Foreword

This manual contains complete rebuild procedures and specifications. Disassembly, cleaning, inspection, and assembly instructions are included. A listing of accessory and component suppliers is located in Section M - Component Manufacturers. Suppliers can be contacted directly for any information not covered in this manual.

Read and follow all safety instructions. Refer to the WARNING in the General Safety Instructions in Section i - Introduction.

The repair procedures in this manual are based on the engine or component removed from chassis. Some rebuild procedures require the use of special service tools. Make sure the correct tools are used as described in the procedures.

When a specific brand name, number, or special tool is referenced in this manual, an equivalent product can be used in place of the recommended item.

A series of specific service manuals (for example: Troubleshooting and Repair, Specifications, and Alternative Repair) are available and can be ordered by Contacting your local area Cummins Regional office. A Cummins Regional office listing is located in Service Literature (Section L).

Cummins Inc. encourages the user of this manual to report errors, omissions, and recommendations for improvement. Please use the postage paid, pre-addressed Literature Survey Form in the back of this manual for communicating your comments.

The specifications and rebuild information in this manual is based on the information in effect at the time of printing. Cummins Inc. reserves the right to make any changes at any time without obligation. If differences are found between your engine and the information in this manual, contact a Cummins Authorized Repair Location or call 1-800-DIESELS (1-800-343-7357) toll free in the U.S. and Canada.

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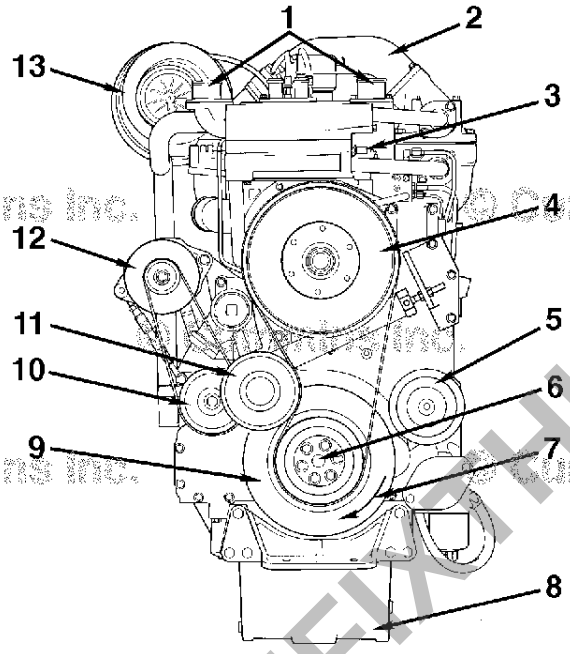
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Engine Diagrams

Engine Views

with Mechanically Actuated Injector

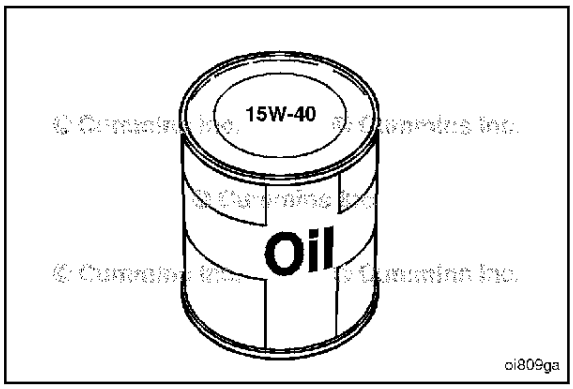


Front View - QSK19

1 Coolant outlet
2 Air crossover
3 Coolant temperature sensor
4 Fan pulley
5 Accessory drive pulley
6 Crankshaft pulley
7 Direction of rotation
8 Oil pan
9 Vibration damper
10 Alternator drive pulley
11 Fan tensioner idler
12 Alternator
13 Turbocharger.

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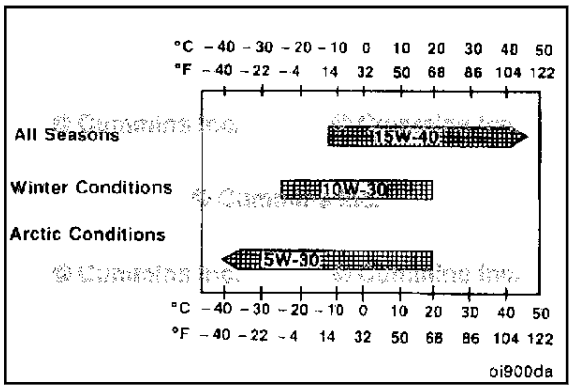


Lubricating Oil System - Overview (007-999)

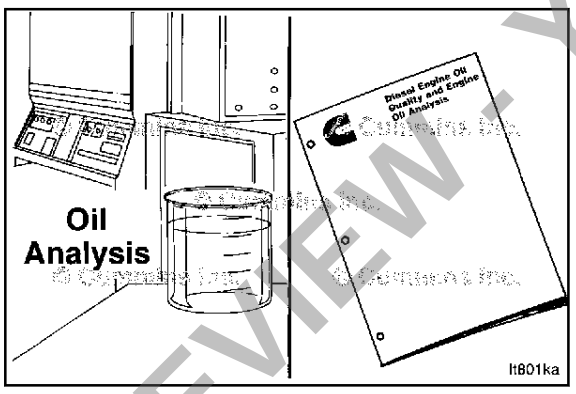
General Information

⚠WARNING⚠
Some state and federal agencies have determined that used engine oil can be carcinogenic and cause reproductive toxicity. Avoid the possibility of inhalation of vapors, ingestion, and prolonged contact with used engine oil. If not reused, dispose of in accordance with local environmental regulations.

⚠WARNING⚠
To reduce the possibility of personal injury, avoid direct contact of hot oil with your skin.



△CAUTION△
The use of low viscosity oil, such as 10W or 10W-30, can be used to aid in starting the engine and in providing sufficient oil flow at ambient temperatures below -5°C [23°F]. Continuous use of low viscosity oil can decrease engine life due to wear.



A used oil analysis can help diagnose internal damage and determine if it was caused by one of the following:

- Intake air filter malfunction
- Coolant leaks
- Oil diluted with fuel
- Metal particles causing wear.

Do **not** disassemble an engine for repair based **only** on the results of an oil analysis. Also, inspect the oil filter. If the filter shows evidence of internal damage, find the source of the problem and repair the damage. Refer to Procedure 007-002 in Section for oil filter inspection.

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Coolant Temperature Above Normal - Gradual Overheat

This is symptom tree t022

Cause	Correction
STEP 1 Coolant temperature gauge is malfunctioning	Test the temperature gauge. Repair or replace the gauge, if necessary. Refer to Procedure 008-004 in Section 8 and the equipment manufacturer service information.
OK Go To Next Step	
STEP 2 Cold weather radiator cover or winterfront is closed	Open the cold weather radiator cover or the winterfront. Maintain a minimum of 784 cm² [122 in²] or approximately 28 x 28 cm [11 x 11 in] of opening at all times. Refer to the equipment manufacturer service information.
OK Go To Next Step	
STEP 3 Coolant level is below specification	Check the coolant level. Check for an external leak. Refer to Procedure 008-018 in Section 8. Sample the lubricating oil and have a laboratory check for coolant in the oil (internal leak).
OK Go To Next Step	
STEP 4 Radiator fins or air conditioner condenser fins are damaged or obstructed with debris	Inspect the radiator fins and air conditioner condenser fins. Clean if necessary. Refer to Procedure 008-042 in Section 8.
OK Go To Next Step	
STEP 5 Cooling system hose is collapsed, restricted, or leaking	Inspect the hoses. Refer to Procedure 008-045 in Section 8.
OK Go To Next Step	
STEP 6 Fan drive belt is loose	Check the belt tension and tighten, if necessary. Refer to Procedure 008-002 in Section 8.
OK Go To Next Step	
STEP 7 Lubricating oil level is above or below specification	Check the oil level. Add or drain oil, if necessary. Refer to Procedure 007-037 in Section 7.
OK Go To Next Step	
STEP 8 Fan shroud is damaged or missing or the air recirculation baffles are damaged or missing	Inspect the shroud and the recirculation baffles. Repair, replace, or install, as necessary. Refer to Procedure 008-038 in Section 8.
OK Go To Next Step	

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ECM - No Communication Troubleshooting Tree

This troubleshooting procedure should be followed for the following symptoms:

- No communication and engine will **not** start
- No communication and engine will start
- No communication related INSITE™ electronic service tool errors
- Communication with some ECMs but **not** all ECMs on a multi-module engine.

How to Use This Troubleshooting Procedure:

This troubleshooting procedure can be used to troubleshoot J1939 and J1587 data link communication issues between the electronic service tool and the ECM. There are four procedures that can be used to support this troubleshooting tree:

- Procedure 022-999 (Service Tools and Hardware - Overview) in Section F, in the appropriate electronic control system troubleshooting and repair manual.
- Procedure 019-165 (Data Link Circuit, SAE J1939) in Section 19 in the appropriate electronic control system troubleshooting and repair manual.
- Procedure 019-166 (Data Link Circuit, SAE J1587) in Section 19 in the appropriate electronic control system troubleshooting and repair manual.

The troubleshooting steps in this procedure build upon information obtained in previous steps. The troubleshooting steps **must** be performed in the sequence specified in the troubleshooting procedure.

This troubleshooting procedure supports several engine families, therefore some instructions are stated in a general manner. Apply the requested procedures and actions to the specific engine family with the support of engine specific documentation that can be found in the Troubleshooting and Repair manuals for the specific engine family.

Shop Talk:

Three basic principles were used to define and sequence the troubleshooting steps that are listed in this tree.

- Verify high level system operation prior to troubleshooting individual components of the system. The purpose for this is to learn from the behavior of the system in order to direct the next steps for troubleshooting.
- Use the Bench Top Harness to separate the ECM from the vehicle so the ECM can be isolated from vehicle issues that could be causing no communication.
- Use a second vehicle or a second ECM to isolate high level system issues before troubleshooting individual components of the system.

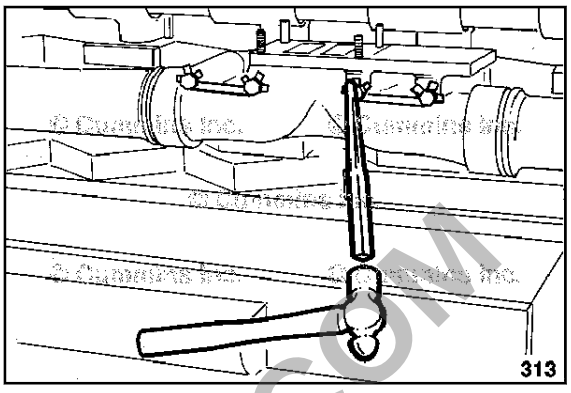
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Use a drift and a hammer to bend the lockplate tabs away from the capscrew heads.

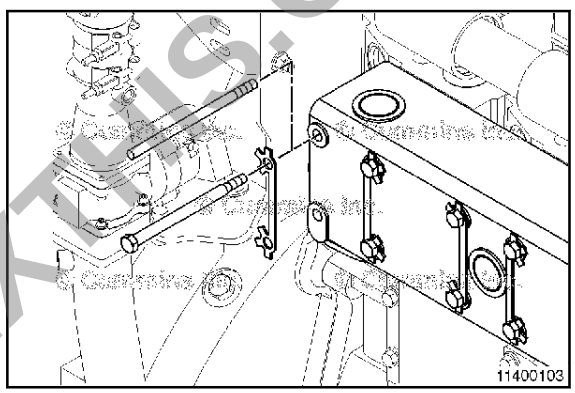
NOTE: Some engines do **not** use this type of lockplate. Some engines use a lockplate that snaps over the capscrew head and some engines use locking capscrews that do **not** require lockplates.



Remove the two exhaust manifold capscrews and lockplates.

Use two 7/16-14 x 15 inch guide studs to support the manifold during removal.

Install the guide studs.

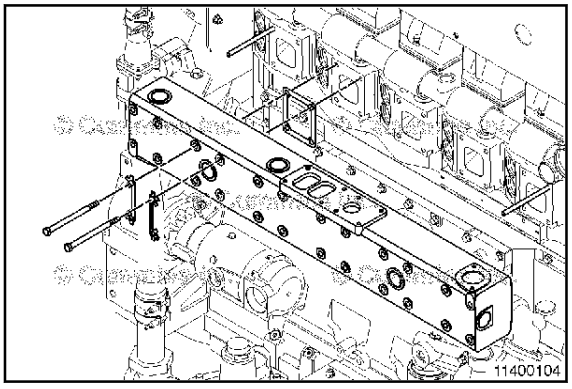


⚠WARNING⚠
This component or assembly weighs greater than 23 kg [50 lb]. To prevent serious personal injury, be sure to have assistance or use appropriate lifting equipment to lift this component or assembly.

Remove the remaining capscrews and lockplates.

Remove the exhaust manifold and gaskets.

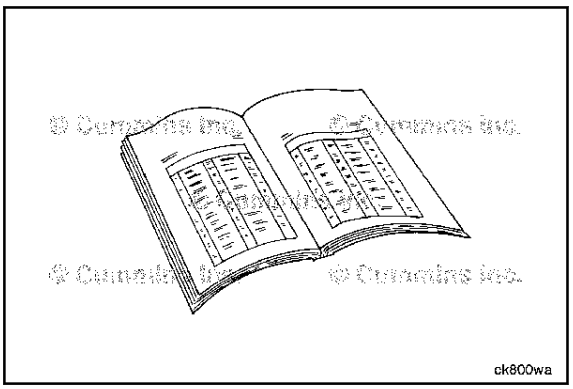
Discard the gaskets.



OEM Wiring Harness (019-071)

General Information

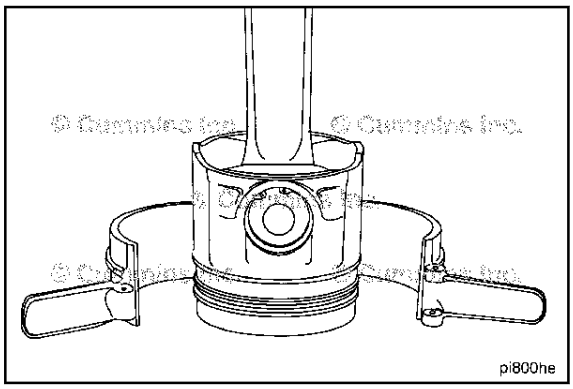
The original equipment manufacturer (OEM) harness is supplied and installed by the vehicle manufacturer. Follow the vehicle manufacturer's procedures, if replacement is necessary. Refer to the vehicle manufacturer's troubleshooting and repair manual.



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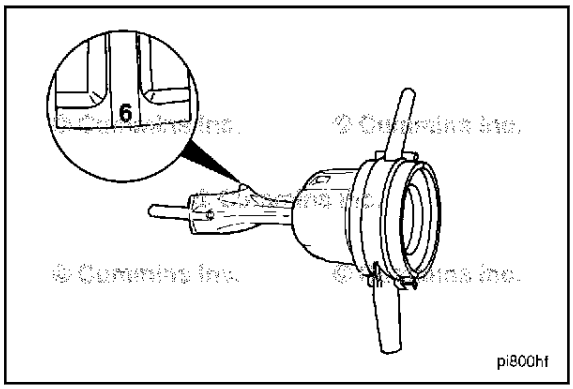
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⚠CAUTION⚠
To reduce the possibility of engine damage, make sure the piston rings fit correctly in the piston.

Use a piston ring compressor, Part Number 4918898, or equivalent. Install the ring compressor on the piston.

NOTE: The ring compressor has a tapered bore. The small end of the taper **must** be positioned toward the piston skirt.

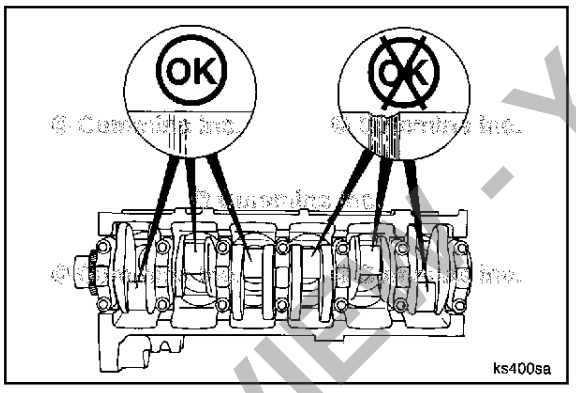


The cylinder number on the connecting rod and connecting rod cap **must** be the same.

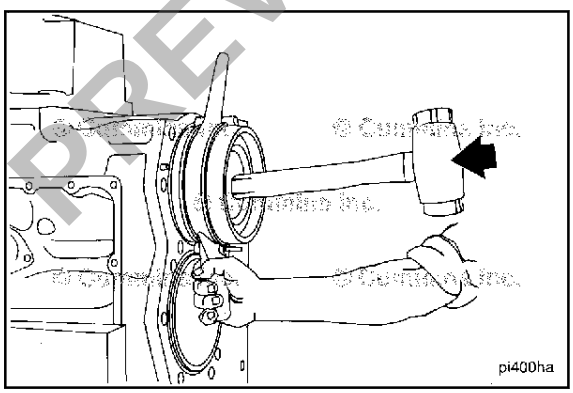
The side of the rod with the cylinder number (bearing tang side) **must** be toward the camshaft.

Rotate the crankshaft until the journal for the rod being installed is at BDC.

NOTE: If the engine has a crankshaft with bolt-on counterweights, the journal **must** be at top dead center (TDC).



Check the crankshaft rod journals for damage.

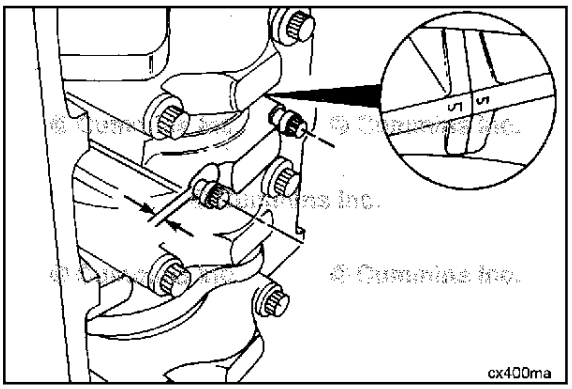


Install the rod and piston until the ring compressor touches the block. Align the rod with the crankshaft journal.

Hold the ring compressor firmly against the block. Use a wooden hammer handle to push the piston into the liner.

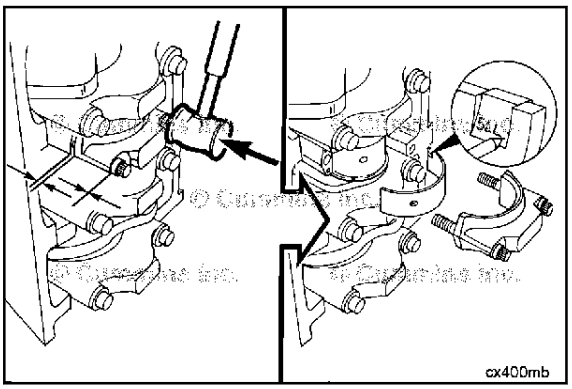
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The connecting rods **must** have the cylinder number marked on both the rod and the cap on the side positioned toward the camshaft. Check the rods for correct markings. Use a steel stamp and mark any rod that is **not** correctly marked.

Loosen the capscrews until there is 6 mm [1/4 inch] of clearance between the rod cap and the capscrew head.

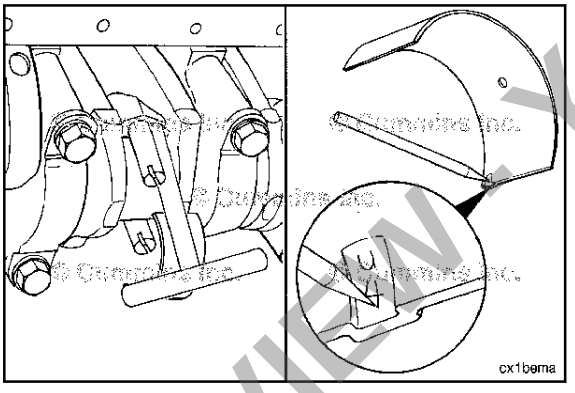


Use a mallet to tap the connecting rod capscrews until the connecting rod cap and rod separate.

Remove the capscrews and the cap.

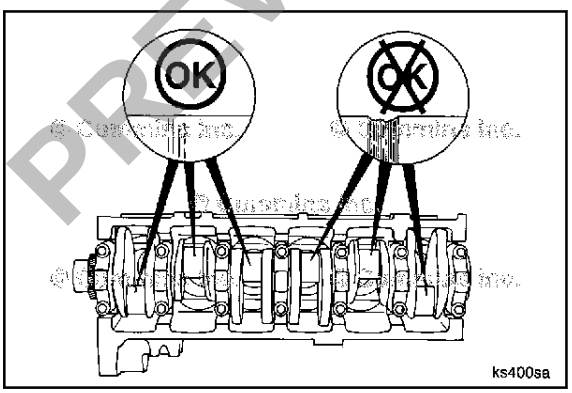
Remove the lower rod bearing. Use an awl to mark the bearing position in the tang area.

NOTE: Mark the cylinder number and the letter “L” in the flat surface of the bearing tangs.



After installing two guide pins, Part Number 3375098, in the connecting rod, push the rod up far enough to allow the upper bearing shell to be removed. Use a “T handle” piston pusher to push the rod away from the crankshaft.

Remove the bearing shell, and mark the cylinder number and the letter “U” in the flat surface of the bearing tangs.



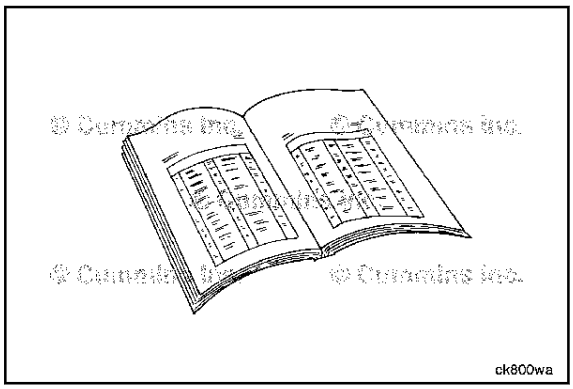
Clean and Inspect for Reuse

Use a clean, lint free paper towel to clean the rod bore, the cap, and the crankshaft rod journal.

Inspect the crankshaft rod journals for damage.

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Preparatory Steps

with Mechanically Actuated Injector

⚠WARNING⚠
Batteries can emit explosive gases. To reduce the possibility of personal injury, always ventilate the compartment before servicing the batteries. To reduce the possibility of arcing, remove the negative (-) battery cable first and attach the negative (-) battery cable last.

⚠WARNING⚠
Do not remove the pressure cap from a hot engine. Wait until the coolant temperature is below 50°C [120°F] before removing the pressure cap. Heated coolant spray or steam can cause personal injury.

⚠WARNING⚠
Coolant is toxic. Keep away from children and pets. If not reused, dispose of in accordance with local environmental regulations.

- Disconnect the batteries to prevent accidental engine starting. Refer to the OEM service manual.
- Disconnect the air supply to the air starter.
- Drain the cooling system. Refer to Procedure 008-018 in Section 8.
- Remove the turbocharger. Refer to Procedure 010-033 in Section 10.
- Remove the exhaust manifold. Refer to Procedure 011-007 in Section 11.
- Remove the fuel tubes. Refer to Procedure 006-024 in Section 6.
- Remove the aftercooler. Refer to Procedure 010-002 in Section 1.
- Remove the fuel manifolds. Refer to Procedure 006-022 in Section 6.
- Remove the rocker lever cover. Refer to Procedure 003-011 in Section 3.
- Remove the rocker levers. Refer to Procedure 003-009 in Section 3.
- Remove the valve push rods, injector push rod, and crossheads. Refer to Procedure 004-014 in Section 4.
- Remove the coolant thermostat housing support. Refer to Procedure 008-015 in Section 8.
- Remove the gear cover clamping plate. Refer to Procedure 001-029 in Section 1.
- Remove the rocker lever housing. Refer to Procedure 003-013 in Section 3.
- Remove the injectors. Refer to Procedure 006-026 in Section 6.

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Crankcase Breather (External) (003-001)

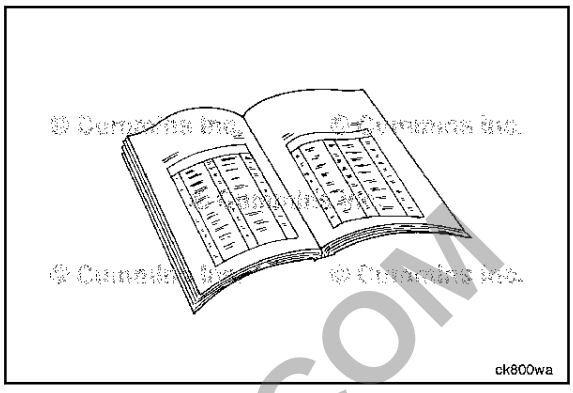
Preparatory Steps

with Electronically Actuated Injector

⚠WARNING⚠
The pressure of the fuel in the line is sufficient to penetrate the skin and cause serious personal injury. Wear gloves and protective clothing.

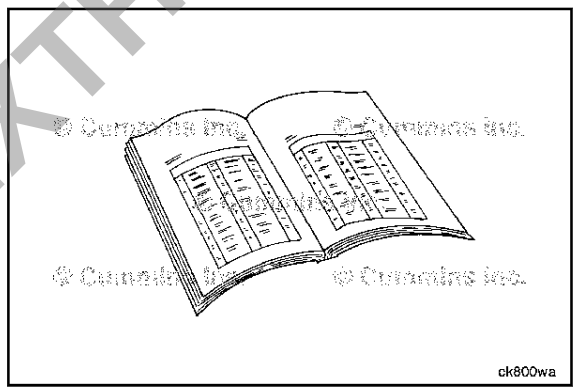
⚠WARNING⚠
Do not remove the pressure cap from a hot engine. Wait until the coolant temperature is below 50°C [120°F] before removing the pressure cap. Heated coolant spray or steam can cause personal injury.

- Remove the high-pressure injector supply lines. Refer to Procedure 006-051 in Section 6.



Rail Applications

- Drain coolant, if necessary. Refer to Procedure 008-018 in Section 8.
- Remove the fuel filters. Refer to Procedure 006-015 in Section 6.
- Remove the high-pressure injector supply lines. Refer to Procedure 006-051 in Section 6.



Remove

with Mechanically Actuated Injector

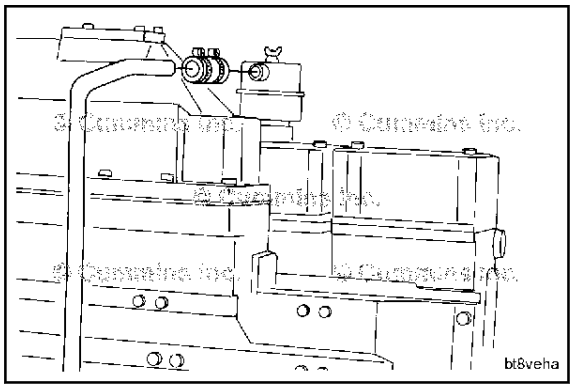
Loosen the hose clamp at the breather vent tube.

Remove the tube support bracket capscrew and the bracket.

Remove the vent tube and the hose from the engine.

If the vent tube is blocked with an obstruction or sludge, it **must** be cleaned to prevent excess crankcase pressure buildup.

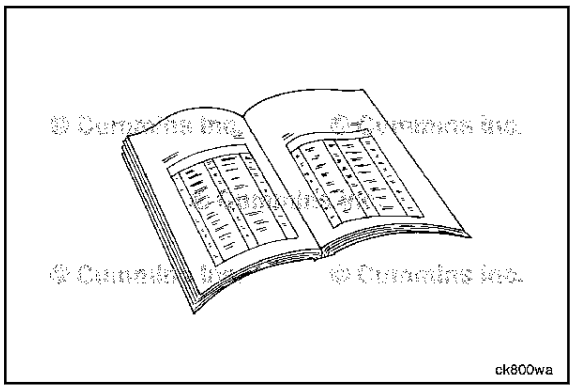
Remove the rocker lever cover. Refer to Procedure 003-011 in Section 3.



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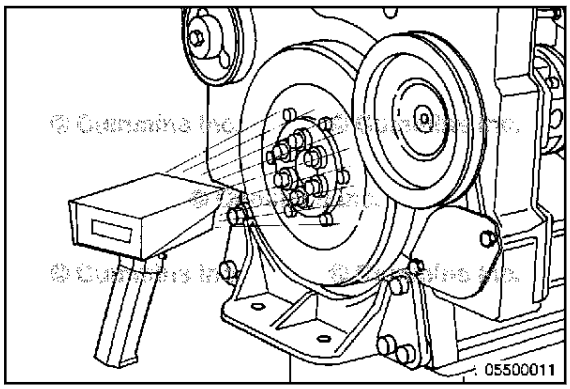
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with Electronically Actuated Injector

Use INSITE™ electronic service tool to monitor fuel consumption.

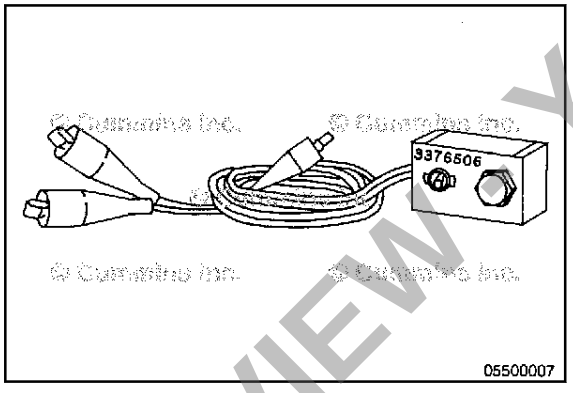


Fuel Pump (005-016)

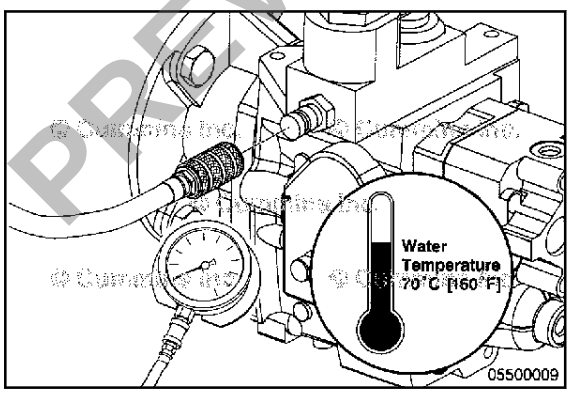
Pressure Test

with Mechanically Actuated Injector

Use the vehicle tachometer or an optical tachometer, Part Number 3377642, along with reflective tape, Part Number 3377464, or equivalent, while checking the fuel pump pressure to determine if the specified engine rpm is reached. Refer to Procedure 018-016 in Section V.



A remote starter, Part Number 3376506, can be used to crank the engine when measuring the cranking pressure.



Use a pressure gauge and hose assembly, Part Number 3824877, or equivalent, capable of 0 to 2800 kPa [0 to 400 psi] with a quick-disconnect fitting, Part Number ST-437-7, or equivalent.

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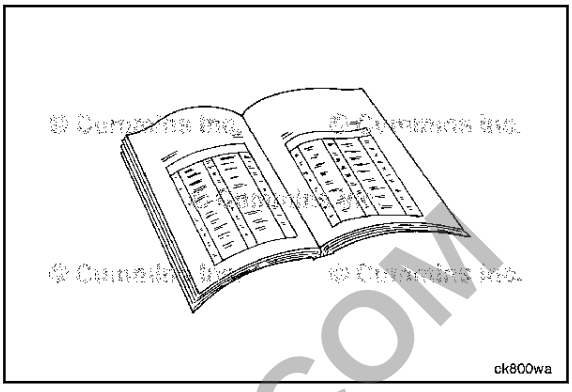
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Finishing Steps

with Electronically Actuated Injector

⚠WARNING⚠
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- Install the ECM. Refer to Procedure 019-031 in the Troubleshooting and Repair Manual, Electronic Control System, QSK19 CM850, Modular Common Rail System, Engine, Bulletin 4021493.
- Install the fuel supply lines to the ECM cooling plate. Refer to Procedure 006-024.
- Connect the battery cables. Refer to Procedure 013-009
- Operate the engine and check for fuel leaks.



Fuel Check Valve (006-008)

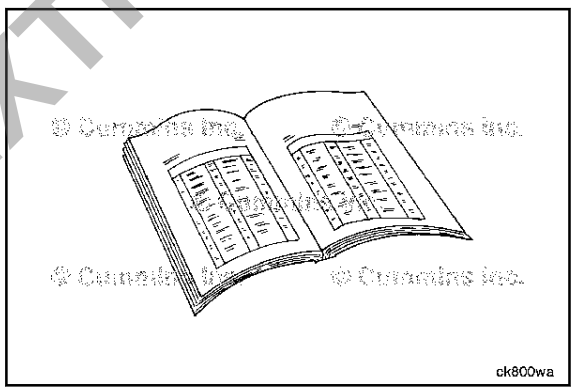
Preparatory Steps

⚠WARNING⚠
Depending on the circumstance, diesel fuel is flammable. When inspecting or performing service or repairs on the fuel system, to reduce the possibility of fire and resulting severe personal injury, death or property damage, never smoke or allow sparks or flames (such as pilot lights, electrical switches, or welding equipment) in the work area.

⚠WARNING⚠
Batteries can emit explosive gases. To reduce the possibility of personal injury, always ventilate the compartment before servicing the batteries. To reduce the possibility of arcing, remove the negative (-) battery cable first and attach the negative (-) battery cable last.

⚠CAUTION⚠
A very small amount of dirt or debris can be very harmful to the fuel system components. Extra care is required to keep the fuel connections clean during the removal and installation. Connections must be covered immediately to keep them clean when the components are removed from the fuel system.

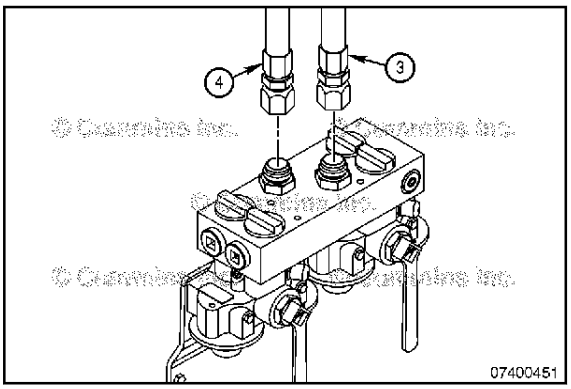
- Disconnect the batteries. Refer to the original equipment manufacturer (OEM) service manual.
- Close the fuel supply valve.



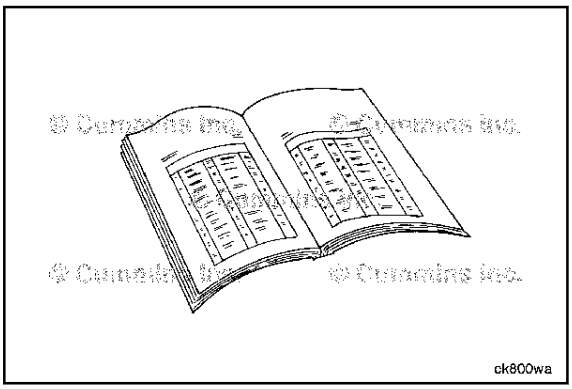
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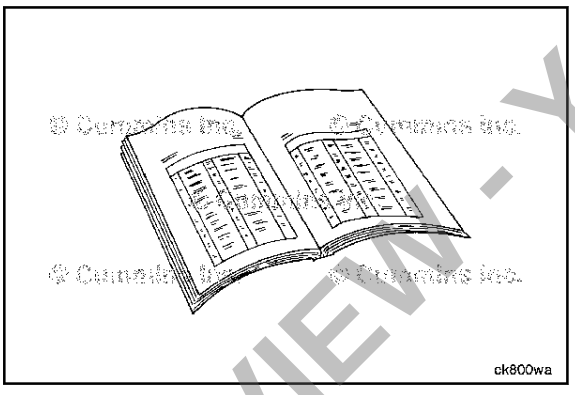


Connect the inlet (3) and outlet (4) hoses to the lubricating oil filter head.



Finishing Steps

- Install the lubricating oil filters. Refer to Procedure 007-013 in Section 7.
- Operate the engine and check for leaks.



Lubricating Oil Filter Head Adapter (007-018)

Preparatory Steps

⚠WARNING⚠
To reduce the possibility of personal injury, avoid direct contact of hot oil with your skin.

⚠WARNING⚠
Some state and federal agencies have determined that used engine oil can be carcinogenic and cause reproductive toxicity. Avoid inhalation of vapors, ingestion, and prolonged contact with used engine oil. If not reused, dispose of in accordance with local environmental regulations.

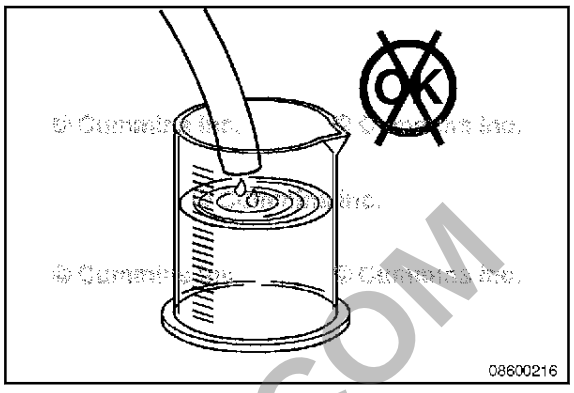
⚠CAUTION⚠
Use caution when draining oil or replacing filters that the oil is not spilled or drained into the bilge area. The oil and oil filters must be disposed of in accordance with local environmental regulations.

- Remove the oil filters. Refer to Procedure 007-013.

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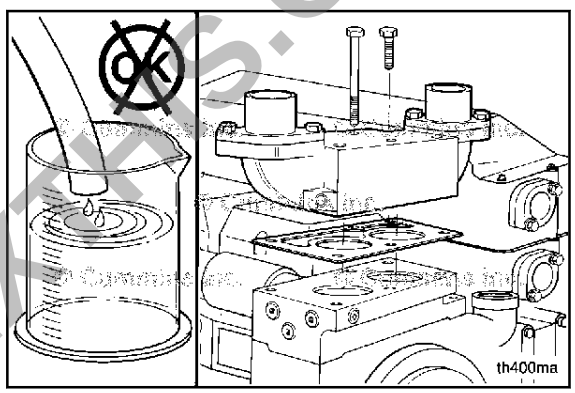
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If more than 100 cc [3.3 fl oz] of coolant is collected, the thermostat or the thermostat seal is leaking.



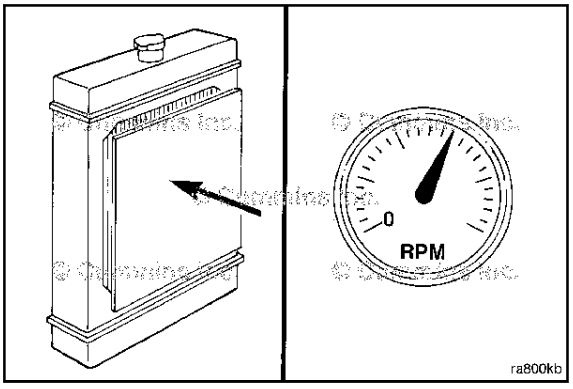
Remove the thermostats and replace the seals. Refer to Procedure 008-015.

Test the thermostats for proper operation.



High Coolant Temperature

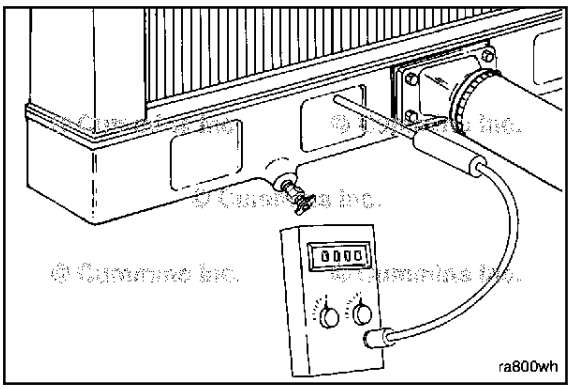
Restrict the radiator airflow. Operate the engine until the coolant temperature reaches 90 to 93°C [195 to 200°F].



Use a contact pyrometer (shown), or install a temperature gauge in the desired locations.

Record the temperature of the coolant outlet hoses. An increase in temperature indicates the thermostats have started to open.

Record the temperature of the radiator bottom tank or coolant out tube.



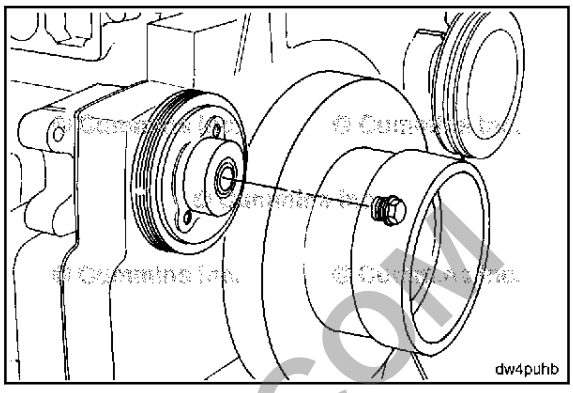
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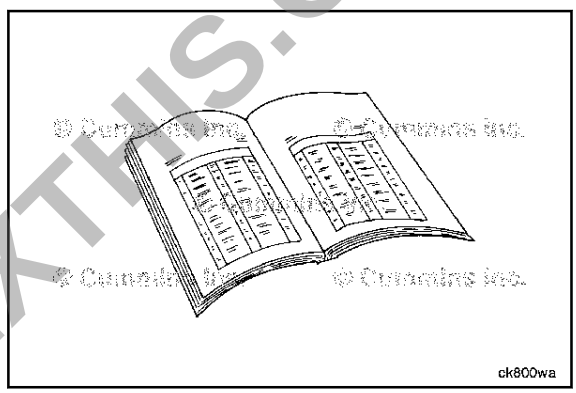
Remove the capscrew from the water pump drive.

Install the plastic plug that protects the threads.



Finishing Steps

- Install the alternator belt. Refer to Procedure 013-005.
- Install the belt guard (if installed). Refer to Procedure 008-001.



Fuel Pump Drive (009-011)

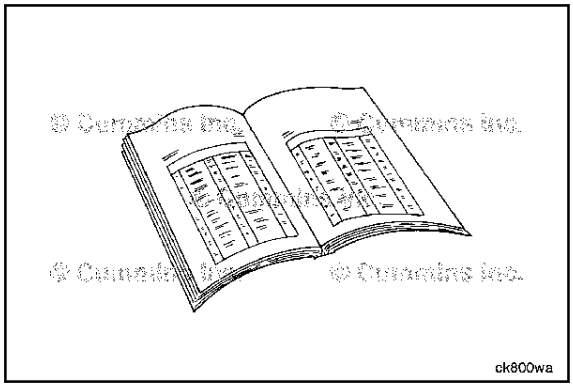
General Information

with Electronically Actuated Injector

This procedure is for engines with electronically actuated injectors **only**.

Use the following procedure for engines with mechanically actuated injectors. Refer to Procedure 009-001 in Section 9.

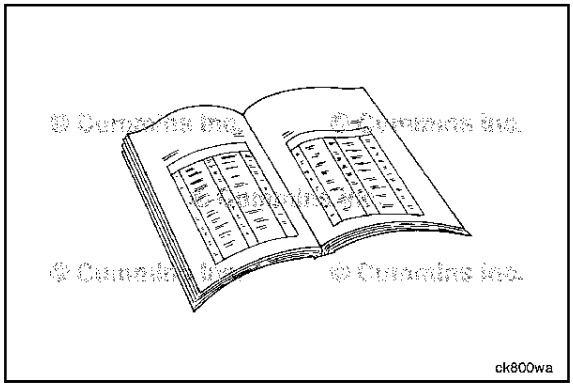
The fuel pump drive on QSK19 engines with electronically actuated injectors contain an oil feed and drain drillings which are larger and in a different location. The QSK19 with electronically actuated injectors does **not** use the fuel pump drive to drive the air compressor.



Preparatory Steps

with Electronically Actuated Injector

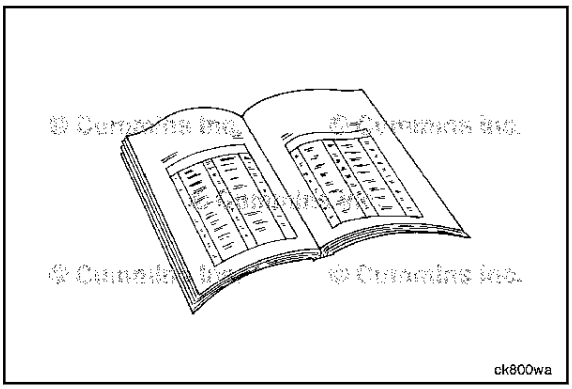
- Disconnect the batteries. See equipment manufacturer service information.
- Remove the fuel pump. Refer to Procedure 005-016 in Section 5.
- Remove the accessory drive pulley, if applicable. Refer to Procedure 009-004 in Section 9.
- Remove the accessory drive seal, if applicable. Refer to Procedure 001-003 in Section 1.



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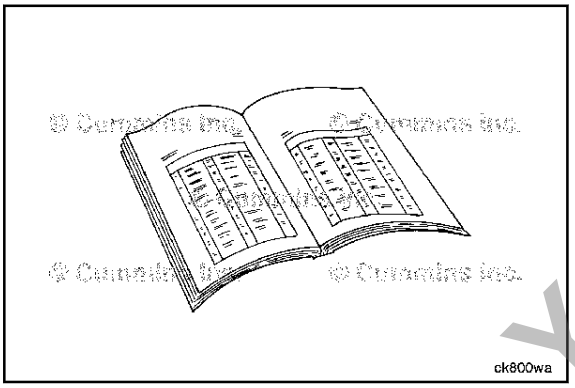
Finishing Steps

Marine Applications

⚠WARNING⚠
Coolant is toxic. Keep away from children and pets. If not reused, dispose of in accordance with local environmental regulations.

⚠CAUTION⚠
Use caution when filling the cooling system that the coolant is not spilled into the bilge area. Do not pump coolant overboard. If the coolant is spilled, it must be disposed of in accordance with local environmental regulations

- Connect the coolant vent line from the aftercooler transfer tube. Refer to Procedure 008-017 in Section
- Fill the cooling system. Refer to Procedure 008-018 in Section
- Operate the engine and check for leaks.



Aftercooler Element (010-008)

Preparatory Steps

⚠WARNING⚠
Do not remove the pressure cap from a hot engine. Wait until the coolant temperature is below 50°C [122°F] before removing the pressure cap. Heated coolant spray or steam can cause personal injury.

⚠WARNING⚠
Coolant is toxic. Keep away from children and pets. If not reused, dispose of in accordance with local environmental regulations.

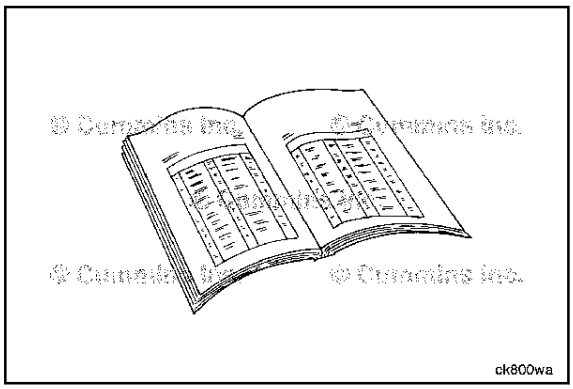
⚠CAUTION⚠
Use caution when draining coolant that the coolant is not spilled or drained into the bilge area. Do not pump coolant overboard. If the coolant is not reused, it must be disposed of in accordance with local environmental regulations.

- Drain the cooling system. Refer to Procedure 008-018.
- Remove the air crossover tube. Refer to Procedure 010-019.
- Remove the aftercooler coolant vent tube. Refer to Procedure 008-017.
- Marine applications: Remove the aftercooler coolant tube. Refer to Procedure 010-006.

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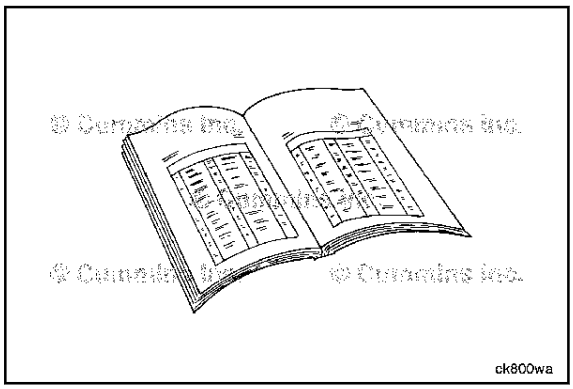


Finishing Steps

Rail Applications

⚠WARNING⚠
Coolant is toxic. Keep away from children and pets. If not reused, dispose of in accordance with local environmental regulations.

- Install the turbocharger. Refer to Procedure 010-033.
- Fill the cooling system. Refer to Procedure .
- Operate the engine and check for leaks.

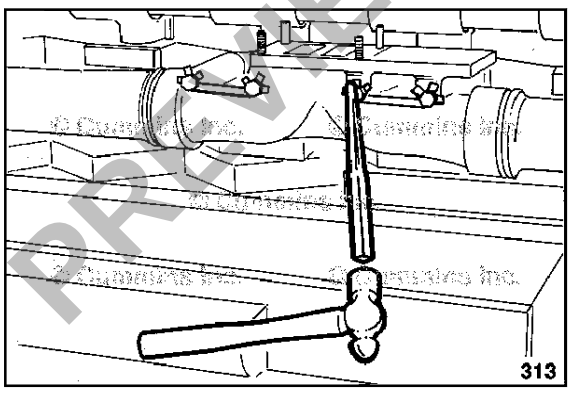


Exhaust Manifold, Dry (011-007)

Preparatory Steps

⚠WARNING⚠
Batteries can emit explosive gases. To reduce the possibility of personal injury, always ventilate the compartment before servicing the batteries. To reduce the possibility of arcing, remove the negative (-) battery cable first and attach the negative (-) battery cable last.

- Disconnect the batteries or air supply line to the air starter to prevent accidental engine starting. Refer to Procedure 013-009 in Section 13
- Drain the cooling system. Refer to Procedure 008-018 in Section 8
- Remove the water bypass clamp. Loosen both hose clamps. Remove the bypass tube, hose, and water connection.
- Remove the turbocharger heat shield, if equipped. Refer to Procedure 010-076 in Section 10
- Remove the turbocharger. Refer to Procedure 010-033 in Section 10



Remove

All Applications Except Marine

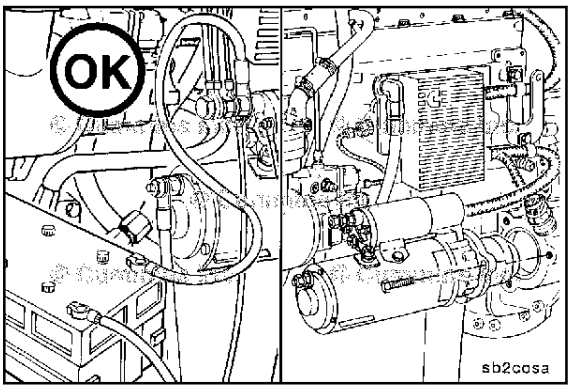
Use a drift and hammer to bend the lock plate tabs away from the capscrew heads, if equipped.

NOTE: Some engines do **not** use this type of lock plate. Some engines use a lock plate that snaps over the capscrew head. Some engines use locking capscrews that do **not** require lockplates.

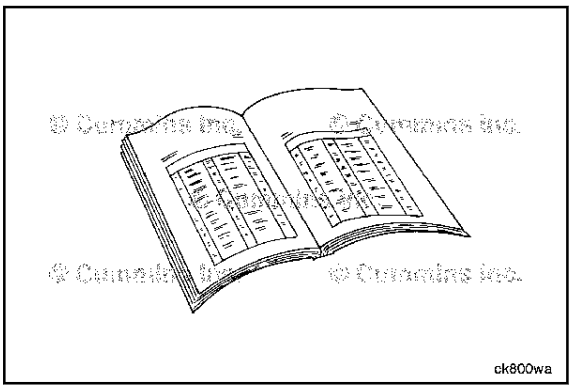
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If the cables are **not** loose or damaged, the starting motor is defective and **must** be replaced.

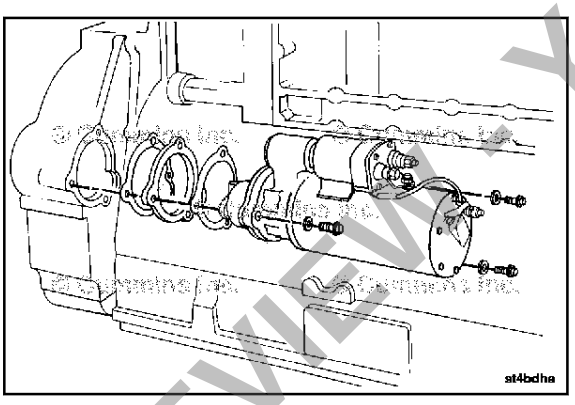


Starting Motor (013-020)

Preparatory Steps

⚠WARNING⚠
Batteries can emit explosive gases. To reduce the possibility of personal injury, always ventilate the compartment before servicing batteries. To reduce the possibility of arcing, remove the negative (-) battery cable first and attach the negative (-) battery cable last.

- Disconnect the batteries. Refer to Procedure 013-009.
- Disconnect the electrical connections from the starting motor.



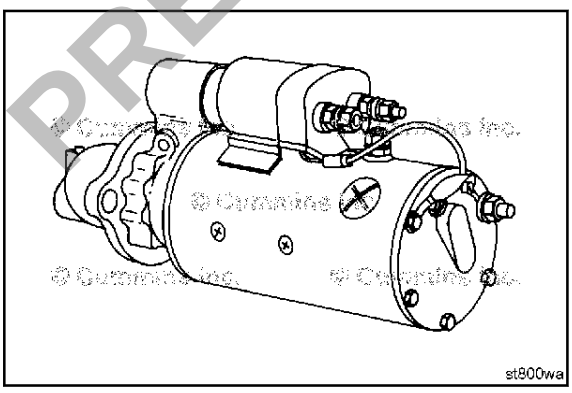
Remove

⚠WARNING⚠
This component or assembly weighs greater than 23 kg [50 lb]. To prevent serious personal injury, be sure to have assistance or use appropriate lifting equipment to lift component or assembly.

Remove the starting motor capscrews, starter, spacers, and gaskets.

Discard the gaskets.

NOTE: All engines do **not** contain spacers and gaskets.



Clean and Inspect for Reuse

⚠WARNING⚠
When using a steam cleaner, wear protective clothing and safety glasses or a face shield. Hot steam can cause serious personal injury.

⚠WARNING⚠
Wear appropriate eye and face protection when using compressed air. Flying debris and dirt can cause personal injury.

Clean the exterior of the motor with steam.

Use compressed air to dry the starter.

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1 in. Hg = 13.514 in. $H_2 0$ = 0.491 psi
1 psi = 2.036 in. Hg = 27.7 in. $H_2 0$

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Engine Testing (Chassis Dynamometer) (014-002)

Setup

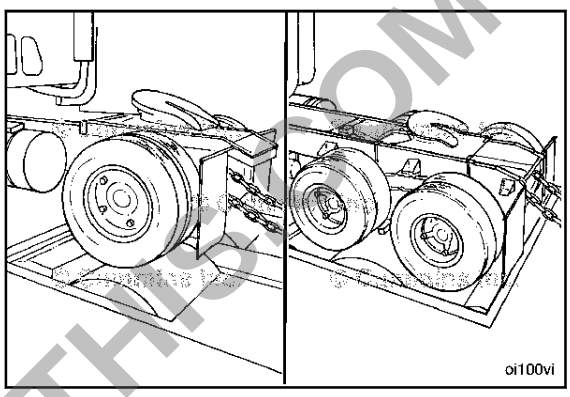
The performance of an engine installed in on-highway vehicles can be tested on a chassis dynamometer.

NOTE: Due to driveline inefficiencies and engine-driven accessories, the rated horsepower can be reduced by approximately:

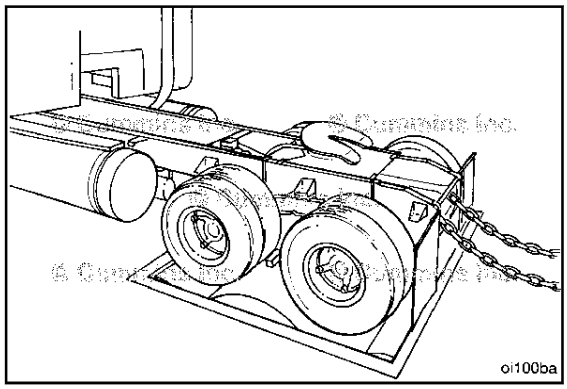
- 20 percent for single axle vehicles
- 25 percent for tandem axle vehicles

The net horsepower available is called Wheel Horsepower (WHP).

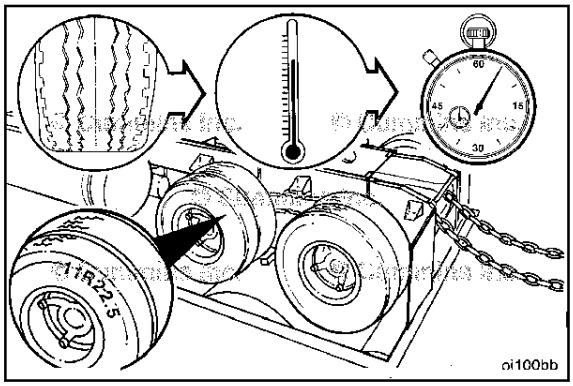
NOTE: Operate the vehicle in a gear that produces a road speed of 90 to 95 Km/H [55 to 60 MPH].



⚠CAUTION⚠
Before installing or operating a vehicle on a chassis dynamometer, follow all the vehicle manufacturer's safety precautions.

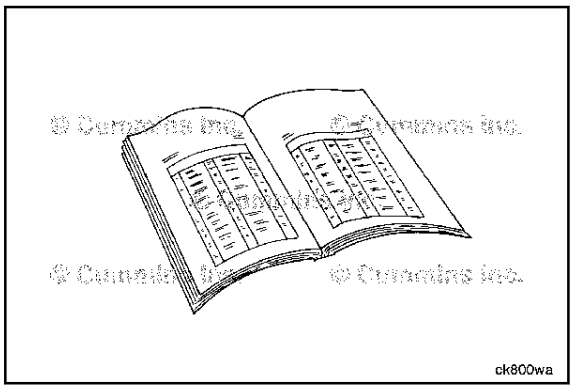


⚠CAUTION⚠
Low profile radial tires are more sensitive to heat than bias ply tires. Excessive operating time at full load can damage tires due to overheating. Check the tire manufacturer's recommendations for the maximum allowable chassis dynamometer operating time.



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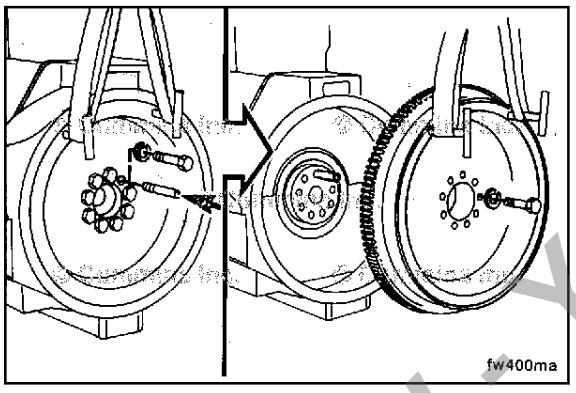
Flywheel (016-005)

Preparatory Steps

⚠WARNING⚠
Batteries can emit explosive gases. To reduce the possibility of personal injury, always ventilate the compartment before servicing the batteries. To reduce the possibility of arcing, remove the negative (-) battery cable first, and attach the negative (-) battery cable last.

⚠WARNING⚠
This component or assembly weighs greater than 23 kg [50 lb]. To prevent serious personal injury, be sure to have assistance or use appropriate lifting equipment to lift this component or assembly.

- Disconnect the batteries or air starter. Refer to Procedure 013-009.
- Remove the transmission, clutch, and all related components. Refer to the manufacturer's operating instructions.



Remove

⚠WARNING⚠
This component or assembly weighs greater than 23 kg [50 lb]. To prevent serious personal injury, be sure to have assistance or use appropriate lifting equipment to lift this component or assembly.

Use two [5/8-18 inch] guide studs to prevent the flywheel from rotating. Remove two capscrews and install the guide studs.

Use a hoist, two tee handles, and a lifting sling. Install the tee handles.

Remove the remaining capscrews.

Remove the flywheel.

NOTE: Use a mallet to tap the flywheel from the crankshaft, if necessary.

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Additional Service Literature

General Information

The following publications can be purchased:

Bulletin	Title of Publication
3885786	Users Guide Electronic Software and Database Network Version 3.1
3666120	QSK19, QSK19 CM850 MCRS, QSK19 CM2150 MCRS Operation and Maintenance Manual
3666113	QSK19, QSK23, QSK45, QSK60, and QSK78 Engines Electronic Control System Troubleshooting and Repair Manual
4021493	QSK19 CM850 Modular Common Rail System Series Engine Electronic Control System Troubleshooting and Repair Manual
3666133	QSK Fuel System Wiring/Fault Code Diagram
3666163	QSK Fuel System Echek™ 1.0 Cartridge Manual
3666148	INSITE™ For QSK Fuel System QUANTUM™ User's Manual
3672094	QSK19 Parts Catalog - Construction
3666121	Holset® Air Compressor Master Repair Manual
3898170	QUANTUM™ QSK19 Engine Familiarization
3898180	QUANTUM™ QSK19 Fuel System Familiarization
4021497	QSK19 CM850 Modular Common Rail System, Industrial Applications Wiring Diagram
4021585	QSK19 CM850 Modular Common Rail System, Power Generation Applications Wiring Diagram
4021583	QSK19 CM850 Modular Common Rail System, Marine Auxiliary with Base Panel System Wiring Diagram
4021584	QSK19 CM850 Modular Common Rail System, Marine Propulsion with Base Panel System Wiring Diagram
3379001	Fuels for Cummins® Engines
3379009	Operation of Diesel Engines in Cold Climates
3379084	Fuel Pump Rebuild Manual
3666005	Dynamometer and Road Testing N14 and L10 Change Air Cooled Engines
3666052	Camshaft Reuse Guidelines for Cummins® Engines with Roller Followers or Roller Tappets
3666091	Prelubrication Device for Heavy Duty and High Horsepower Engines
3666121	Holset® Air Compressor Master Repair Manual
3666132	Cummins® Coolant Requirements and Maintenance
3666209	Extended Service Interval, Cooling System Maintenance
3666286	Cummins® Requirements for Cooling System Extended Service Intervals
3666456	QSK19 Hot Start Knock Kit
3666494	Cummins® Branded Delco Remy Starter and Alternators
3666635	Cummins® Branded Prestolite Starters, Alternators, Service and Repair
3810340	Cummins® Engine Oil Recommendations
4021322	QSK19 Hot Start Knock Kit
4021325	Low Hour, False Head Gasket Oil Leaks
4091837	QSK19 with CM850 Virtual College

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General Engine

Specifications

NOTE: For performance and fuel rate values, see the engine data sheet or the fuel pump code for the particular model involved.

NOTE: No injector adjustments are required for engines with electronic injectors.

Engine Speed..... Refer to the Fuel Pump Calibration Data for optional speed rating
Displacement..... 19 liters [1150 cu in]
Bore and Stroke..... 158.75 mm x 158.75 mm [6.25 in x 6.25 in]
Engine Weight (Approximate):
- Dry.....1720 kg [3800 lb]
- Wet.....2045 kg [4504 lb]

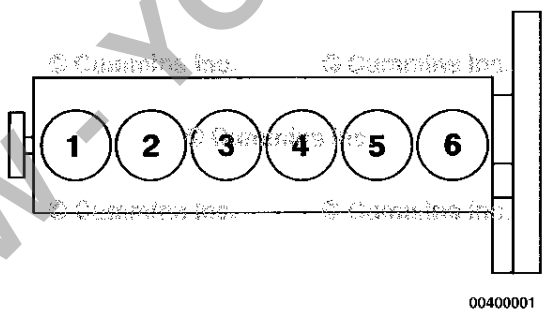
Firing Order.....1-5-3-6-2-4
Valve and Injector Settings (Mechanical Injectors):
- Intake Valve Adjustment.....0.36 mm [0.014 in]
- Intake Valve Limits.....0.28 to 0.43 mm [0.011 to 0.017 in]
- Exhaust Valve Adjustment.....0.81 mm [0.032 in]
- Exhaust Valve Limits.....0.74 to 0.89 mm [0.029 to 0.035 in]
- Injector OBC Method Adjustment (in engine).....19 N•m [165 in-lb]

Valve Settings (Electronic Injectors):
- Intake Valve Adjustment.....0.36 mm [0.014 in]
- Intake Valve Limits.....0.28 to 0.43 mm [0.011 to 0.017 in]
- Exhaust Valve Adjustment.....0.69 mm [0.027 in]
- Exhaust Valve Limits.....0.69 to 0.77 mm [0.027 to 0.030 in]

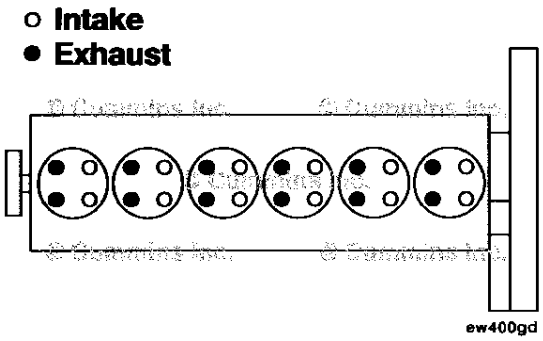
Compression Ratio:
- 525 to 600 hp - Jacket Water Aftercooled.....17.0:1
- 600 to 750 hp - Low-Temperature Aftercooled (LTA).....15.0:1
- Engines with Electronic Injectors.....16.0:1

Crankshaft Rotation (viewed from the front of the engine).....Clockwise

QSK19 Cylinder Location



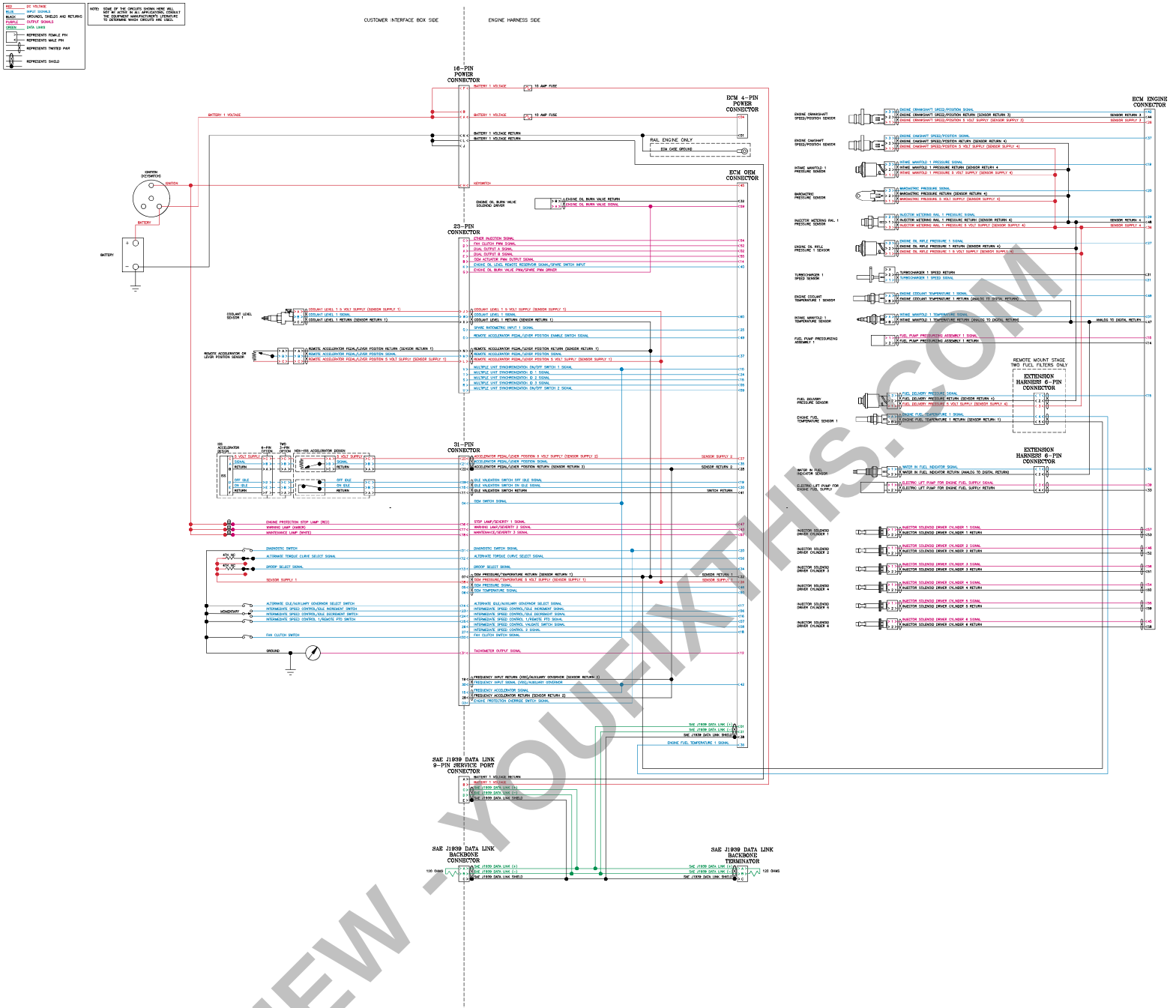
The above illustration indicates the cylinder locations.

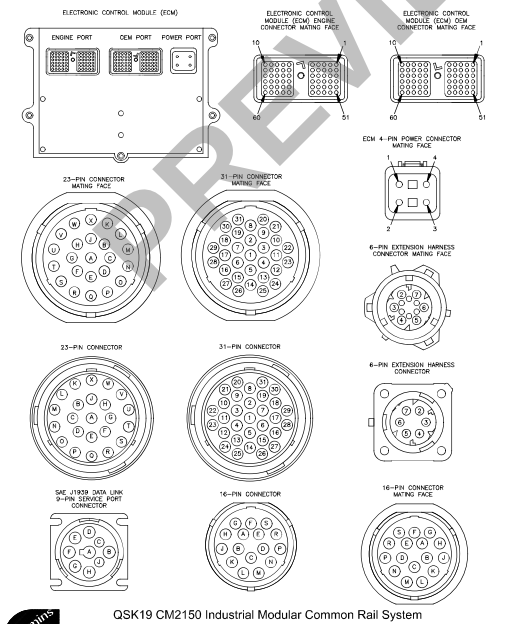


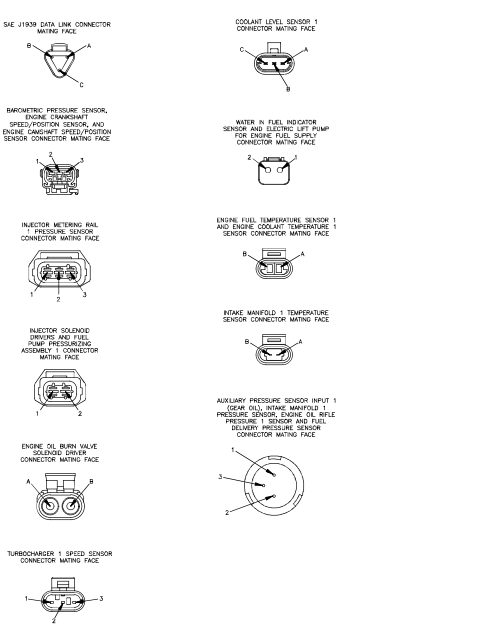
The above illustration indicates the intake and exhaust valve locations.

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Specifications

General Information

⚠WARNING⚠

This diagram is provided as a diagnostic tool for trained, experienced technicians only. Improper troubleshooting or repair can result in severe personal injury or death or property damage. See important instructions in the service manual.

Electrical Specifications

SAE J1939 Data Link
- Positive wire to chassis ground
  - 2.5 to 5.0 VDC
- Negative wire to chassis ground
  - 0.0 to 2.5 VDC

All Continuity Checks
- OK (no open circuit) if less than 10 Ohms

All Shorts to Ground
- Turbocharger 1 Speed Sensor Circuit
  - OK (no short circuit) if more than 10M Ohms
- All other circuits
  - OK (no short circuit) if more than 100K Ohms

Short Circuit to External Voltage
- OK if less than 1.5 VDC

Sensor Specifications

Engine Oil Rifle Pressure 1 Sensor
Torque = 14 N·m [124 in-lb]

Pressure (kPa)	Pressure [psia]	Pressure (inHg)	Voltage (VDC)
0	0	0	0,21 to 0,79
103	15	31	0,90 to 1,10
172	25	51	1,17 to 1,52
345	50	102	1,83 to 2,50
517	75	153	2,59 to 3,41
689	100	204	3,43 to 4,25
827	120	244	4,09 to 4,91

Intake Manifold 1 Pressure Sensor
Torque = 14 N·m [124 in-lb]

Pressure (kPa)	Pressure [psia]	Pressure [inHg]	Voltage (VDC)
0	0	0	0,22 to 0,80
103	15	31	1,23 to 1,40
207	30	61	1,97 to 2,27
310	45	92	2,71 to 3,16
414	60	122	3,45 to 4,04
519	75	153	4,20 to 4,92

All Temperature Sensors
Torque = 15 N·m [133 in-lb]

Temperature (°C)	Temperature [°F]	Resistance (ohms)
0	32	30K to 36K
25	77	9K to 11K
50	122	3K to 4K
75	167	1350 to 1500

All Temperature Sensors
Torque = 15 N·m [133 in-lb]

Temperature (°C)	Temperature [°F]	Resistance (ohms)
100	212	600 to 675

Barometric Pressure Sensor
Torque = 23 N·m [204 in-lb]

Pressure (kPa)	Pressure (psia)	Pressure (inHg)	Voltage (VDC)
45	6,50	13	0,32 to 0,69
69	10	20	1,72 to 2,23
90	13	27	2,96 to 3,52
103	15	31	3,72 to 4,45
110	16	33	4,14 to 4,87

Fuel Delivery Pressure Sensor
Torque = 23 N·m [204 in-lb]

Pressure (kPa)	Pressure [psia]	Pressure [inHg]	Voltage (VDC)
103	15	31	0,50
552	80	163	1,61
1034	150	305	2,80
1379	200	407	3,65
1724	250	509	4,50

Injector Metering Rail 1 Pressure Sensor
Torque = 100 N·m [74 ft-lb]

Pressure (kPa)	Pressure [psia]	Pressure [inHg]	Voltage (VDC)
0	0	0	0,50
50,000	7,252	14,765	1,50
100,000	14,504	29,530	2,50
150,000	21,756	44,295	3,50
200,000	29,008	59,060	4,50

QSK19 CM2150 Industrial Modular Common Rail System Wiring Diagram

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