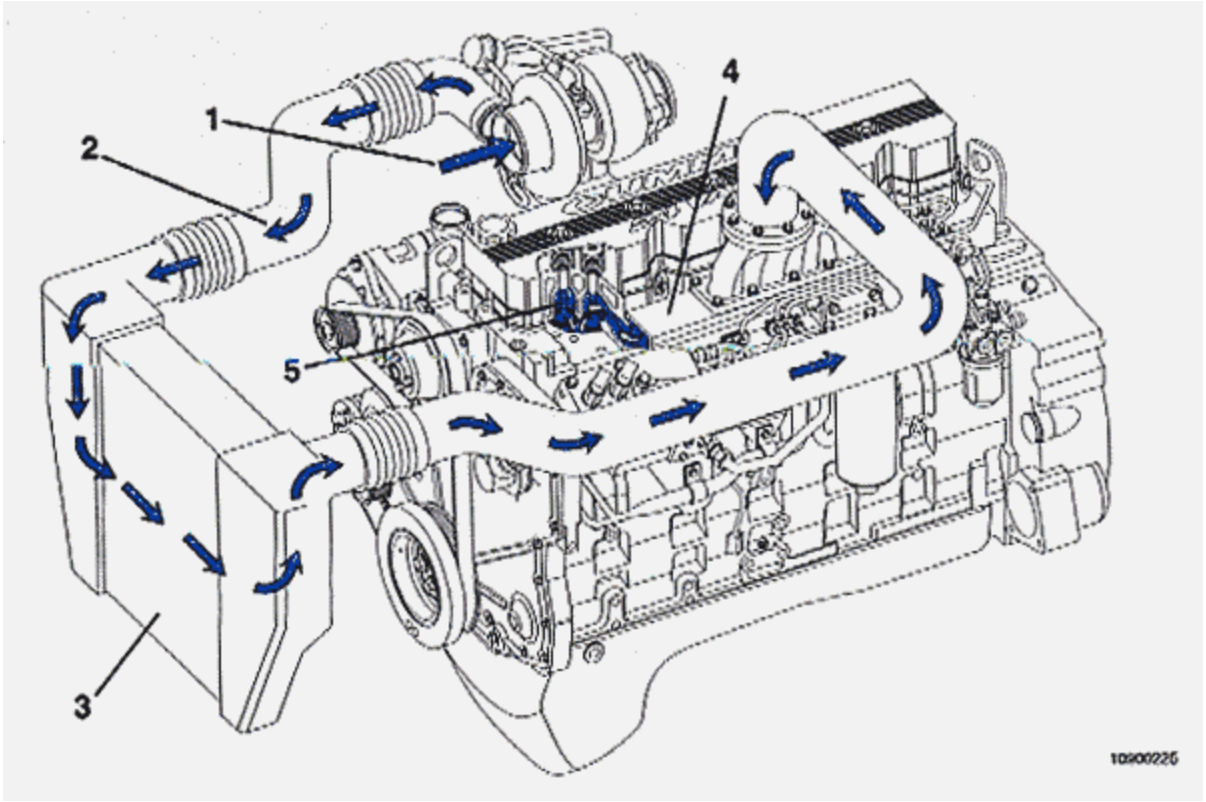


Design Features

Roller Followers

Large Tappet
31mm Diameter

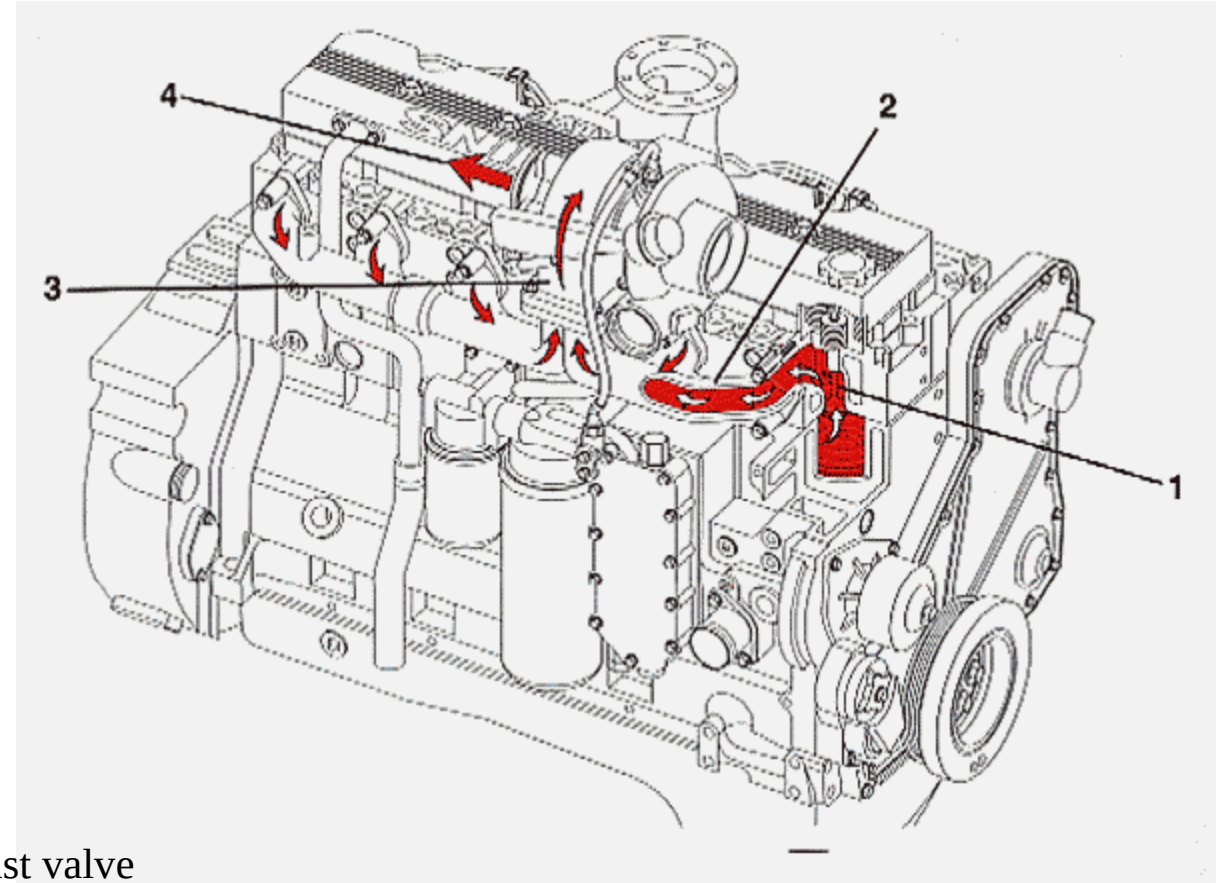




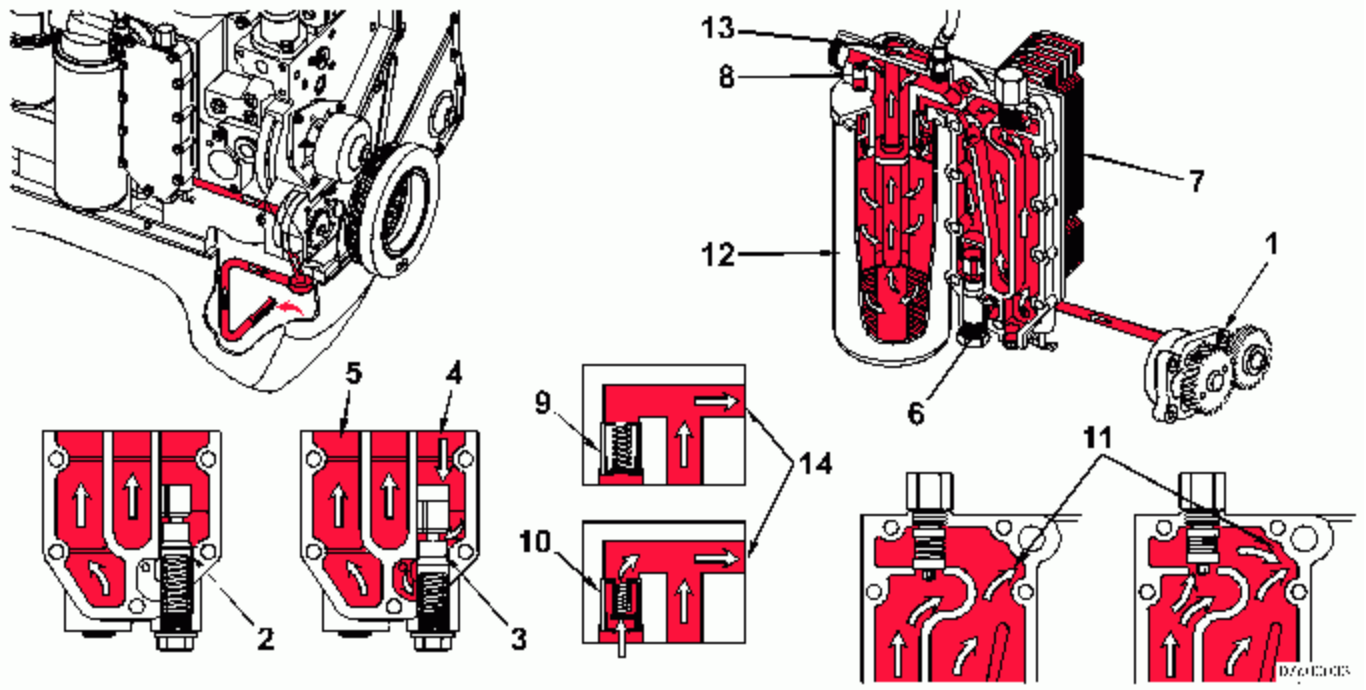
1. Intake Air Inlet to Turbocharger
2. Turbocharger Air to Charge Air Cooler
3. Charge Air Cooler
4. Intake Manifold (Integral Part of Cylinder Head)
5. Intake Valve.

Specifications - Air Intake System

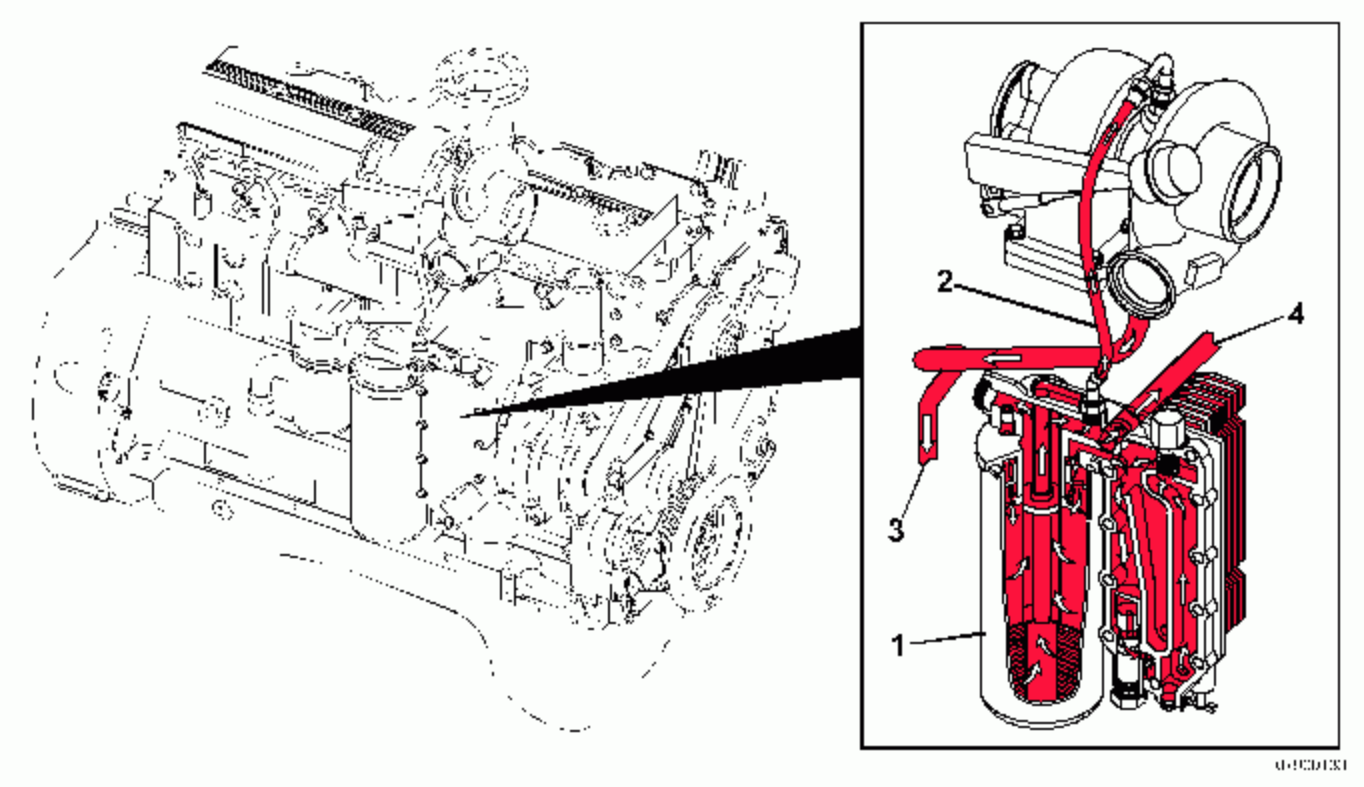
Maximum Intake Restriction (clean air filter element)	**254 mm H_2O [10.0 in H_2O]**
Maximum Intake Restriction (dirty air filter element)	**635 mm H_2O [25.0 in H_2O]**
Charge Air Cooler Restriction	**152 mm Hg (6.0 in.Hg)**



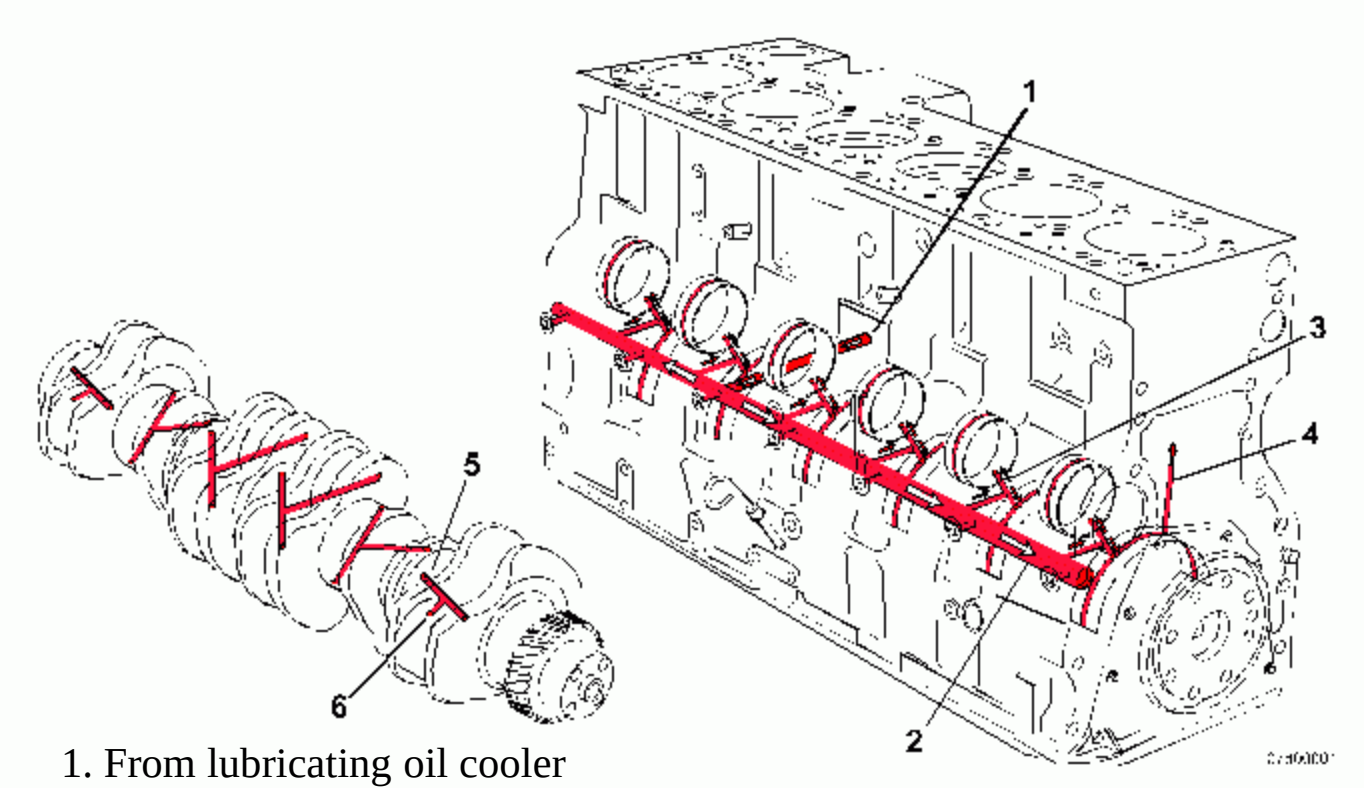
1. Exhaust valve
2. Exhaust manifold - pulse type
3. Dual entry to turbocharger
4. Turbocharger exhaust outlet.



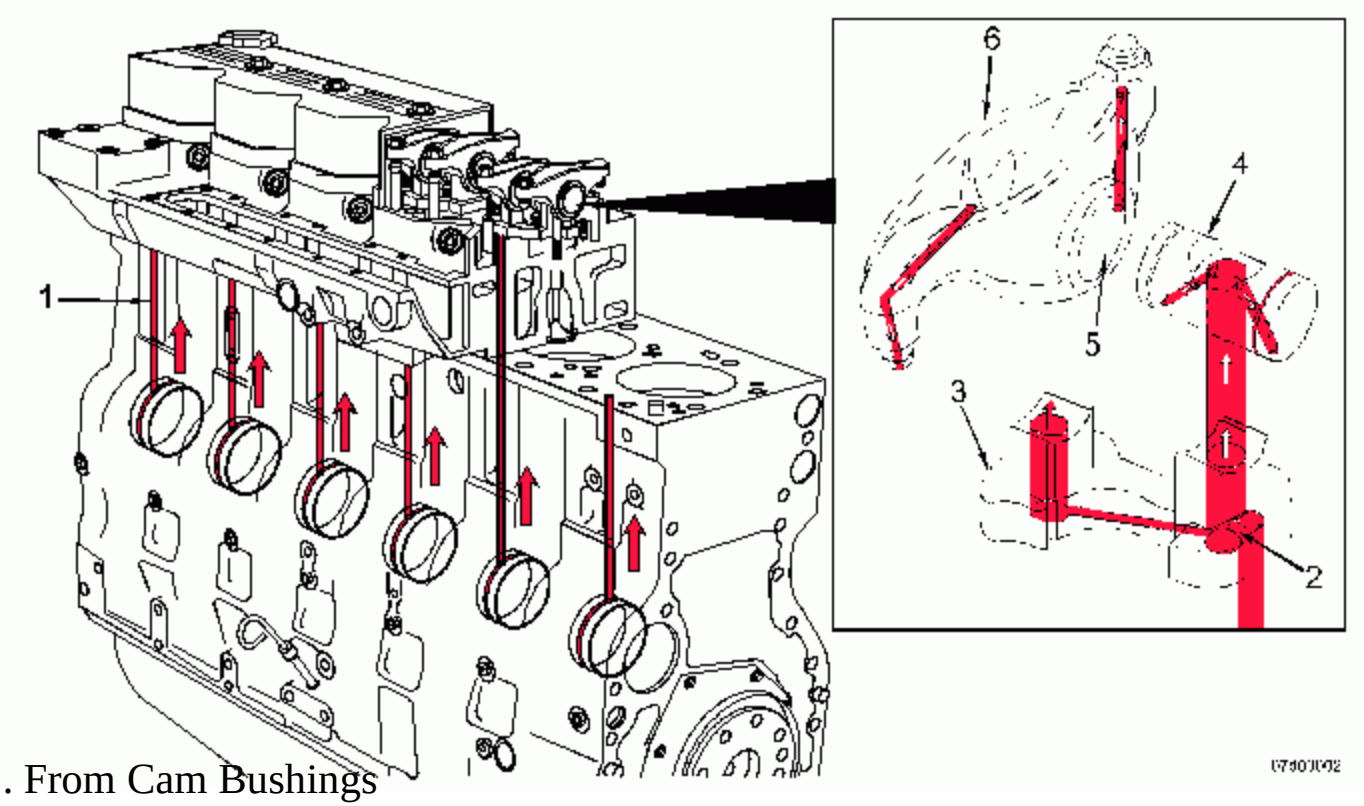
1. Gerotor lubricating oil pump
2. Pressure regulating valve closed
3. Pressure regulating valve open
4. From lubricating oil pump
5. To lubricating oil cooler
6. To lubricating oil pump oil pan
7. Lubricating oil cooler
8. Filter bypass valve
9. Filter bypass valve closed
10. Filter bypass valve open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



1. Lubrication oil filter
2. Turbocharger lubricating oil supply
3. Turbocharger lubricating oil drain
4. To main lubricating oil rifle.



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



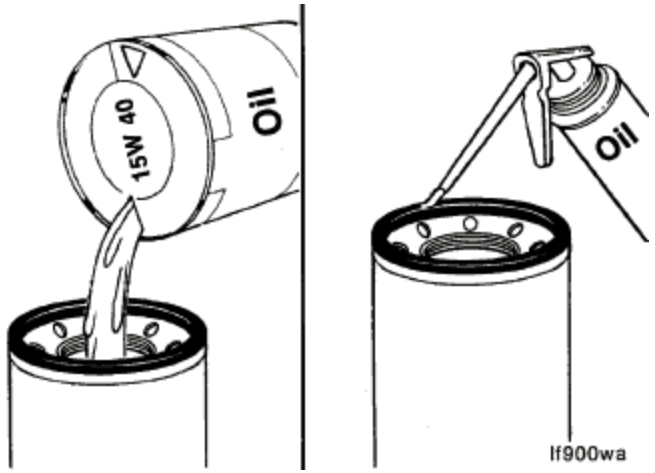
1. From Cam Bushings
2. Transfer Slot
3. Rocker Lever Support
4. Rocker Lever Shaft
5. Rocker Lever Bore
6. Rocker Lever.

Lubricating Oil Filter Requirements

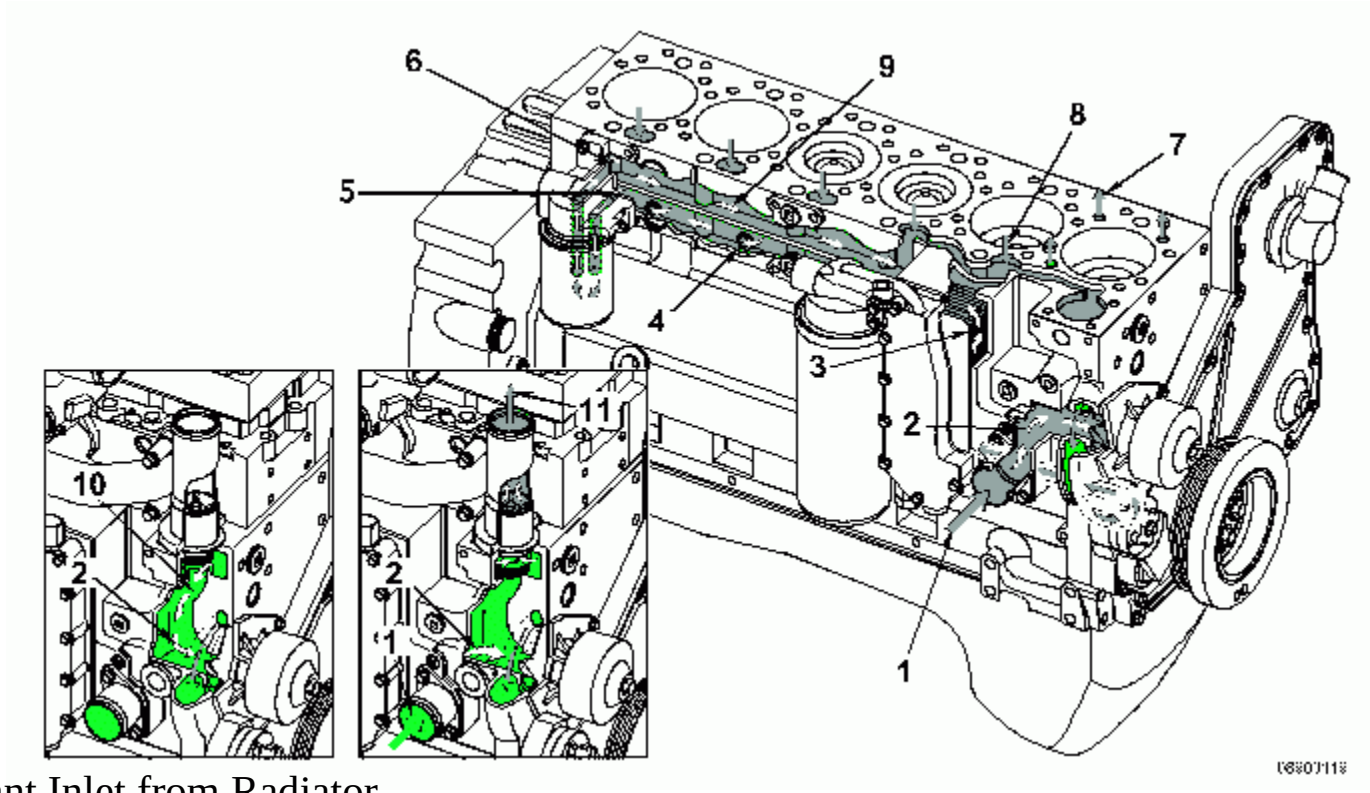
- ISL CM 850 engines **must** use the LF9009 oil filter with an internal venturi that provides filter bypass oil flow through a ‘stacked disk’ section of the filter.

Specifications - Lubricating Oil System

Oil Pressure:	
At Low Idle (minimum allowable)	69 kPa [10 psi]
At Rated Speed (minimum allowable)	207 kPa [30 psi]
Regulated Pressure	517 kPa [75 psi]
Oil Capacity of Standard Engine:	
Standard Oil Pan	18.9 to 22.7 liters
Pan with Stiffener Plate	19.9 liters to 23.7 liters
Total System Capacity (oil pan and oil filter	
Standard Oil pan	26.5 liters
Pan with stiffener plate	27.4 liters



Cummins Inc. recommends the use of a high-quality SAE 15W-40 heavy duty
Engine oil, such as Cummins Premium Blue, which meets the American Petroleum Institute (API)
Performance classification CG-4/SH or CF-4/SG



1. Coolant Inlet from Radiator
2. Water Pump Suction
3. Coolant Flow Through Lubricating Oil Cooler
4. Block Lower Water Manifold (to Cylinders)
5. Coolant Filter Inlet
6. Coolant Filter Outlet
7. Coolant Supply to Cylinder Head
8. Coolant Return from Cylinder Head
9. Block Upper Water Manifold
10. Thermostat Bypass
11. Coolant Return to Radiator.

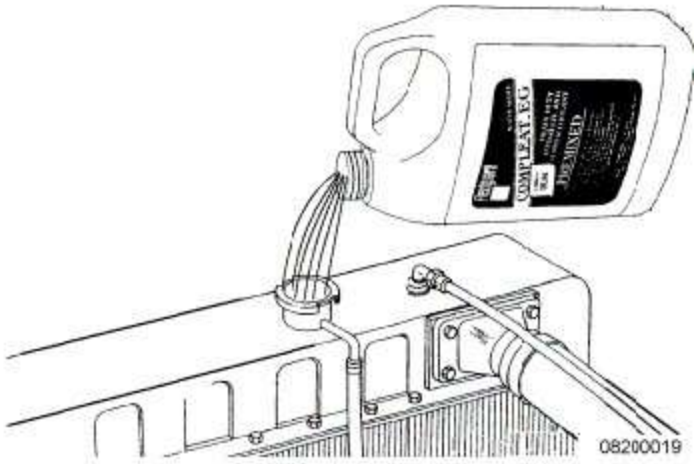
Specifications - Cooling System

Coolant Capacity (engine only)	**11.1 liters**
Standard Modulating Thermostat - Range	**82 to 93°C [180 to 200°F]**
Minimum Fill Rate (without low level alarm)	**19 liters/ min [5gpm]**
Maximum Top Tank Coolant Temperature	**107°C [225°F]**
Minimum Recommended Pressure Cap	**48 kPa [7 psi]**

Water Quality

Calcium Magnesium (Hardness)	Maximum 170 ppm as ($CaCO_3$ + $MgCO_3$)
Chloride	40 ppm as(Cl)
Sulfur	100 ppm as (SO_4)

18200001



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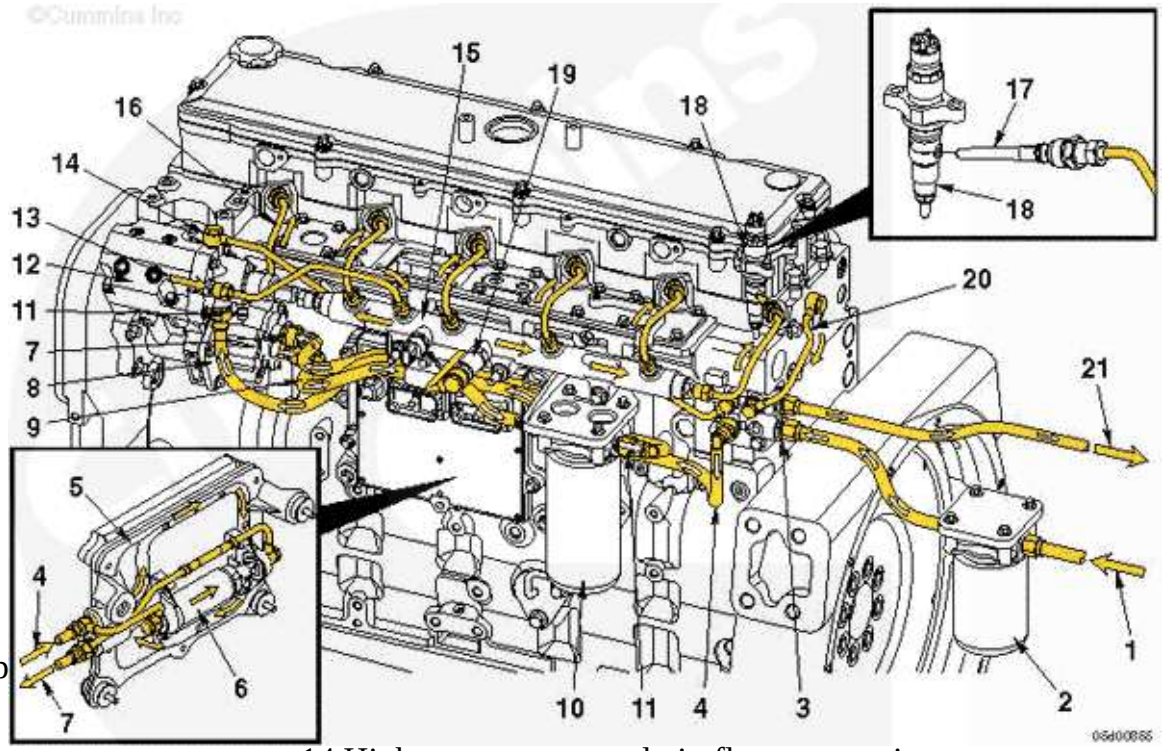


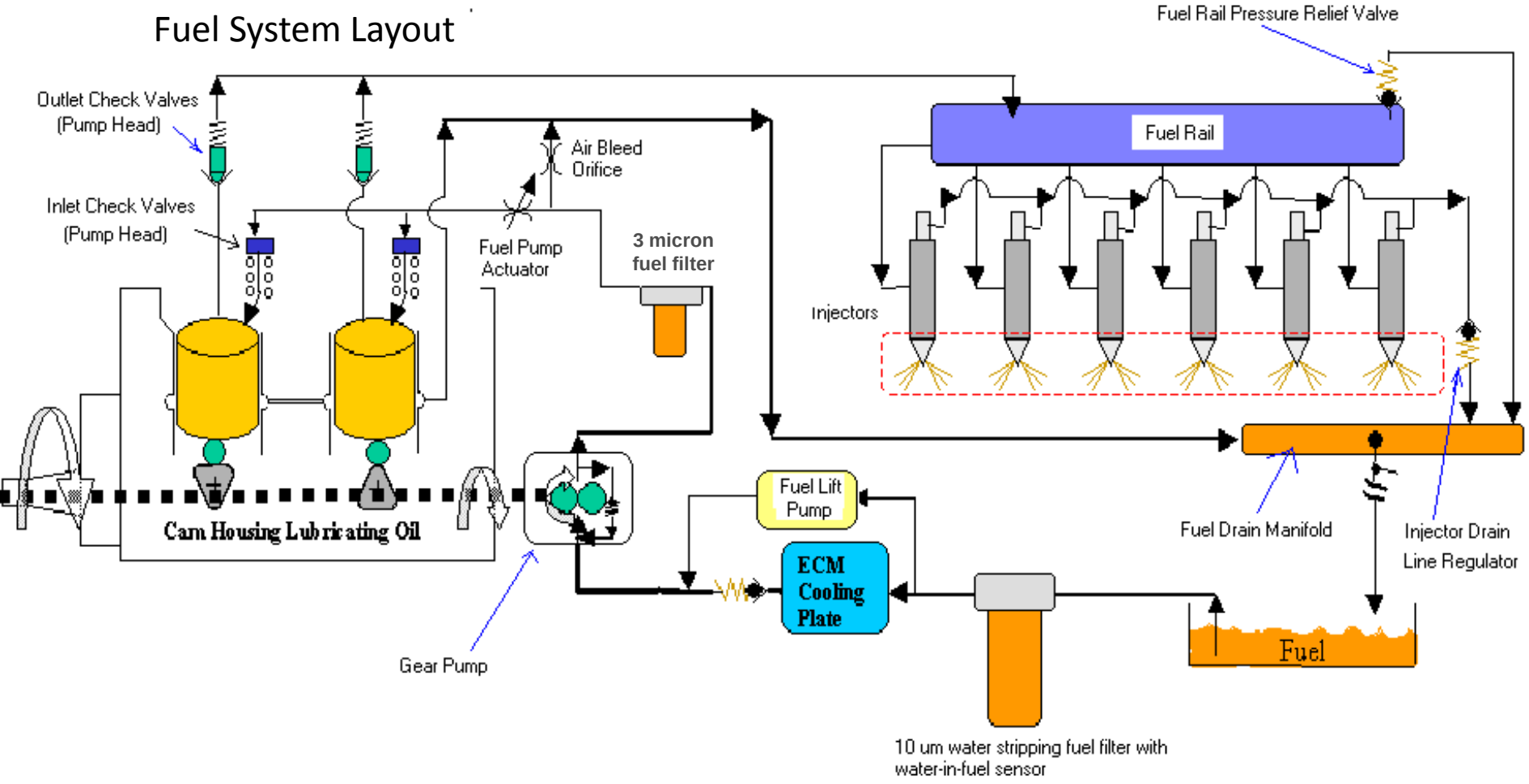
1.Fuel from supply tank
2.Fuel filter and water separator
3.OEM Fuel supply connection
4.Fuel supply to ECM mounted fuel lift pump
5.ECM Cooling plate
6.ECM mounted fuel lift pump
7.Fuel outlet from ECM mounted fuel lift pump
8.Fuel gear pump
9.Fuel from gear pump to fuel filter
10.Primary fuel filter
11.Fuel inlet to fuel pump actuator

14.High pressure pump drain flow connection
15. Fuel rail
16. High pressure injector supply lines
17. High pressure fuel connector
18. Fuel injector
19. Fuel pressure relief valve
20. Fuel injector drain flow line
21. Fuel return to supply tanks

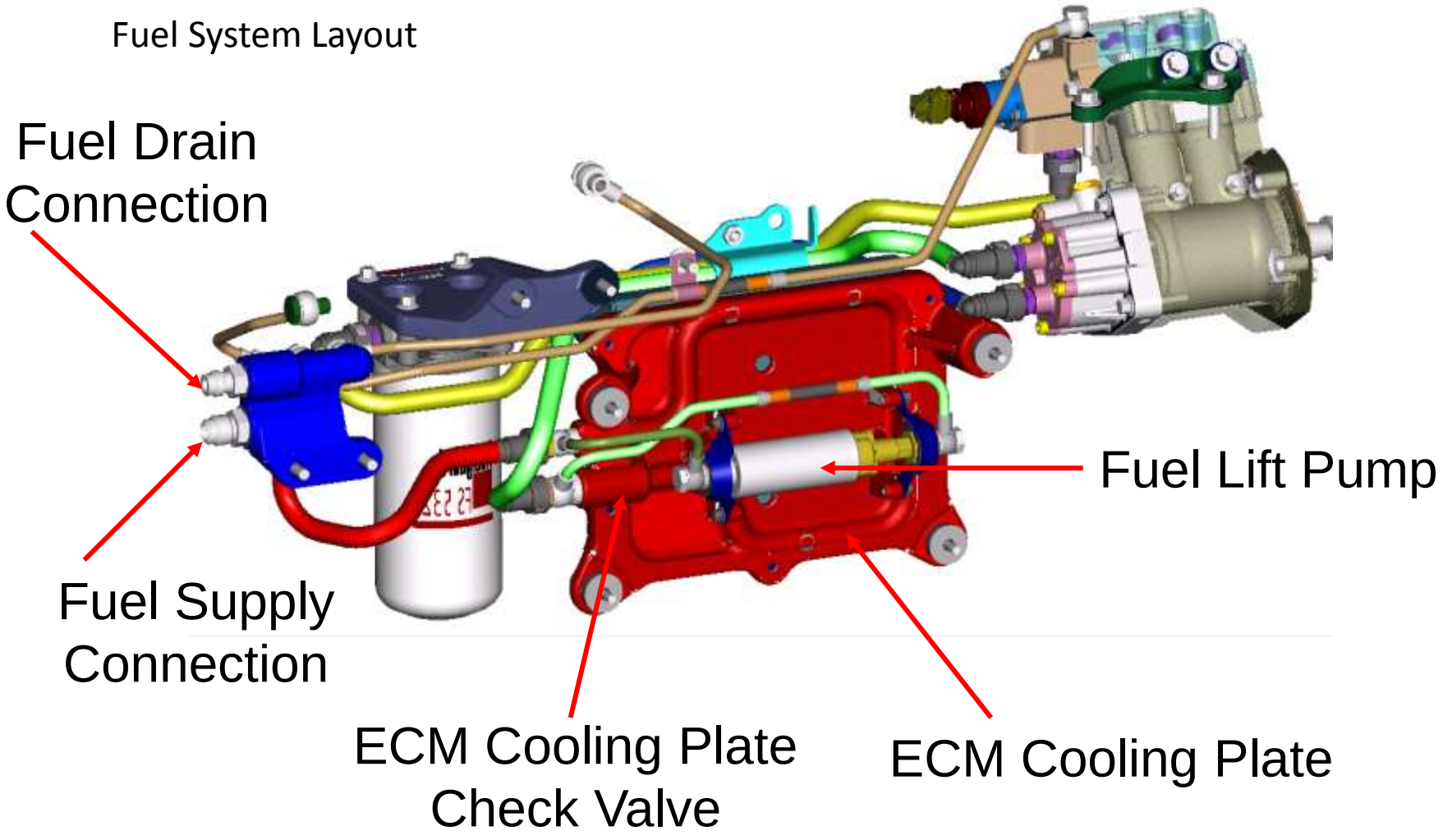
Specifications - Fuel System

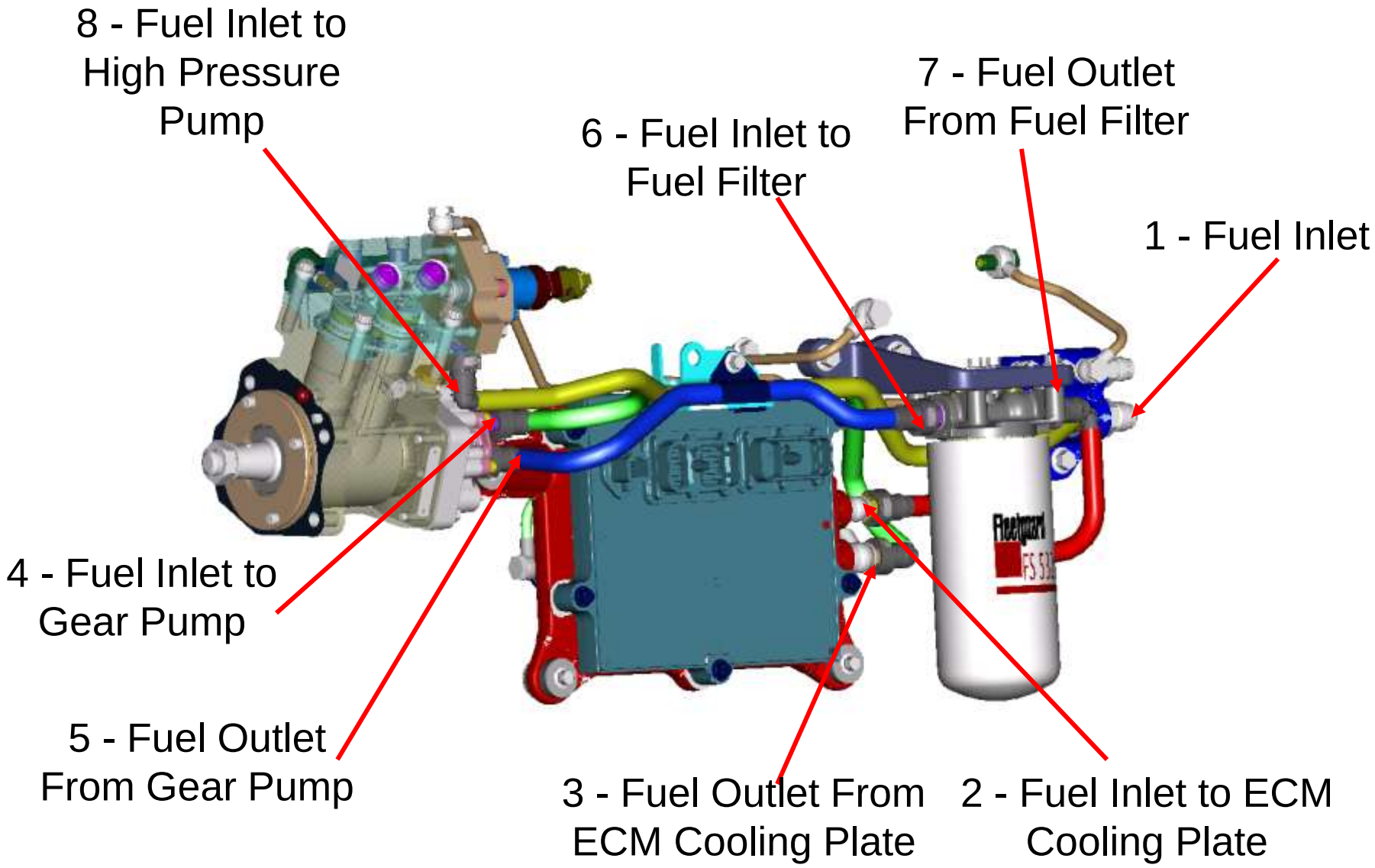
Maximum Fuel Return Line Pressure	254 mm Hg [10 in Hg]
Maximum Fuel Inlet Restriction (gear pump inlet)	304.8 mm HG [10 in HG]
Maximum Fuel Inlet Restriction – At OEM connection (dirty filter) Loaded Condition	203.2 mm Hg [8 in. Hg]
Minimum Gear Pump Pressure	
- During Cranking Condition	69 kPa [10 psi]
- During Rated Condition	483 kPa [70 psi]
Minimum Engine Cranking Speed	150 rpm
Maximum filter pressure drop	138 kPa [20psi]
Minimum Lift Pump Pressure (gear pump inlet during cranking	35 kPa [5 psi]

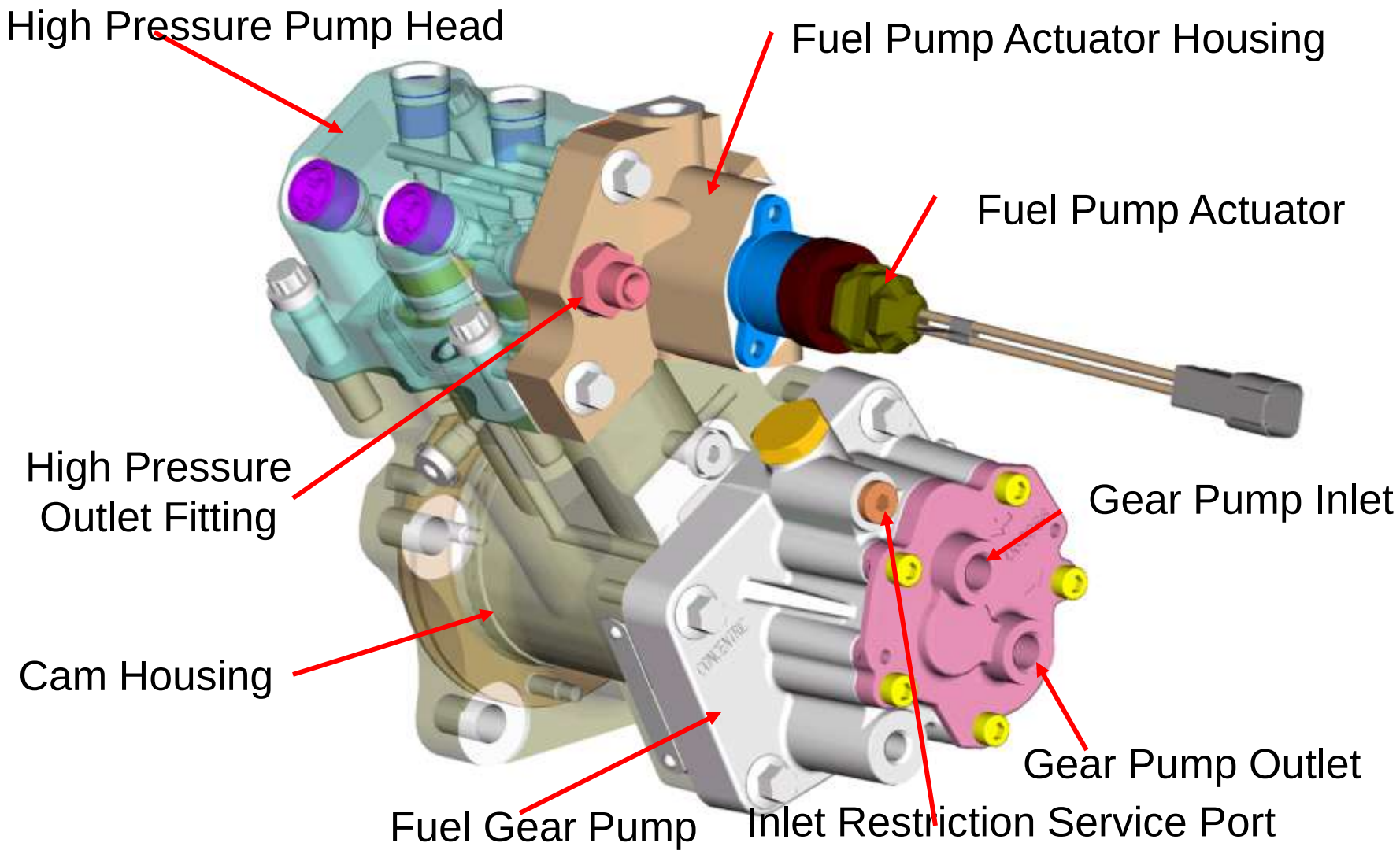
Fuel System Layout



Fuel System Layout




8 - Fuel Inlet to High Pressure Pump
6 - Fuel Inlet to Fuel Filter
7 - Fuel Outlet From Fuel Filter
1 - Fuel Inlet
4 - Fuel Inlet to Gear Pump
5 - Fuel Outlet From Gear Pump
3 - Fuel Outlet From ECM Cooling Plate
2 - Fuel Inlet to ECM Cooling Plate


High Pressure Pump Head
Fuel Pump Actuator Housing
Fuel Pump Actuator
High Pressure
Outlet Fitting
Gear Pump Inlet
Cam Housing
Gear Pump Outlet
Fuel Gear Pump
Inlet Restriction Service Port

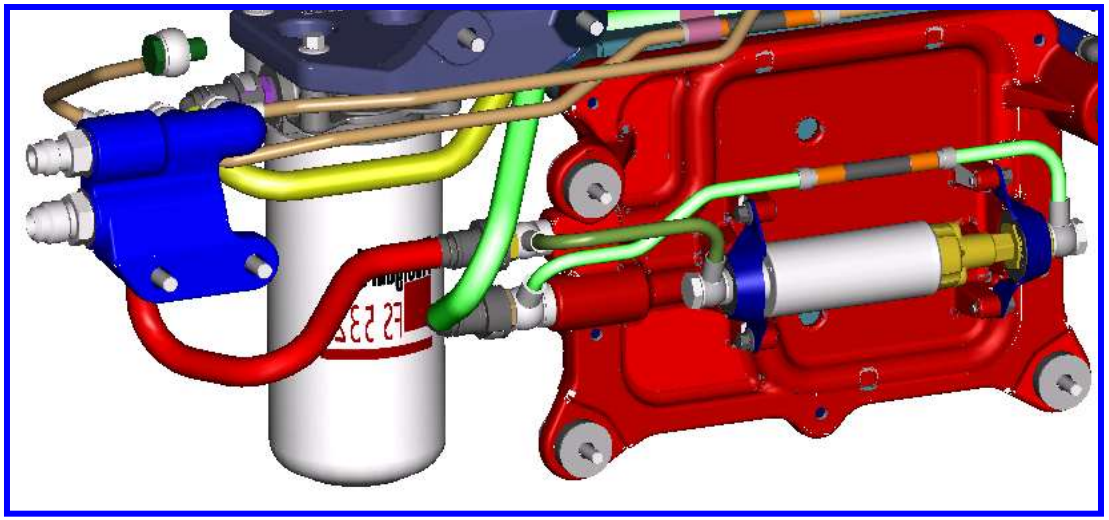
Engine Priming

The primary purpose of the priming circuit is to provide pressure to the gear pump for quick engine starts.

The fuel lift pump only runs for 30 seconds at key-on. It is only used for priming the fuel system at start-up.

The priming pump will fill the pressure side filter when installed dry. 5 or 6 key cycles is required to fill the pressure side filter.

The lift pump does not do a good job of priming a dry system. It is recommended that the suction filter be pre-filled with clean fuel when replaced.



ECM Cooling Plate Assembly

Fuel Lift Pump Check Valve

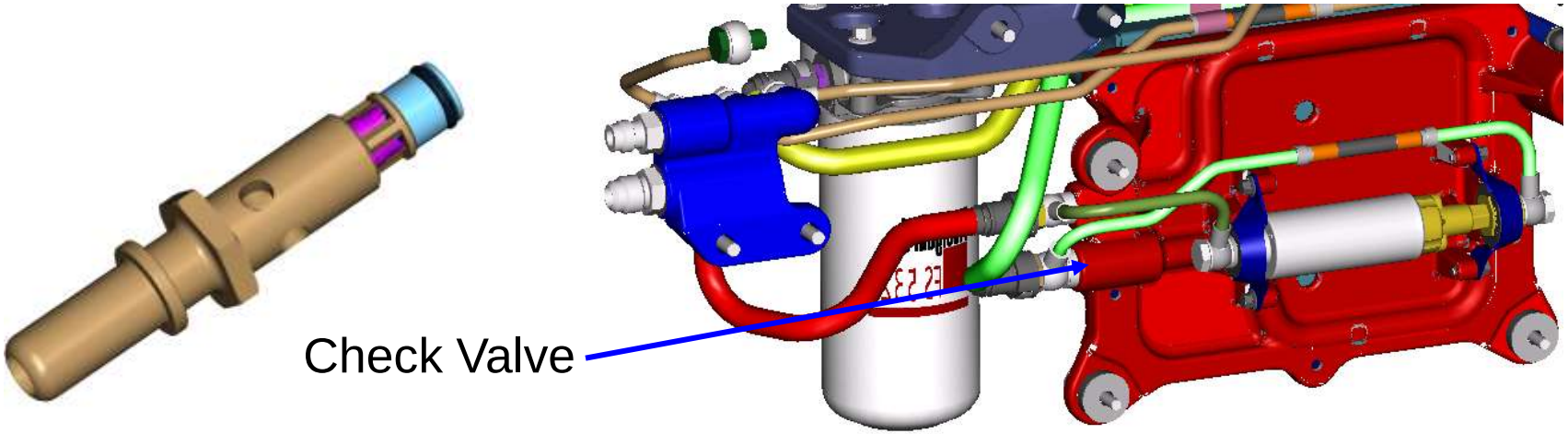
Lift Pump Inlet

σ

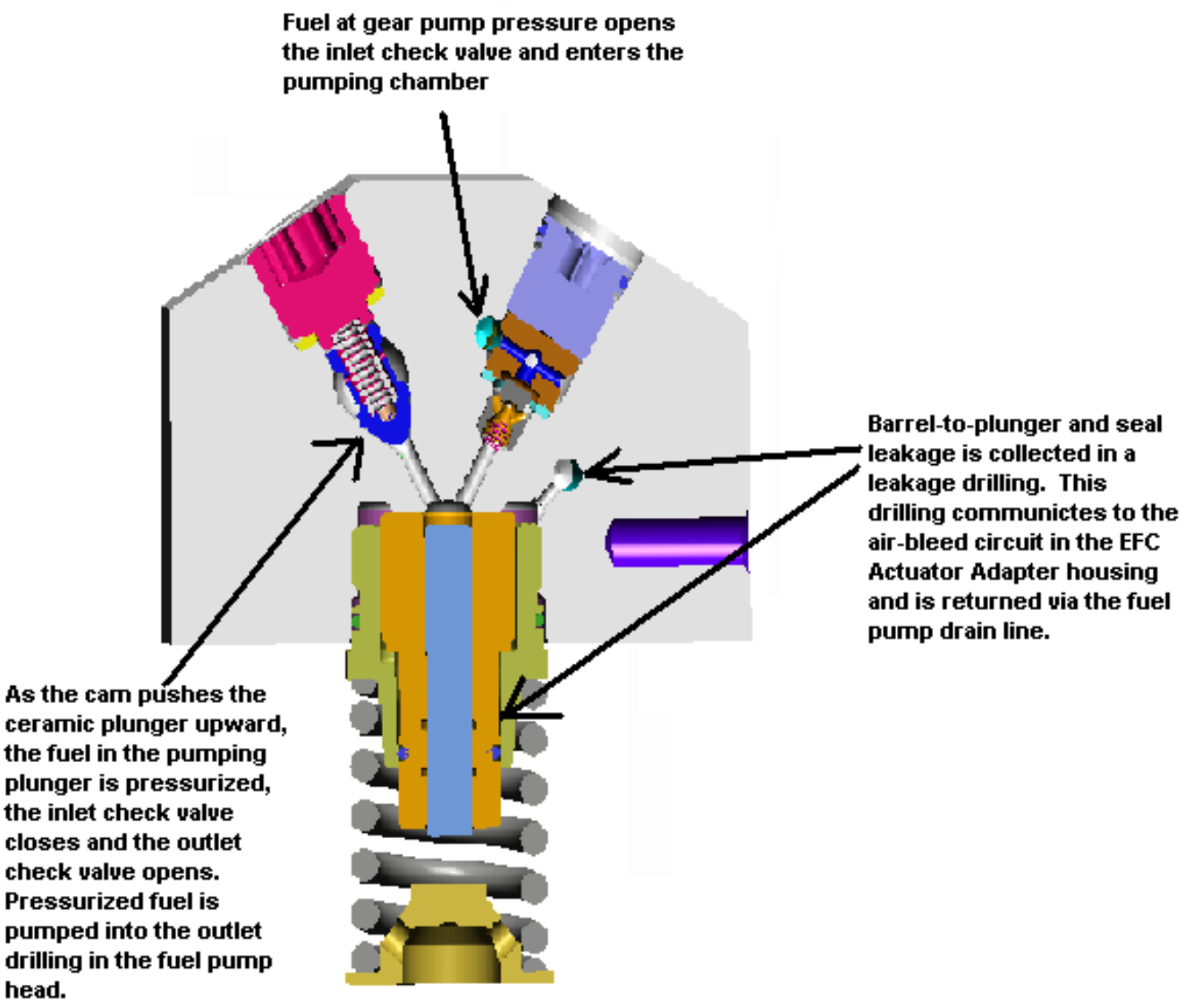
Lift Pump Outlet

ECM Cooling Plate Check Valve

- Without the ECM cooling plate check valve, fuel would continuously circulate through the ECM cooling plate when the lift pump is not running.
- The check valve can become damaged upon installation. Inspect the check valve for damage or debris when troubleshooting low power and performance problems.
- High fuel inlet restriction will be measured at the gear pump inlet if the check valve is damaged.



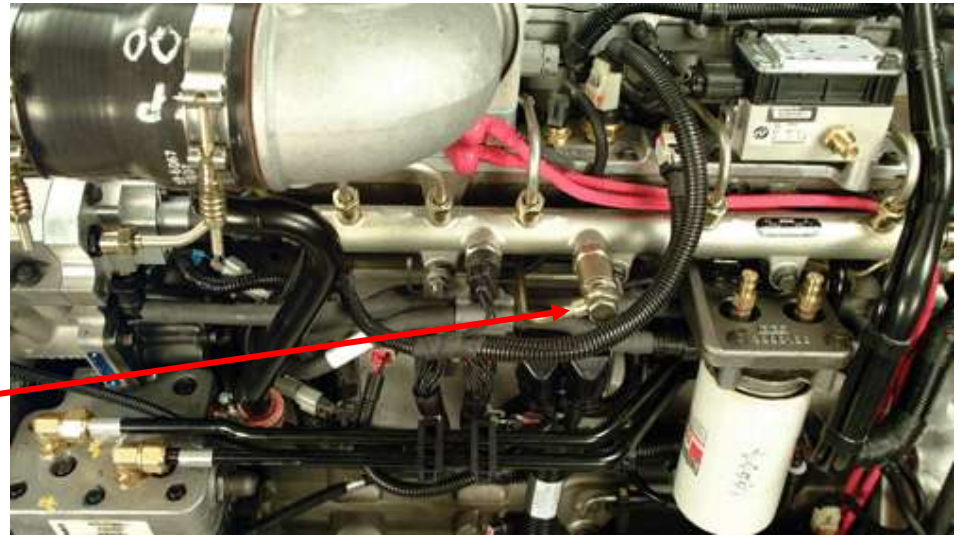
Fuel Pump Head Details



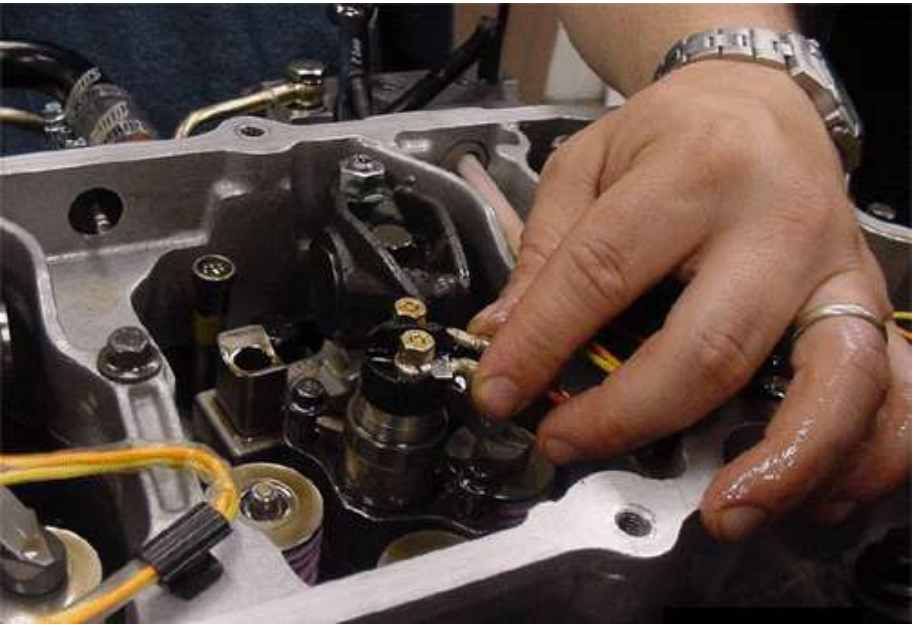
High Pressure Relief Valve

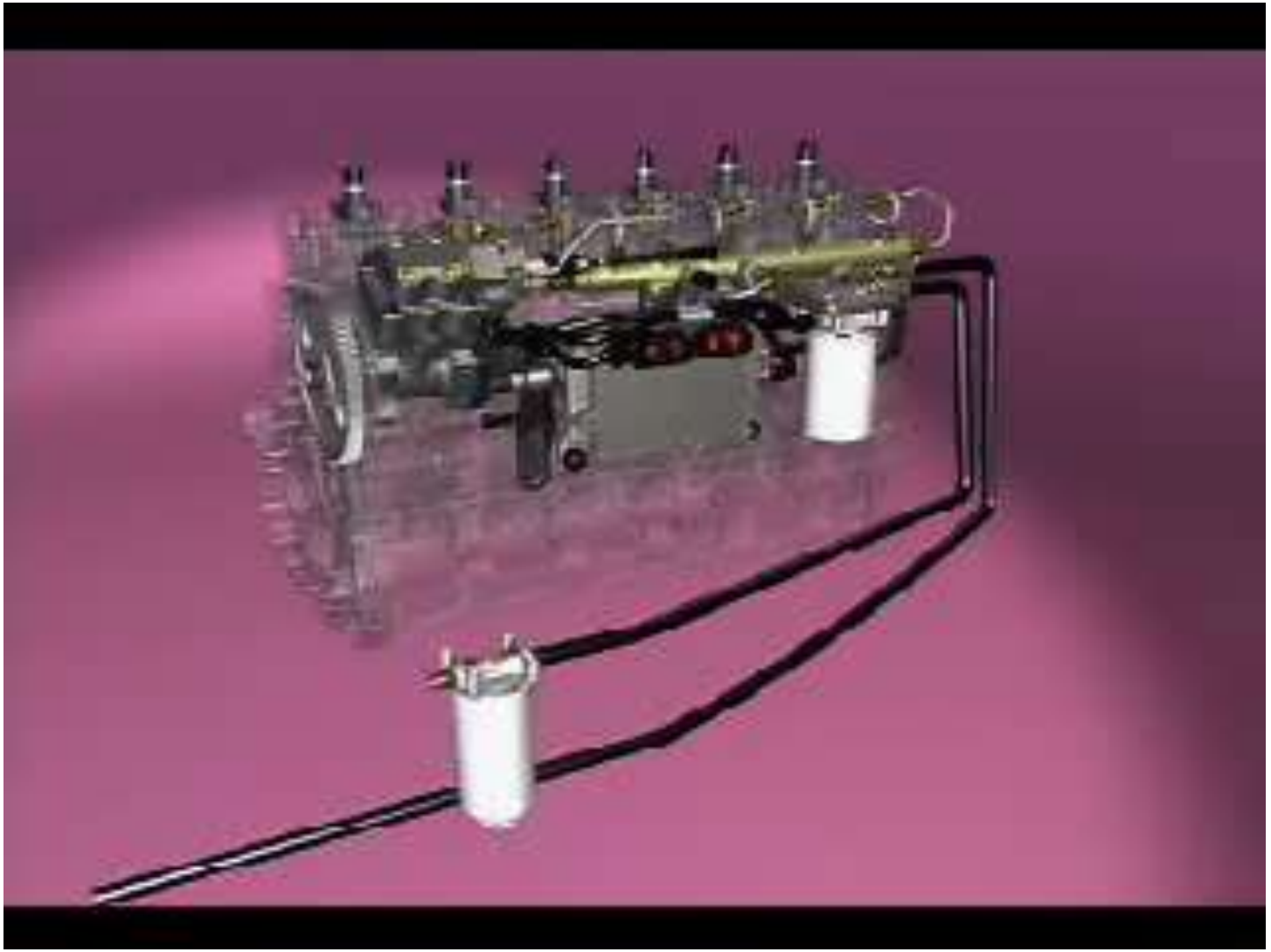
- High pressure relief valve acts like a ‘fuse’ in the fuel system.
- If fuel pressure exceeds the relief valve pop-off pressure, fuel rail pressure will be regulated to 900 bar and the excess fuel will be returned to drain.
- If the high pressure relief valve opens, fault code 449 or 2311 will activate indicating a pressure overshoot occurred.
- If the control system still has pressure control, the valve will reseat through a momentary pressure interruption (3x max) and normal operation will continue.

High Pressure Relief Valve



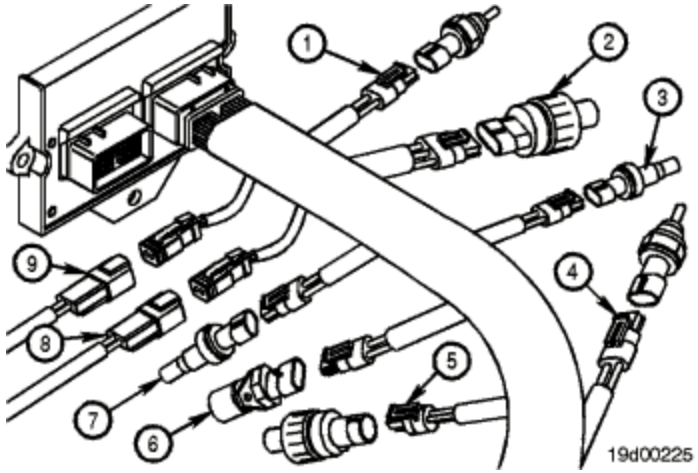
Injector



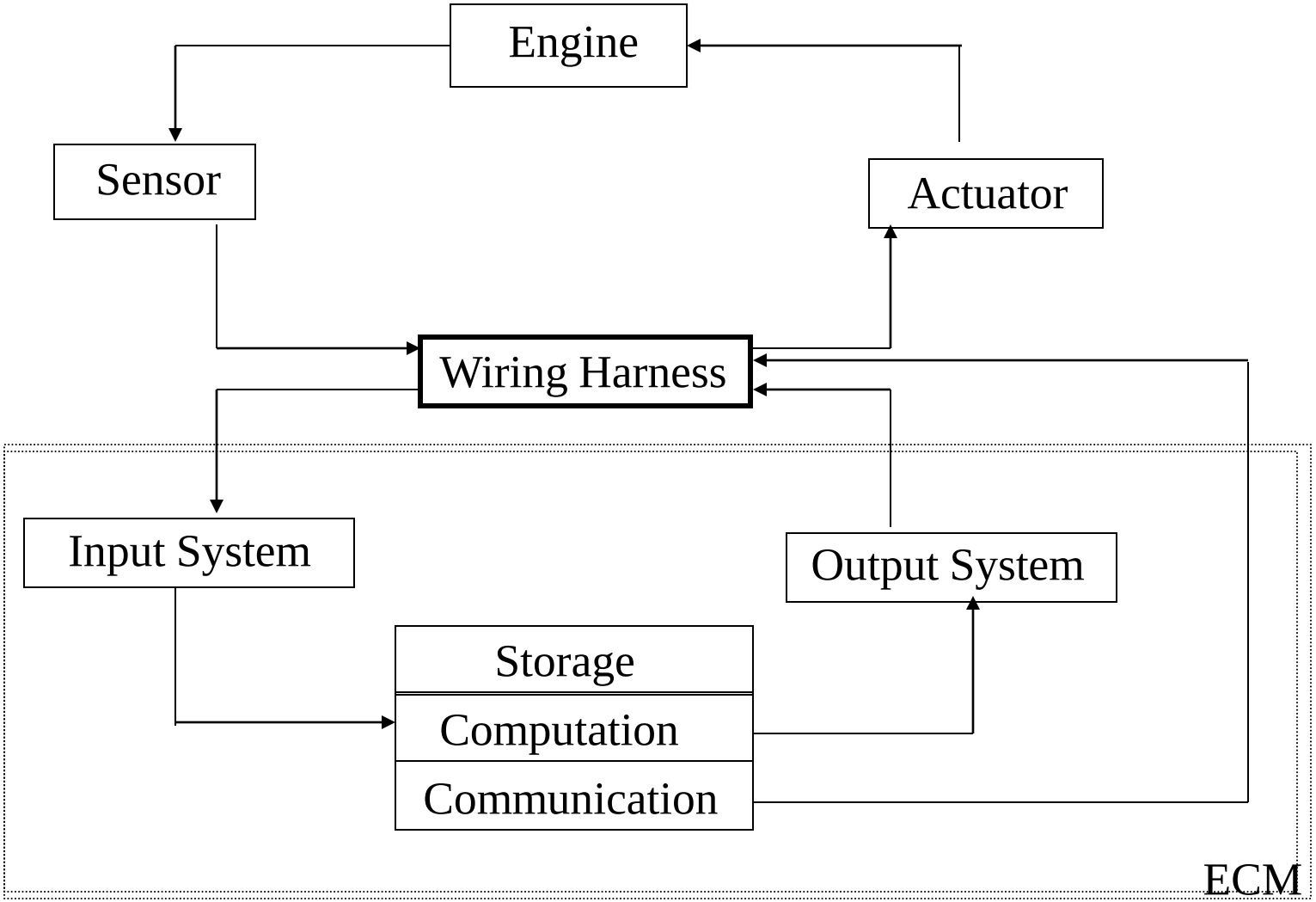


The control system utilizes a number of sensors to provide data on engine operating parameters. These sensors include

Coolant Temperature Sensor
Oil Pressure Sensor
Water-in-Fuel (WIF) Sensor
Intake Air Temperature Sensor
Intake Manifold Pressure Sensor
Engine Speed and Position Sensors
Engine Speed (crankshaft position sensor
Camshaft position sensor
Barometric pressure sensor



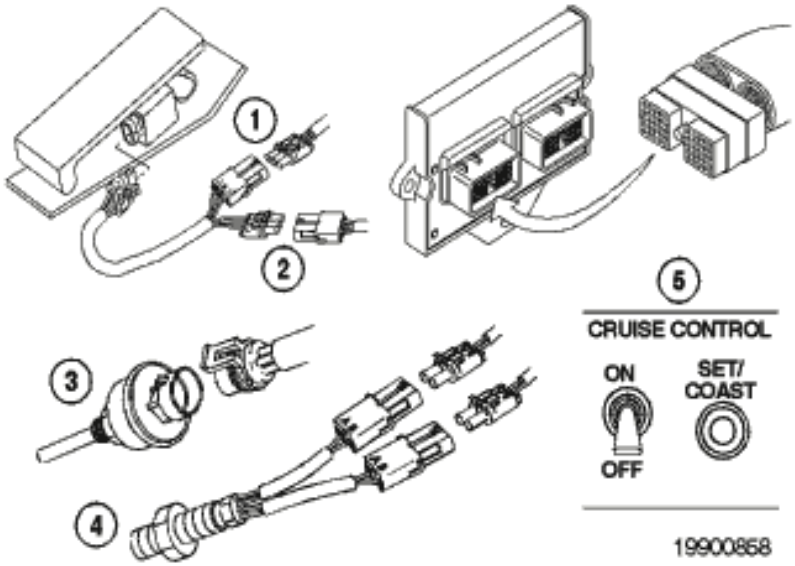
- **Electronic Control System Block Diagram**



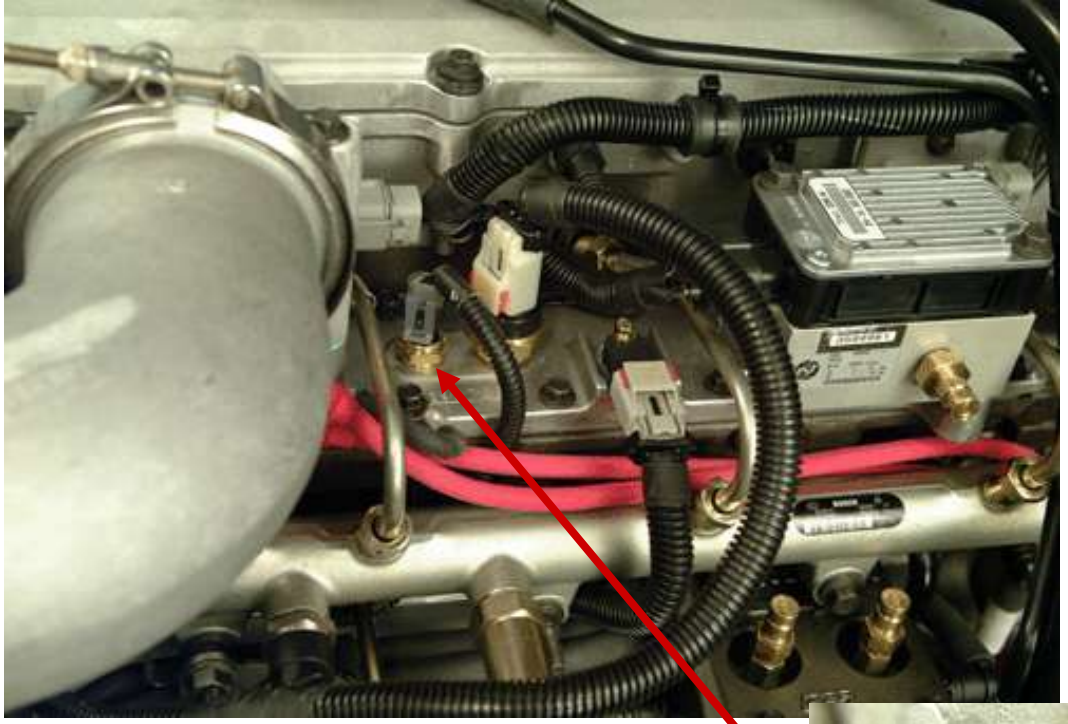
The following inputs are provided by original equipment manufacturer (OEM)-selected devices:

Accelerator pedal position sensor
Idle validation switch
Coolant level sensor
Vehicle speed sensor (VSS)
Feature control switches such as cruise control, power take off (PTO)
Fan Control switch
Air conditioner pressure switch

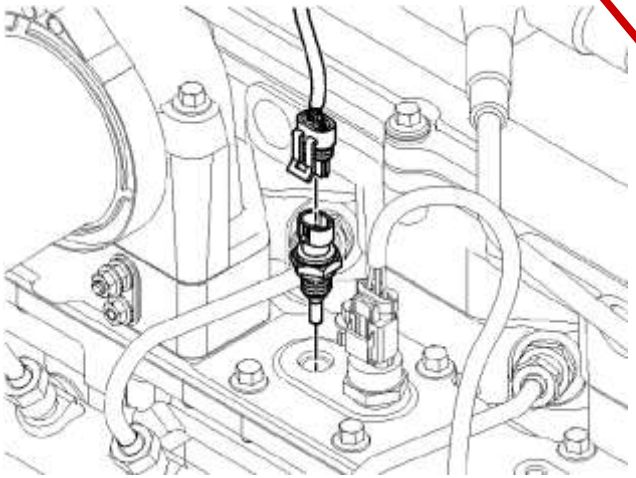
NOTE: These inputs are application-dependent. Some applications will **not** use all of these inputs.



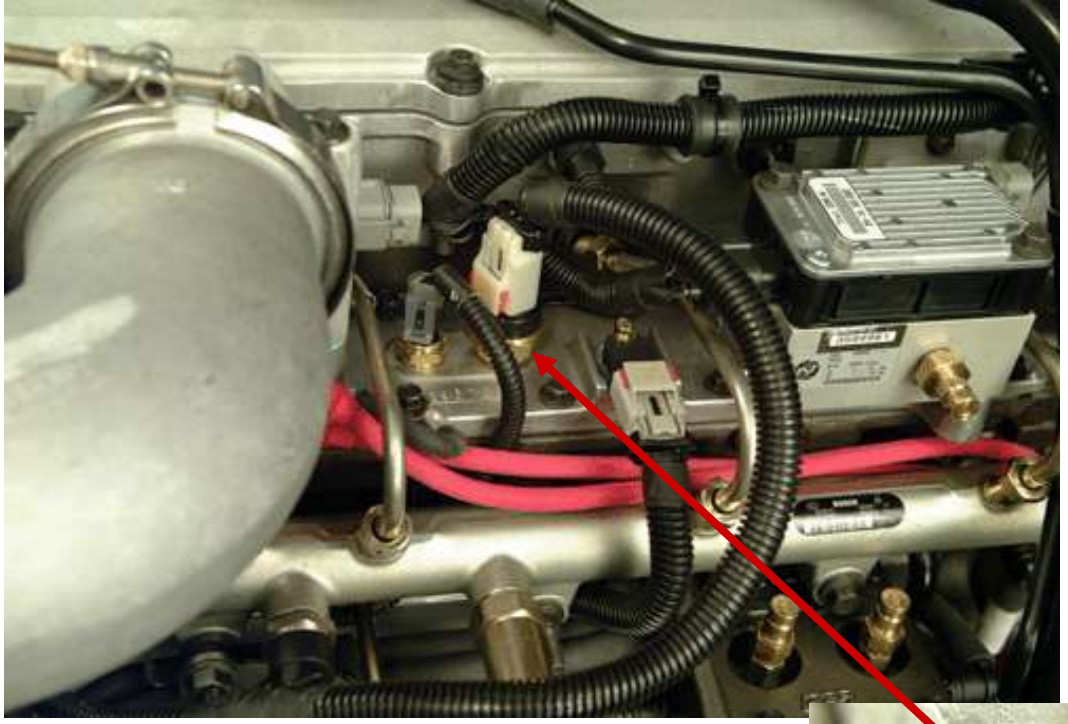
Electronic Components

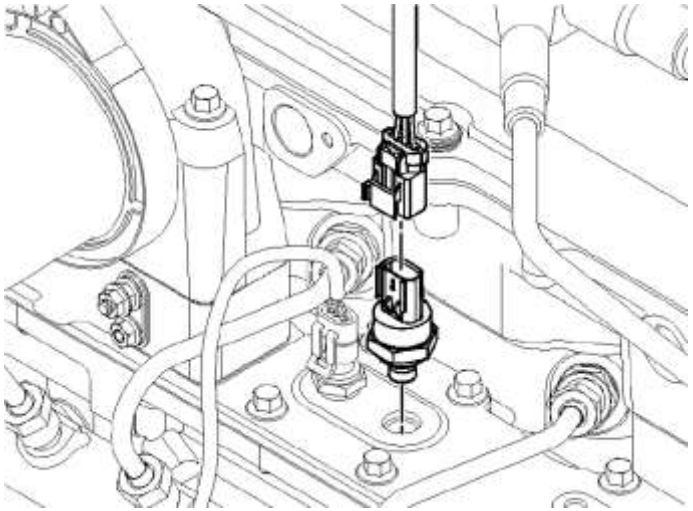


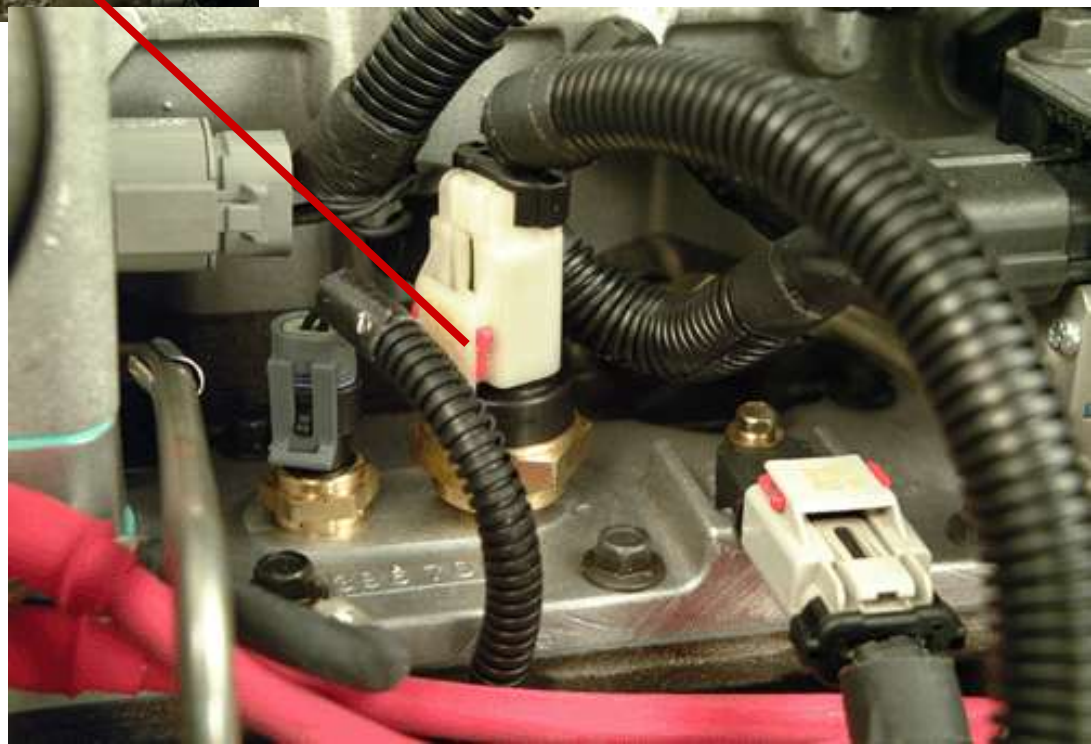
Intake Manifold Temperature Sensor



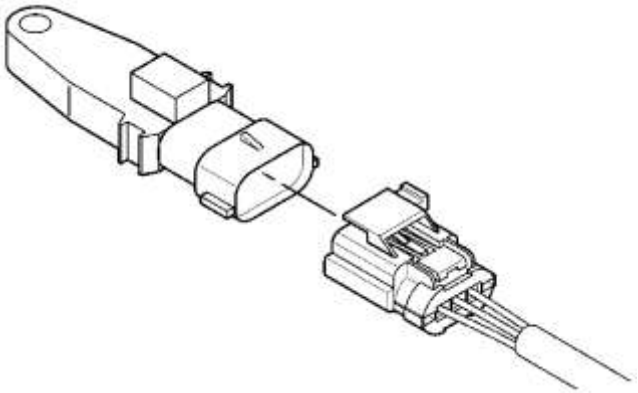
Intake Manifold Pressure Sensor

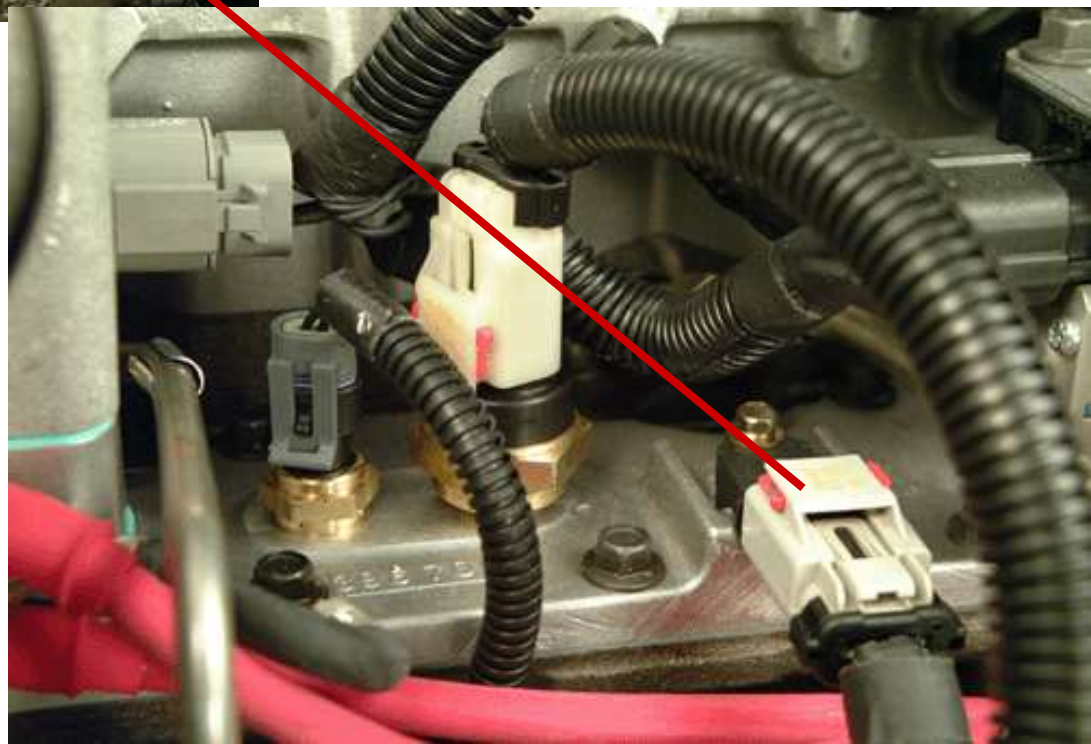




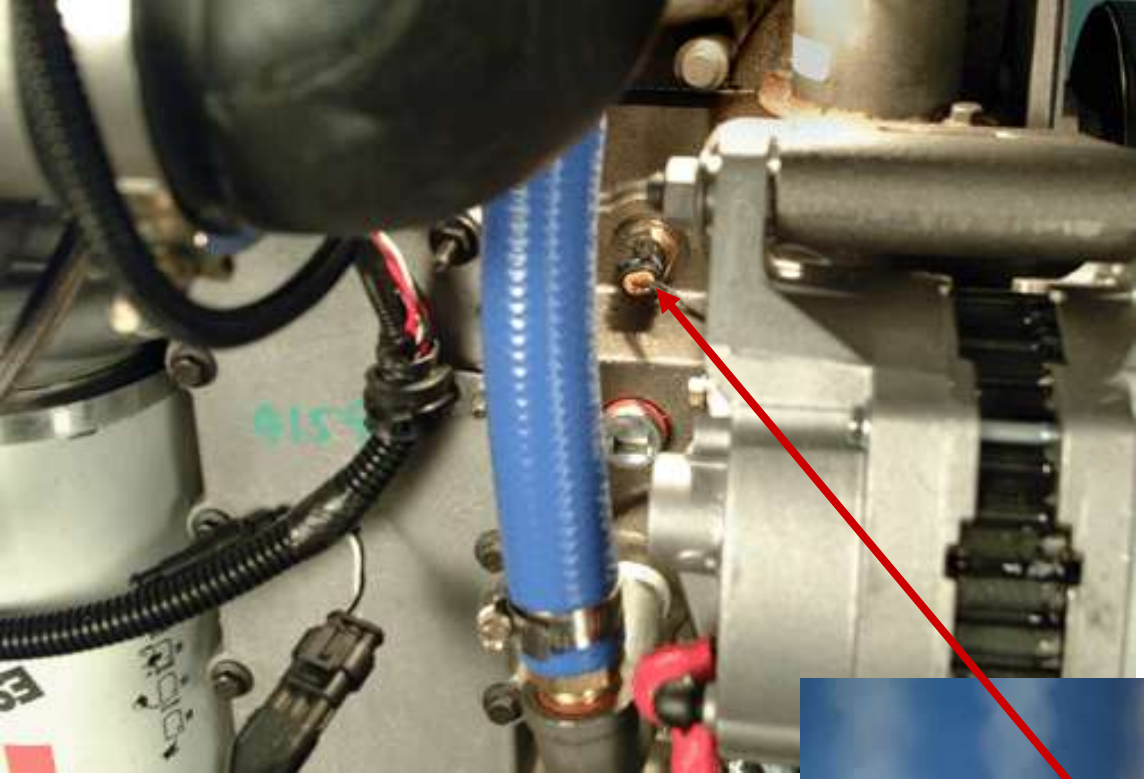


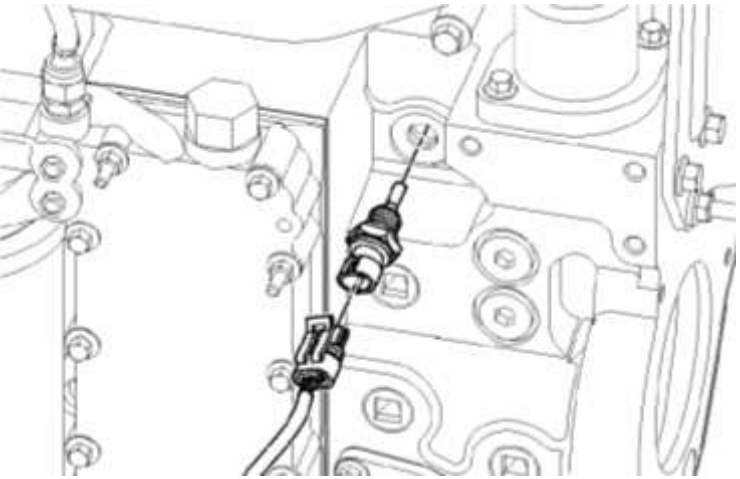
Barometric Air Pressure Sensor



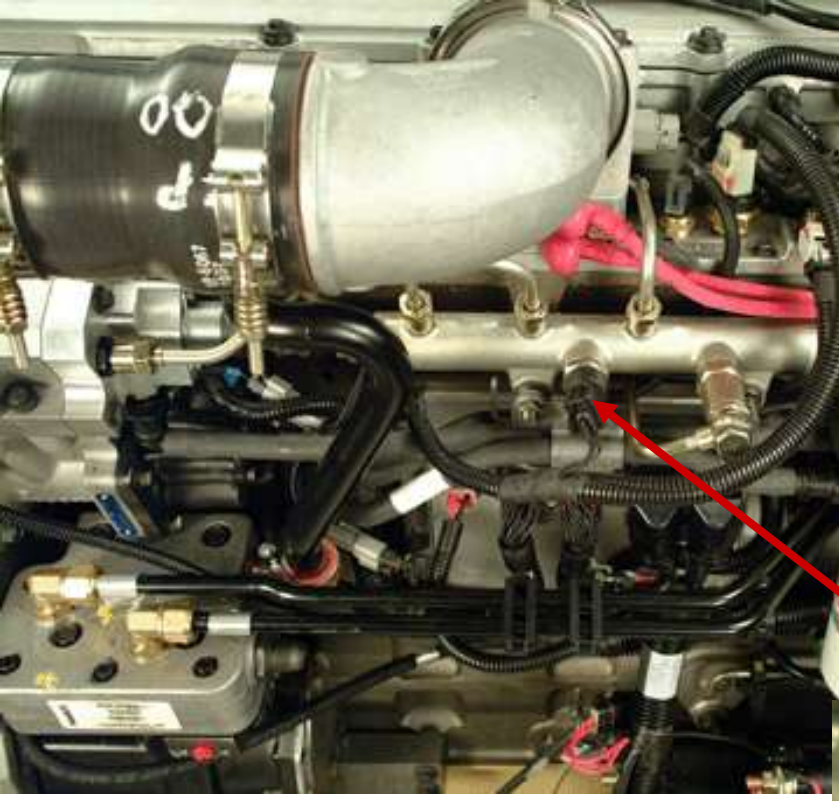


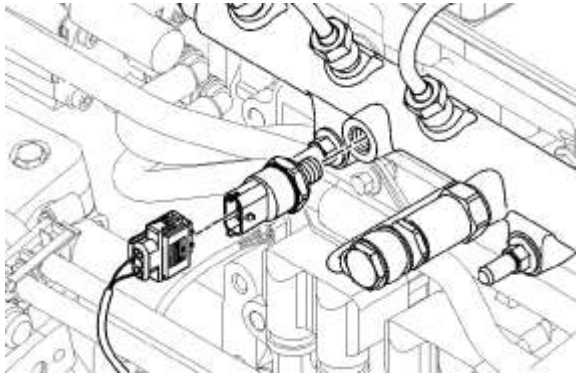
Coolant Temperature Sensor

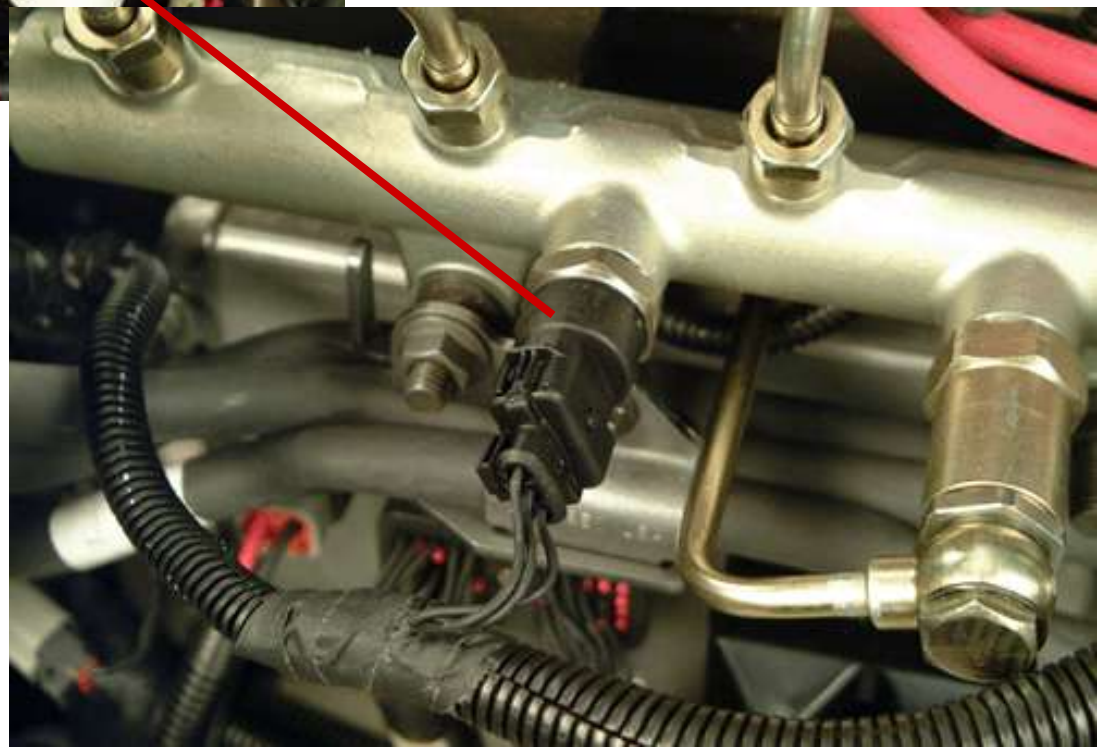




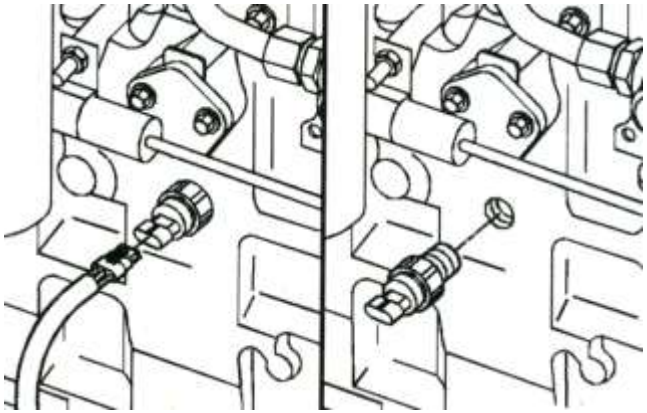
Common Rail Pressure Sensor



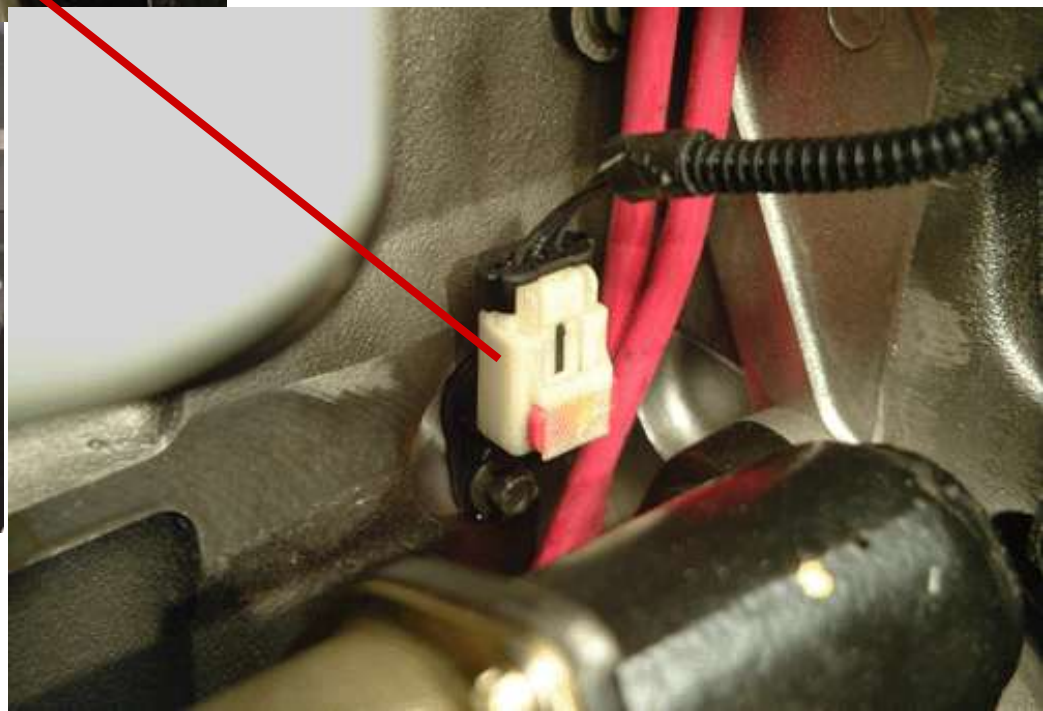




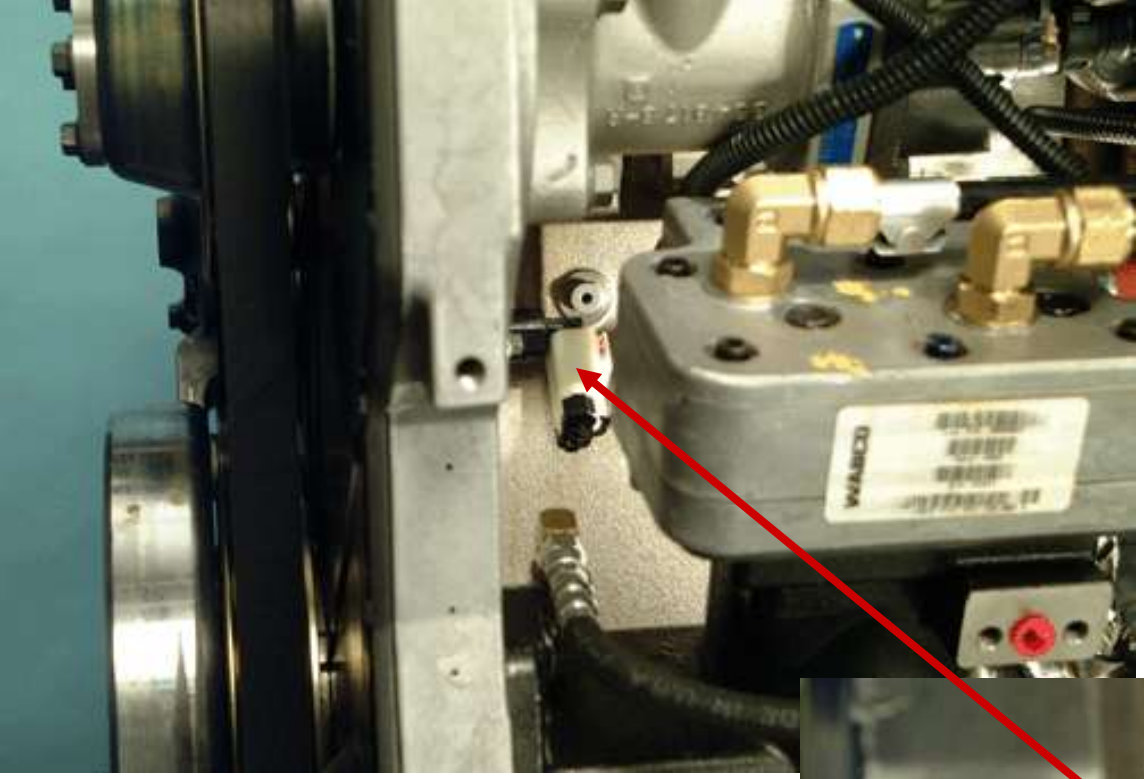
Oil Pressure Sensor

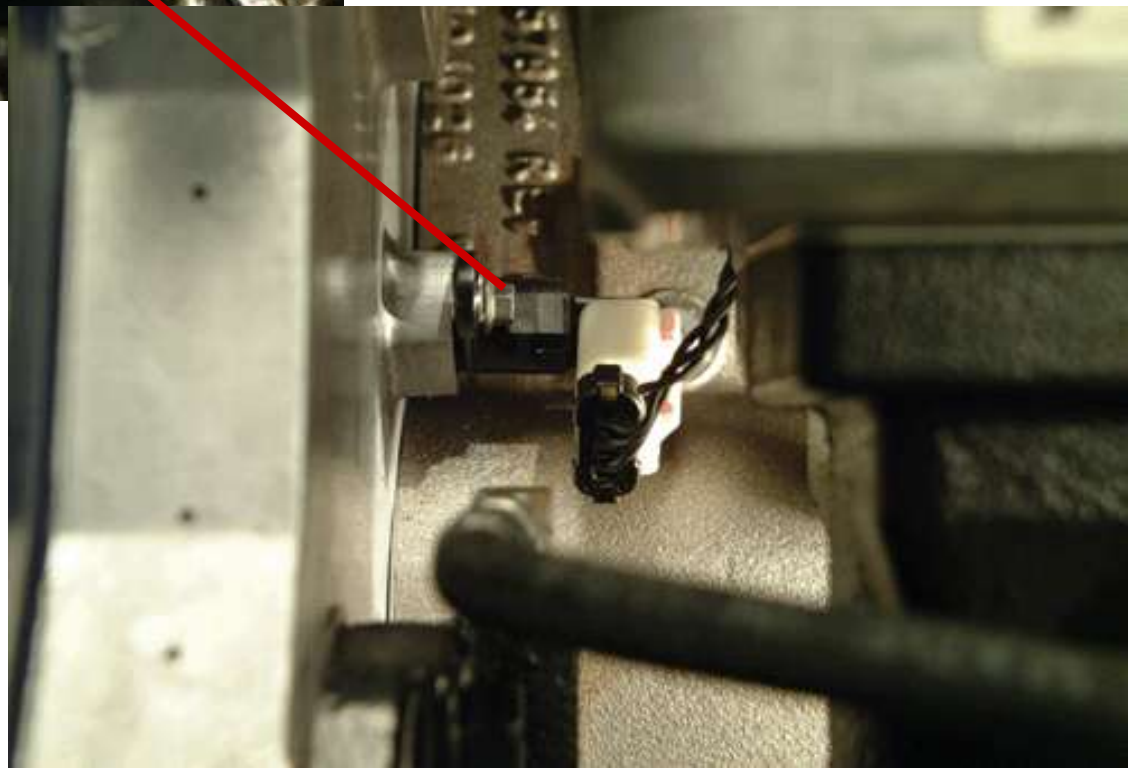


Engine Position Sensor

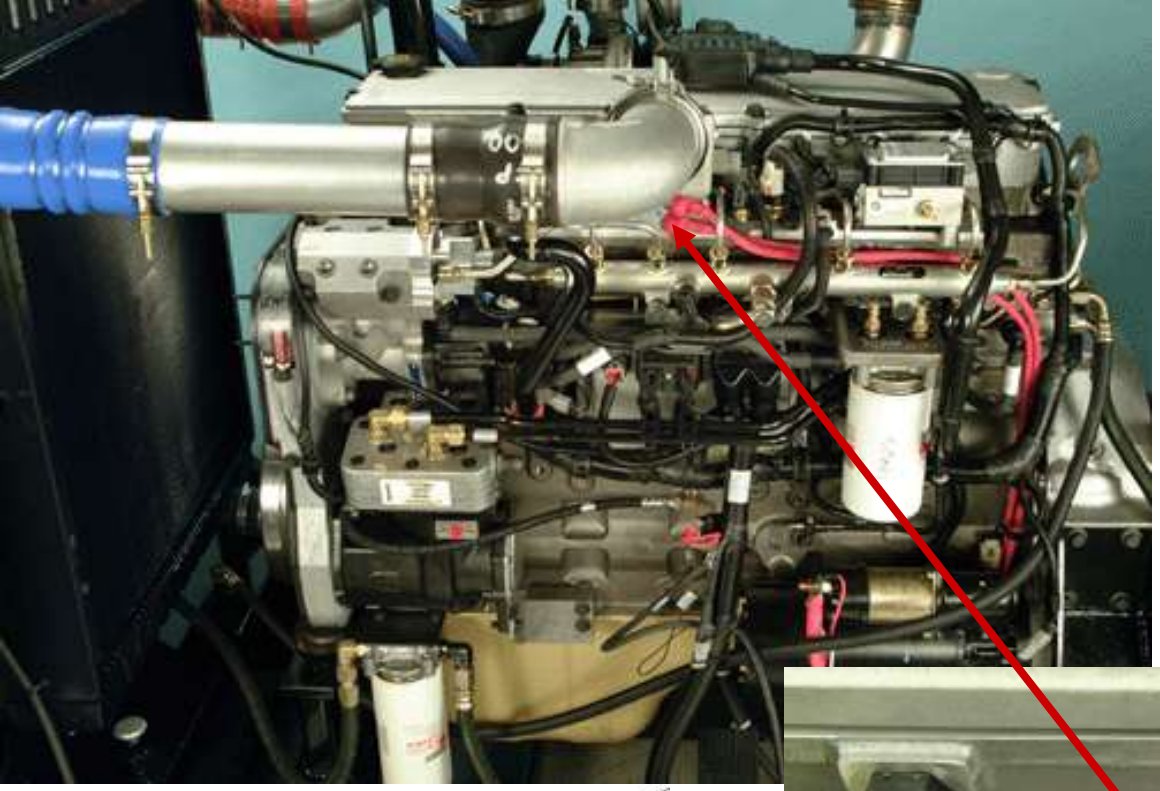


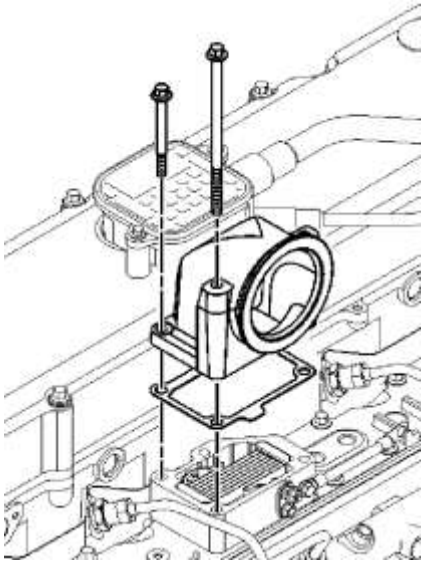
Camshaft Position Sensor



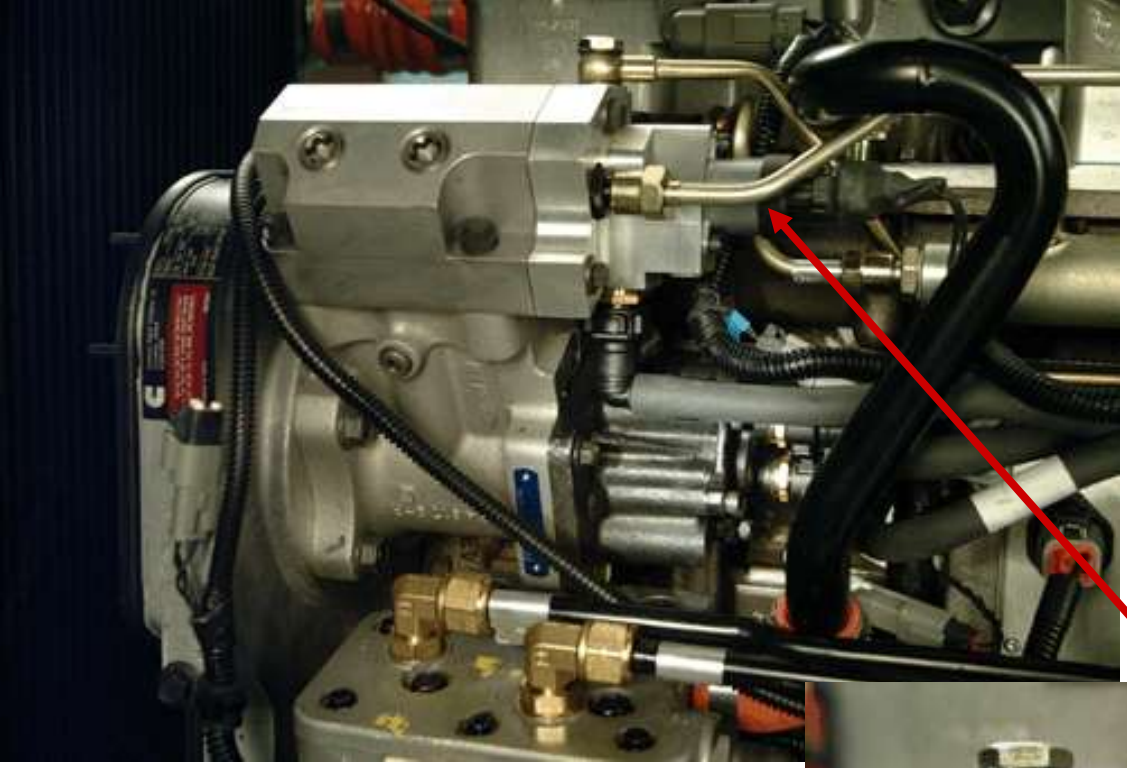


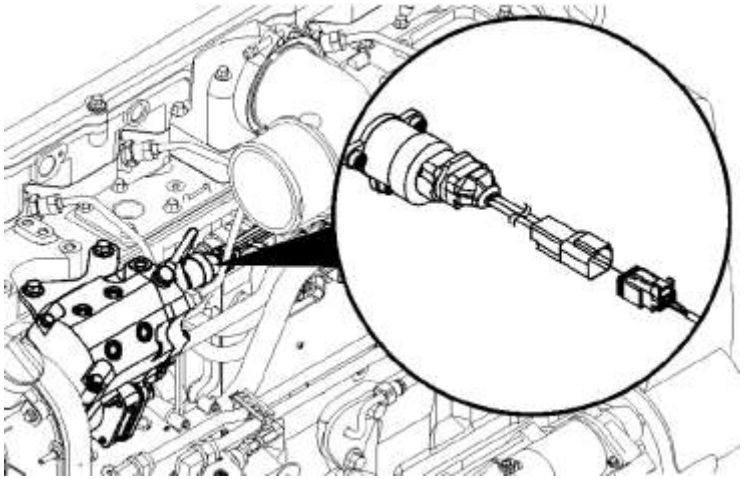
Intake Air Heater

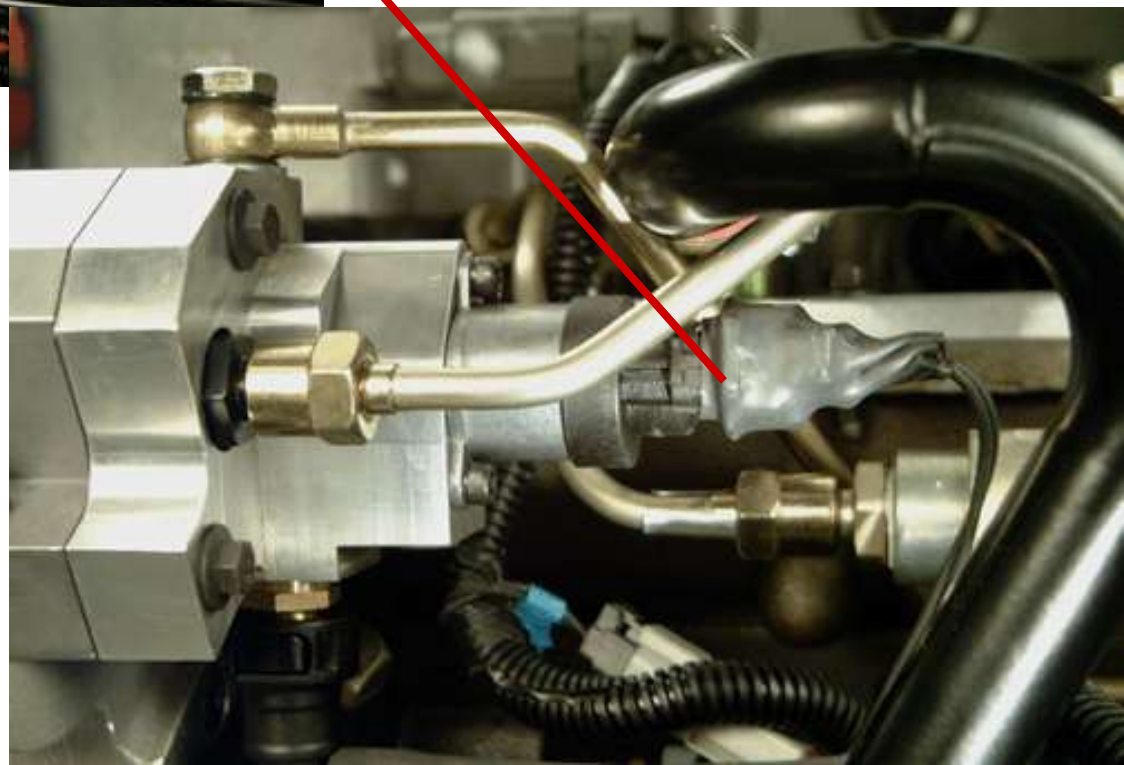




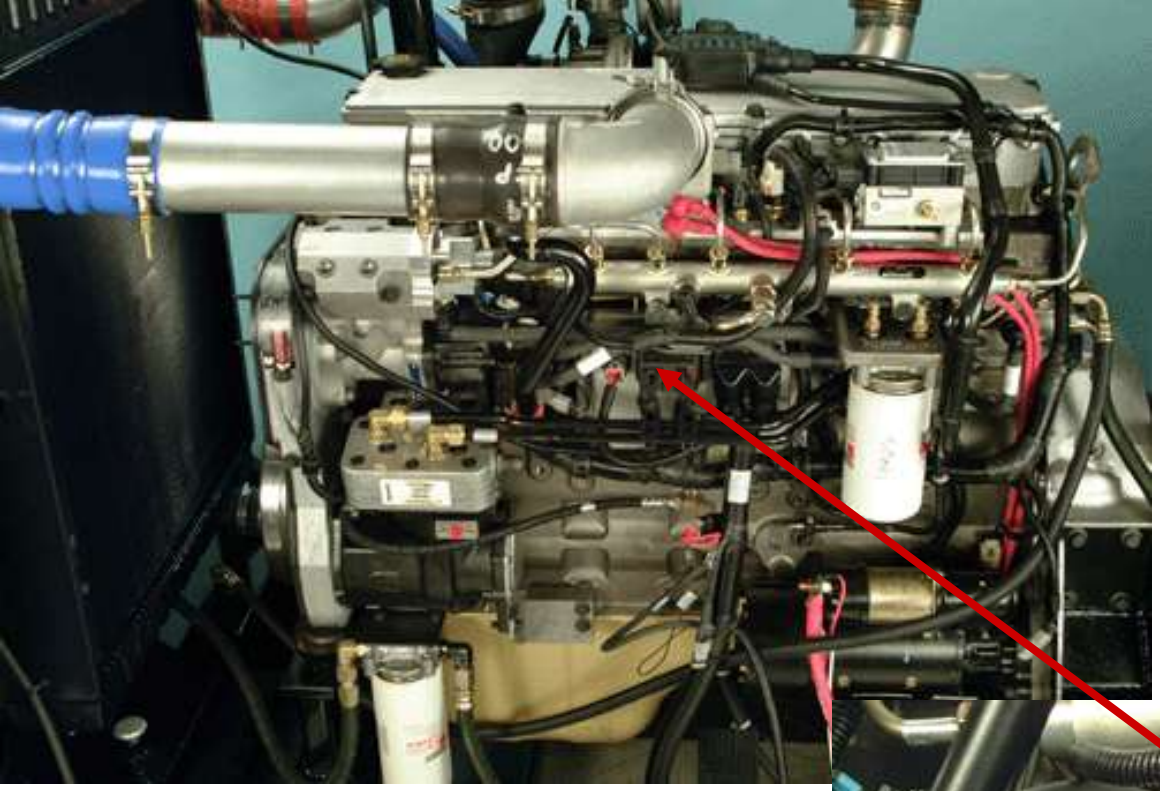
Fuel Pump Actuator

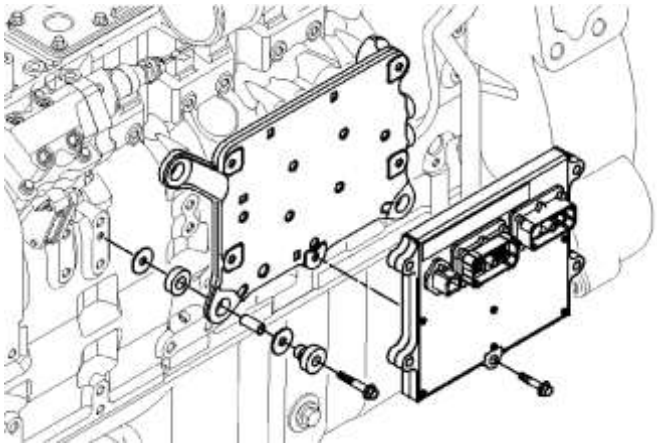


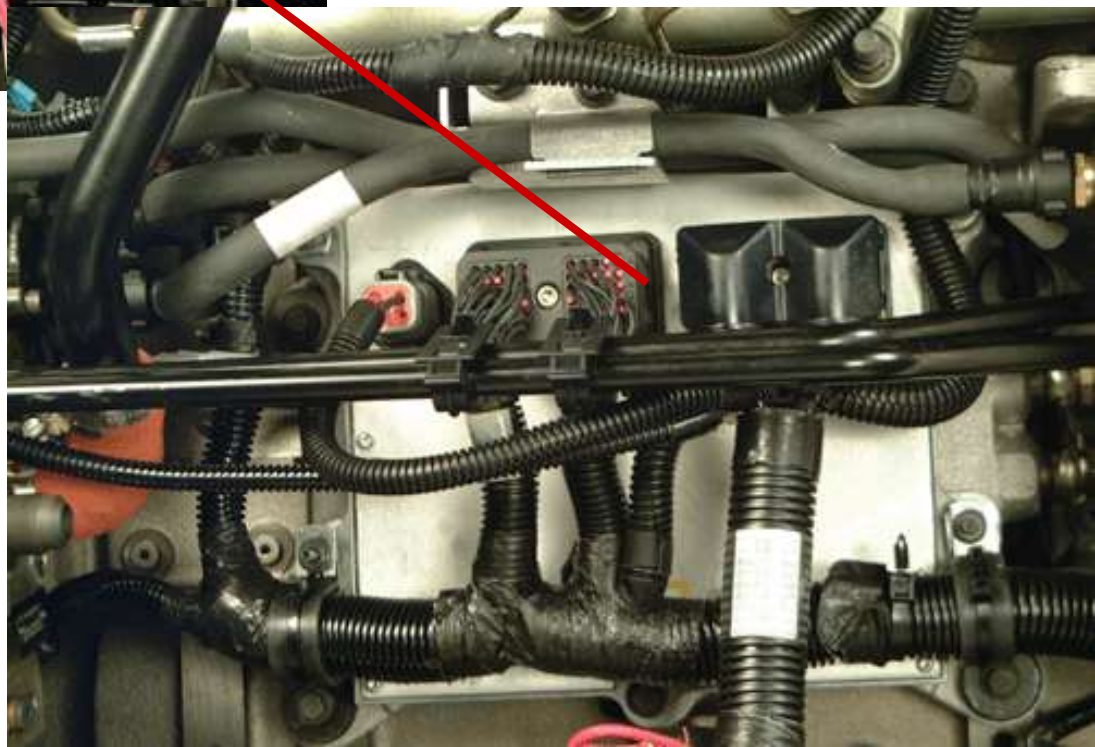


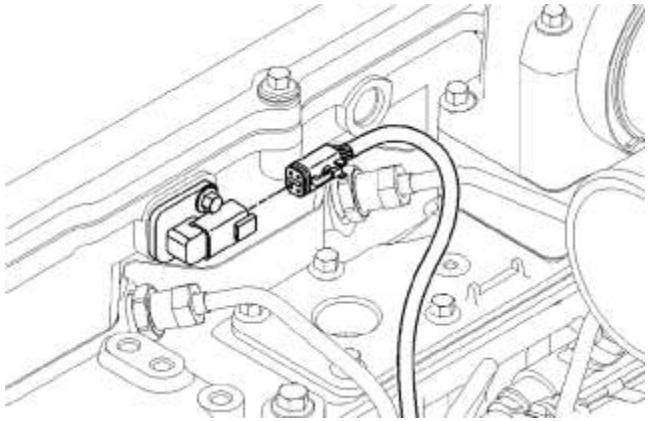


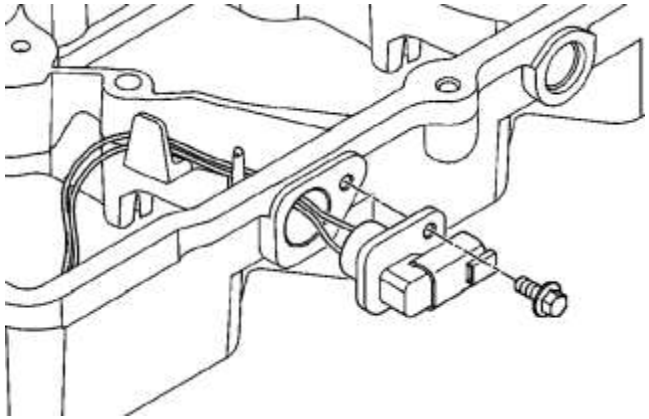
Electronic Control Module

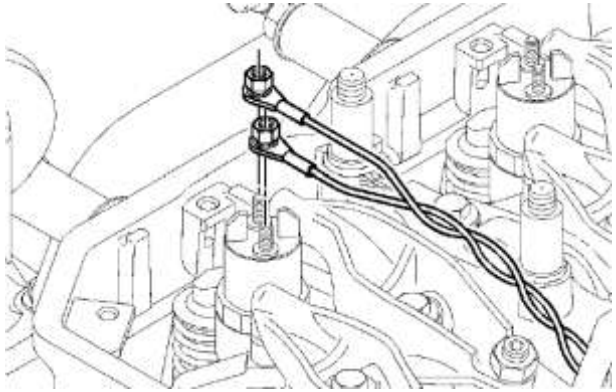




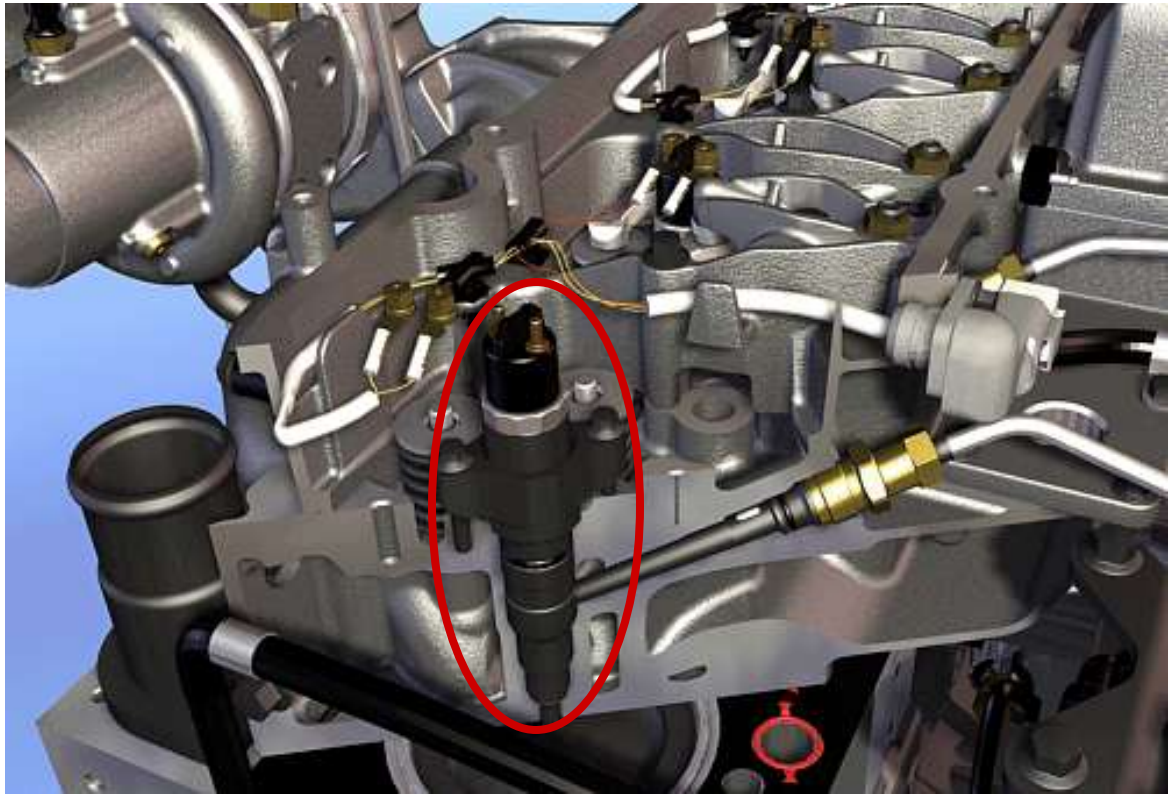


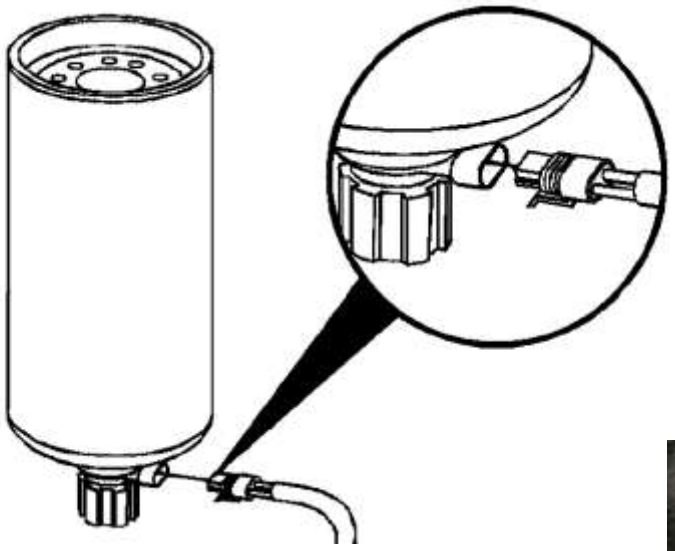




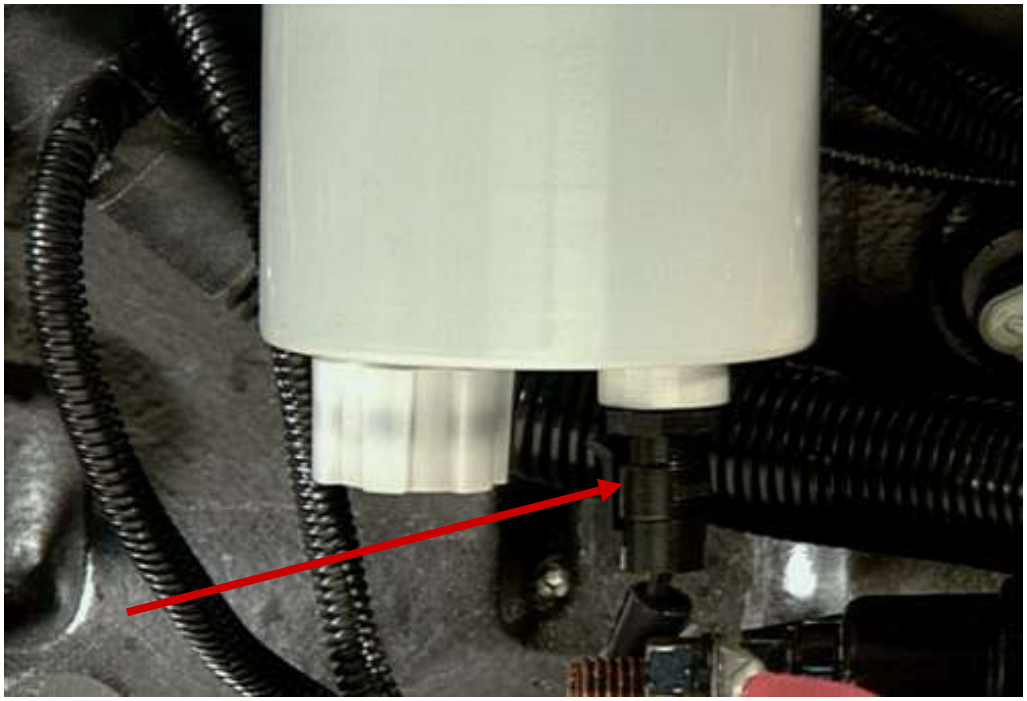


Injector

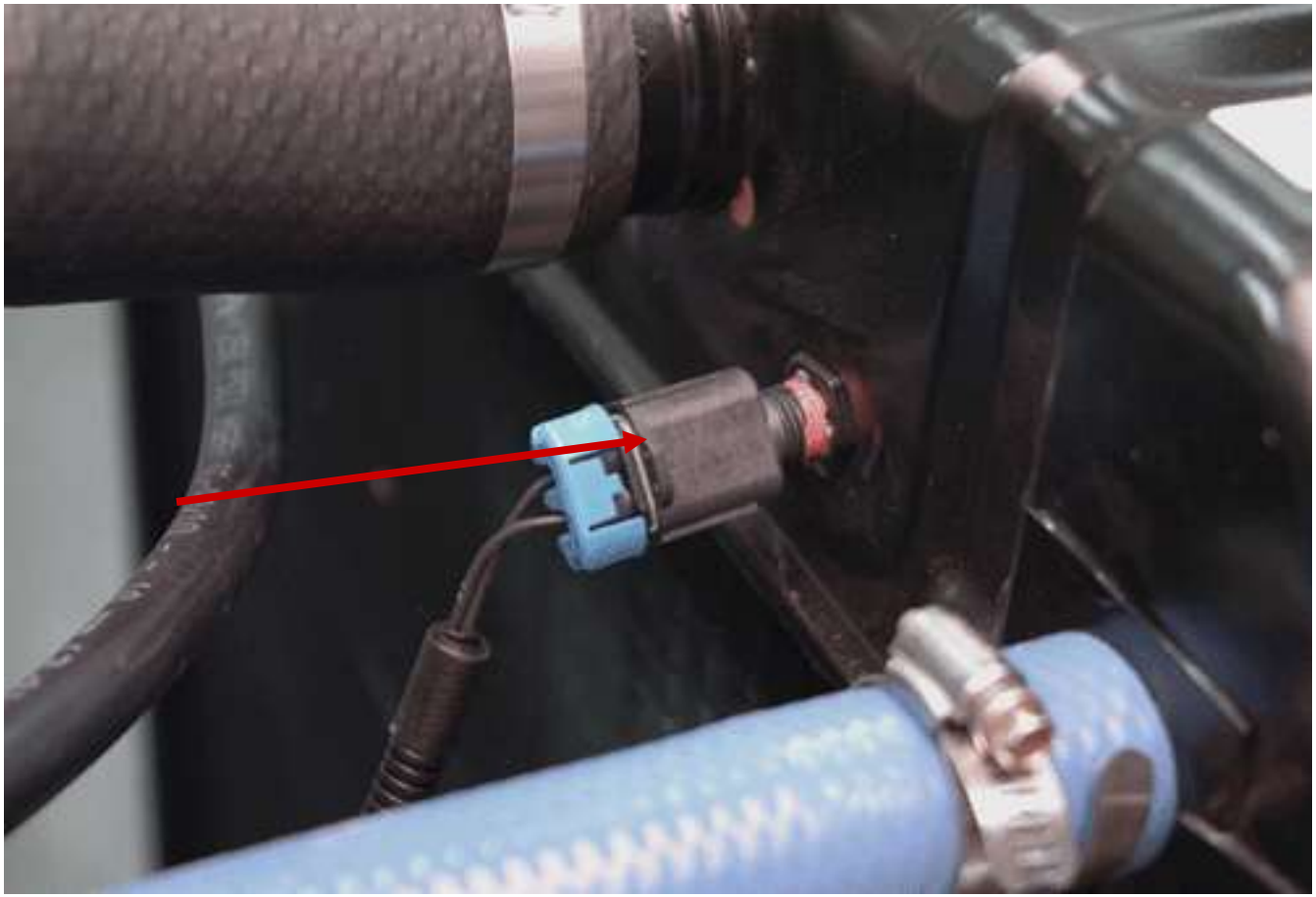


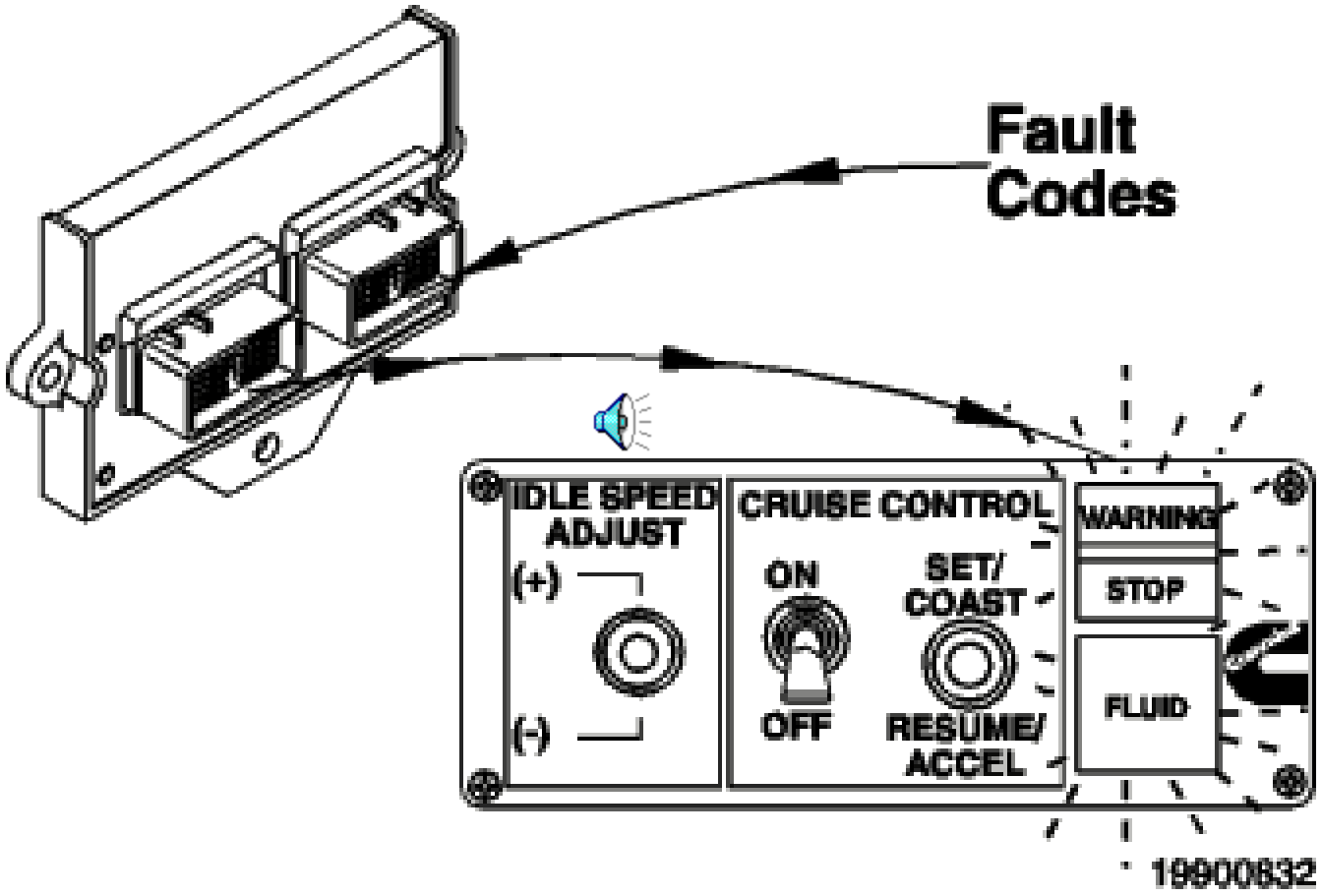


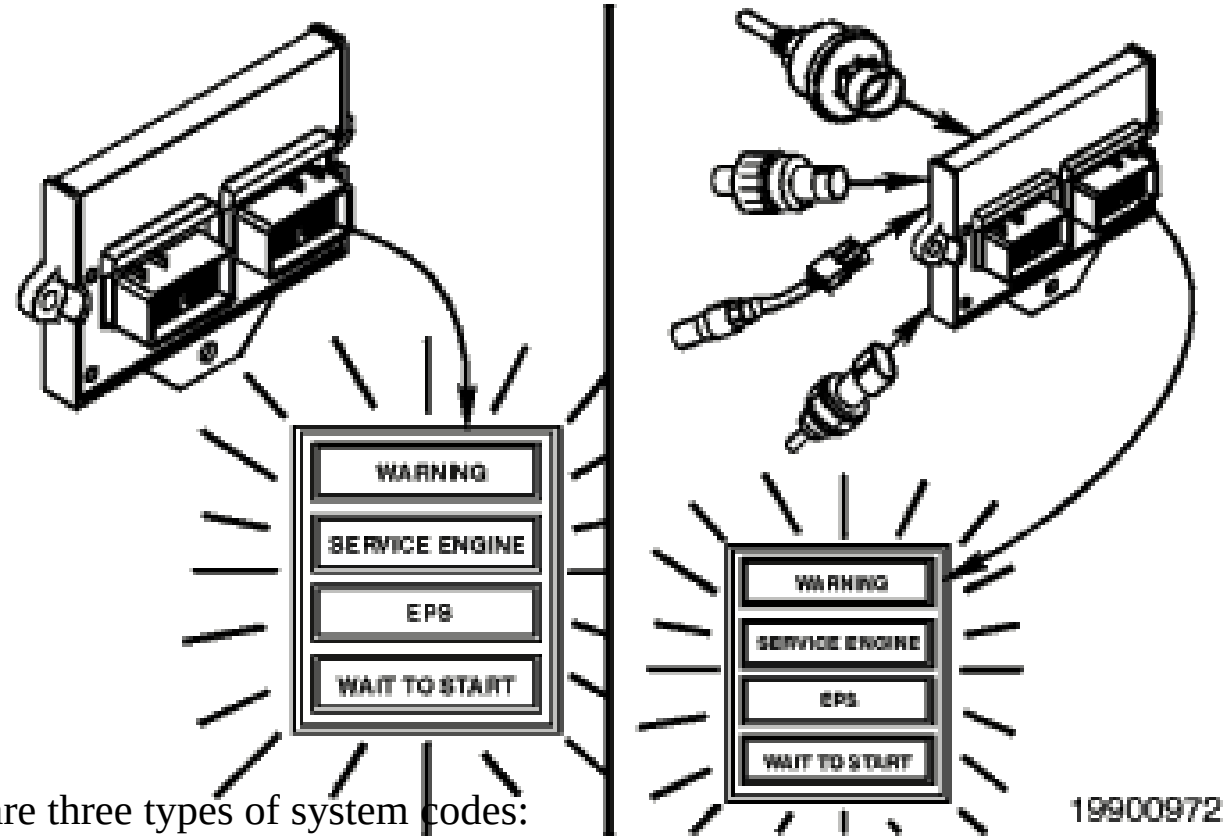
OEM Water in Fuel Sensor



Coolant Level Sensor




Fault
Codes
IDLE SPEED
ADJUST
(+)
(-)
CRUISE CONTROL
ON
OFF
SET/
COAST
RESUME/
ACCEL
WARNING
STOP
FLUID
19900832



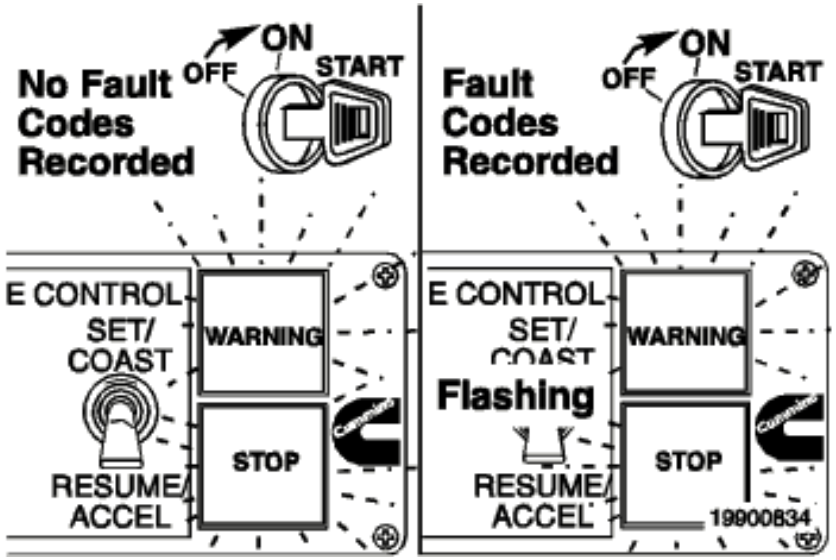
There are three types of system codes:

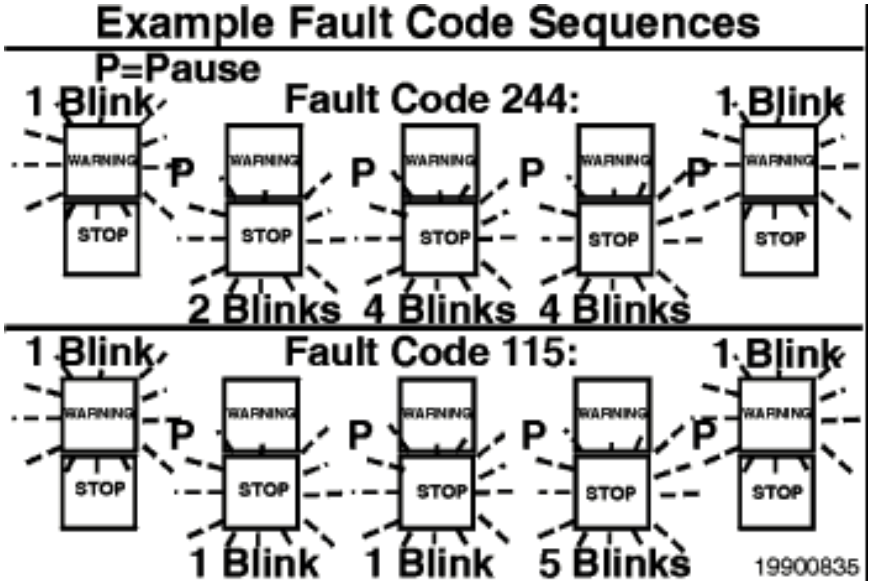
Engine electronic control system fault codes
Engine protection system fault codes
Engine maintenance indicator codes.

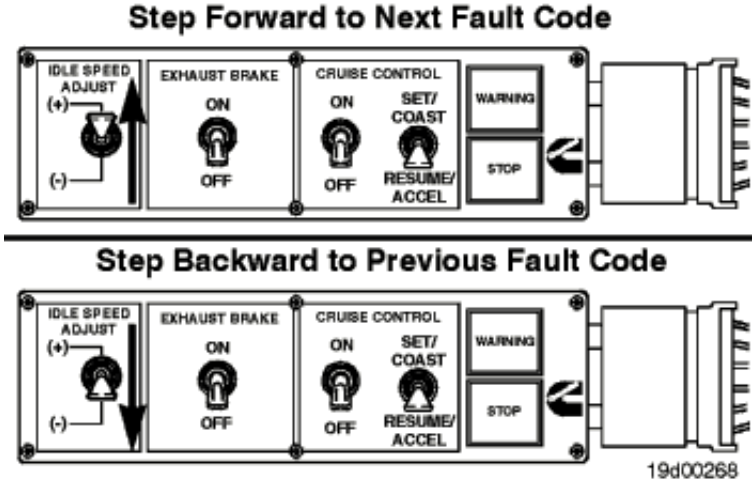
Check for Fault Codes

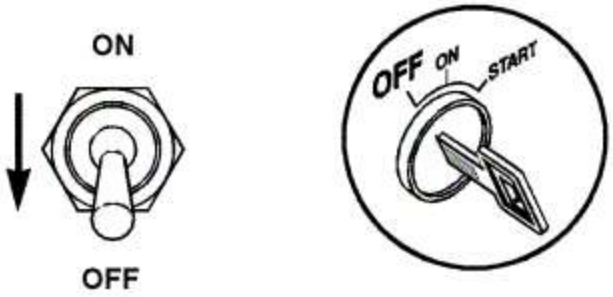
Diagnostic Switch or Shorting Plug

gp8swvs

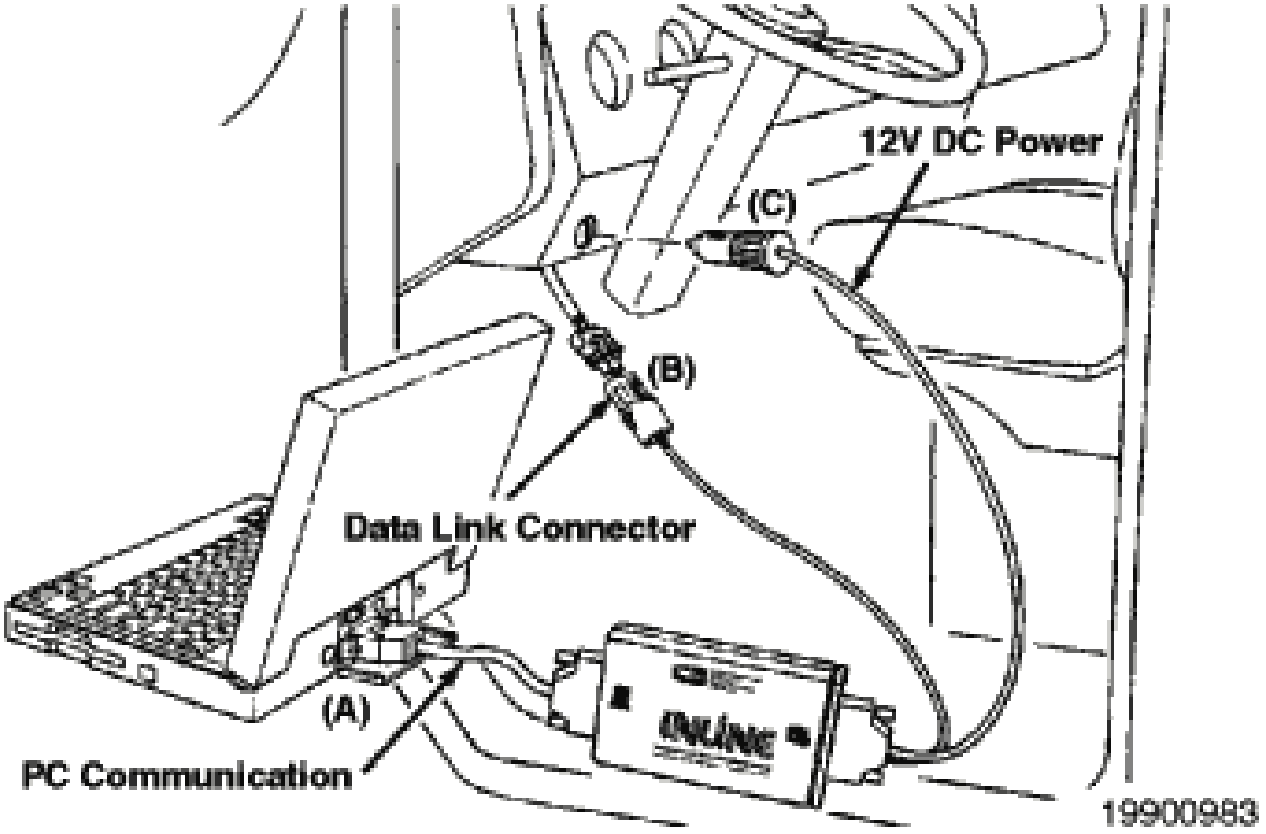



Example Fault Code Sequences
P=Pause
1 Blink
Fault Code 244:
1 Blink
WARNING
STOP
P
2 Blinks
4 Blinks
4 Blinks
1 Blink
Fault Code 115:
1 Blink
1 Blink
5 Blinks
19900835


Step Forward to Next Fault Code
IDLE SPEED ADJUST
(+)
(-)
EXHAUST BRAKE
ON
OFF
CRUISE CONTROL
ON
OFF
SET/ COAST
RESUME/ ACCEL
WARNING
STOP
Step Backward to Previous Fault Code
19d00268


ON
OFF
OFF
ON
START

gp8swvv


12V DC Power
(C)
(B)
Data Link Connector
(A)
PC Communication
ONLINE
19900983

Engine Protection Shutdown

This feature automatically shuts off the engine when the temperature, pressure, or coolant level sensors indicate the engine is operating over or under normal operating conditions. The red “STOP” lamp in the cab will flash for 30 seconds prior to shutdown to alert the driver. The engine protection shutdown feature can be enabled or disabled using the INSITE™ service tool if the feature is available in the calibration.