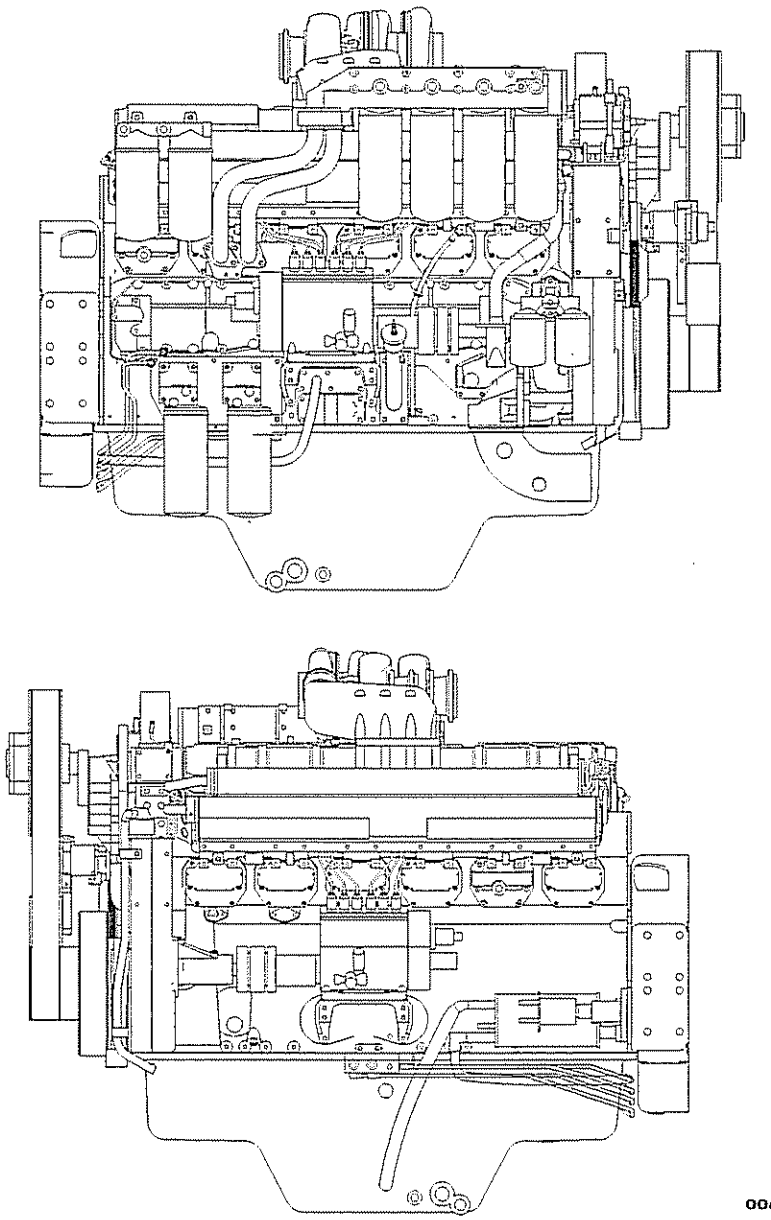
Operation and Maintenance Manual
QST30 Series Engine



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Foreword

This manual contains information for the correct operation and maintenance of your Cummins engine. It also includes important safety information, engine and systems specifications, troubleshooting guidelines, and listings of Cummins Authorized Repair Locations and component manufacturers.

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

Keep this manual with the equipment. If the equipment is traded or sold, give the manual to the new owner.

The information, specifications, and recommended maintenance guidelines in this manual are based on information in effect at the time of printing. Cummins Engine Company, Inc. reserves the right to make changes at any time without obligation. If you find differences between your engine and the information in this manual, contact your local Cummins Authorized Repair Location or call 1-800-DIESELS (1-800-343-7357).

The latest technology and the highest quality components were used to produce this engine. When replacement parts are needed, we recommend using only genuine Cummins or ReCon® exchange parts. These parts can be identified by the following trademarks:

Note: Warranty information is located in Section W. Make sure you are familiar with the warranty or warranties applicable to your engine.

Table of Contents

Section i - Introduction

Section Contents

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To the Owner and Operator

Preventative maintenance is the easiest and least expensive type of maintenance. Follow the maintenance schedule recommendations outlined in Maintenance Guidelines (Section 2).

Keep records of regularly scheduled maintenance.

Use the correct fuel, oil, and coolant in your engine as specified in Engine Specifications, Section V.

Cummins uses the latest technology and the highest quality components to produce its engine. Cummins recommends using only genuine Cummins parts and ReCon® exchange parts.

Personnel at Cummins authorized repair locations have been trained to provide expert service and parts support. If you have a problem that can **not** be resolved by a Cummins authorized repair location, follow the steps outlined in the Cummins Service Assistance (Section S).

About the Manual

This manual contains information needed to correctly operate and maintain your engine as recommended by Cummins Engine Company, Inc. Additional service literature (Shop Manual, Troubleshooting and Repair Manual, etc.) can be ordered by filling out and mailing the Literature Order Form located in Service Literature, Section L.

This manual does **not** cover vehicle or equipment maintenance procedures. Consult the vehicle or equipment manufacturer for specific maintenance recommendations.

Both metric and U.S. customary values are listed in this manual. The metric value is listed first, followed by the U.S. customary in brackets.

Numerous illustrations and symbols are used to aid in understanding the meaning of the text. Refer to page i-3 through i-6 for a complete listing of symbols and their definitions.

Each section is preceded by a Section Contents to aid in locating information more quickly.

How to Use the Manual

This manual is organized according to the maintenance intervals that are to be performed. A table that states the required intervals and the checks to be made is located in Section 2. Locate the maintenance interval that you are performing and follow all the procedure steps given in that section. In addition, all the previous maintenance interval procedures **must** also be performed.

Keep a record of all the checks and inspections made. A record form for recording date, mileage/kilometer or hours, and what maintenance checks were performed is located in Section 2.

Refer to Section T for a troubleshooting guide to your engine. Follow the Troubleshooting Section Contents for locating and correcting engine problems.

Refer to Section V for specifications recommended by Cummins Engine Company, Inc. for your engine. Specifications and torque values for each engine system are given in that section.

Symbols

The following symbols have been used in this manual to help communicate the intent of the instructions. When one of the symbols appears, it conveys the meaning defined below:

WARNING - Serious personal injury or extensive property damage can result if the warning instructions are **not** followed.

CAUTION - Minor personal injury can result or a part, an assembly, or the engine can be damaged if the caution instructions are **not** followed.

Indicates a **REMOVAL or DISASSEMBLY** step.

Indicates an **INSTALLATION or ASSEMBLY** step.

INSPECTION is required.

CLEAN the part or assembly.

PERFORM a mechanical or time **MEASUREMENT**.

LUBRICATE the part or assembly.

Indicates that a **WRENCH or TOOL SIZE** will be given.

TIGHTEN to a specific torque.

PERFORM an electrical **MEASUREMENT**.

Refer to another location in this manual or another publication for additional information.

The component weighs 23 kg [50 lb] or more. To avoid personal injury, use a hoist or get assistance to lift the component.

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Simbolos

Los símbolos siguientes son usados en este manual para clarificar el proceso de las instrucciones. Cuando aparece uno de estos símbolos, su significado se especifica en la parte inferior.

ADVERTENCIA - Serios daños personales o daño a la propiedad puede resultar si las instrucciones de Advertencia **no** se consideran.

PRECAUCION - Daños menores pueden resultar, o de piezas del conjunto o el motor puede averiarse si las instrucciones de Precaución **no** se siguen.

Indica un paso de **REMOCION** o **DESMONTAJE.**

Indica un paso de **INSTALACION** o **MONTAJE.**

Se requiere **INSPECCION.**

LIMPIESE la pieza o el montaje.

EJECUTESE una **MEDICION** mecánica o del tiempo.

LUBRIQUESE la pieza o el montaje.

Indica que se dará una **LLAVE DE TUERCAS** o el **TAMAÑO DE HERRAMIENTA.**

APRIETESE hasta un par torsor específico.

EJECUTESE una **MEDICION** eléctrica.

Para información adicional refiérase a otro emplazamiento de este manual o a otra publicación anterior.

El componente pesa 23 kg [50 lb] o mas. Para evitar dano corporal empleen una cabria u obtengan ayuda para elevar el componente.

Symbole

In diesem Handbuch werden die folgenden Symbole verwendet, die wesentliche Funktionen hervorheben. Die Symbole haben folgende Bedeutung:

WARNUNG - Wird die Warnung **nicht** beachtet, dann besteht erhöhte Unfall- und Beschädigungsgefahr.

VORSICHT - Werden die Vorsichtsmassnahmen **nicht** beachtet, dann besteht Unfall- und Beschädigungsgefahr.

AUSBAU bzw. **ZERLEGEN.**

EINBAU bzw. **ZUSAMMENBAU.**

INSPEKTION erforderlich.

Teil oder Baugruppe **REINIGEN.**

DIMENSION - oder **ZEITMESSUNG.**

Teil oder Baugruppe **ÖLEN.**

WERKZEUGGRÖSSE wird angegeben.

ANZUG auf vorgeschriebenes Drehmoment erforderlich.

Elektrische **MESSUNG DURCHFÜHREN.**

Weitere Informationen an anderer Stelle bzw. in anderen Handbüchern.

Das teil weigt 23 kg [50 lb] oder mehr. Zur vermeidung von koerperverletzung winde benutzen oder hilfe beim heben des teils in anspruch nehmen.

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Symboles

Les symboles suivants sont utilisés dans ce manuel pour aider à communiquer le but des instructions. Quand l'un de ces symboles apparaît, il évoque le sens défini ci-dessous:

AVERTISSEMENT - De graves lésions corporelles ou des dommages matériels considérables peuvent survenir si les instructions données sous les rubriques "Avertissement" **ne** sont **pas** suivies.

ATTENTION - De petites lésions corporelles peuvent survenir, ou bien une pièce, un ensemble ou le moteur peuvent être endommagés si les instructions données sous les rubriques "Attention" **ne** sont **pas** suivies.

Indique une opération de **DEPOSE.**

Indique une opération de **MONTAGE.**

L'INSPECTION est nécessaire.

NETTOYER la pièce ou l'ensemble.

EFFECTUER une **MESURE** mécanique ou de temps.

GRAISSER la pièce ou l'ensemble.

Indique qu'une **DIMENSION DE CLE** ou **D'OUTIL** sera donnée.

SERRER à un couple spécifique.

EFFECTUER une **MESURE** électrique.

Se reporter à un autre endroit dans ce manuel ou à une autre publication pour obtenir des informations plus complètes.

Le composant pese 23 kg [50 lb] ou davantage. Pour eviter toute blessure, employer un appariel de levage ou demander de l'aide pour le soulever.

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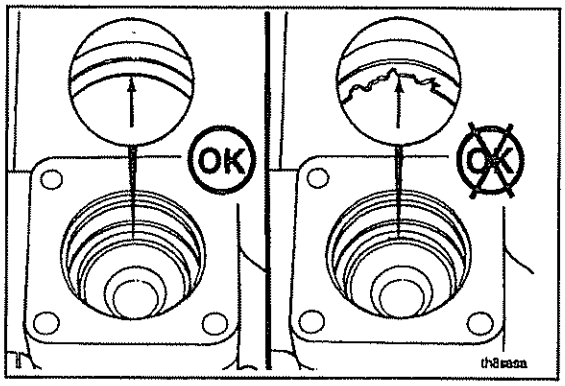
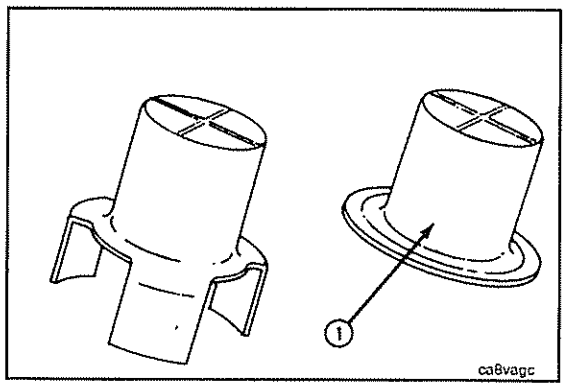


Illustrations

Some of the illustrations throughout this manual are generic and will **not** look exactly like the engine or parts used in your application. The illustrations can contain symbols to indicate an action required and an acceptable or **not** acceptable condition.



The illustrations are intended to show repair or replacement procedures. The procedure will be the same for all applications, although the illustration can differ.

General Safety Instructions

Important Safety Notice

⚠ WARNING ⚠

Improper practices or carelessness can cause burns, cuts, mutilation, asphyxiation or other bodily injury or death.

Read and understand all of the safety precautions and warnings before performing any repair. This list contains the general safety precautions that **must** be followed to provide personal safety. Special safety precautions are included in the procedures when they apply.

- Make sure the work area surrounding the product is dry, well lit, ventilated, free from clutter, loose tools, parts, ignition sources and hazardous substances. Be aware of hazardous conditions that can exist.
- **Always** wear protective glasses and protective shoes when working.
- Rotating parts can cause cuts, mutilation or strangulation.
- Do **not** wear loose-fitting or torn clothing. Remove all jewelry when working.
- Disconnect the battery (negative [-] cable first) and discharge any capacitors before beginning any repair work. Disconnect the air starting motor if equipped to prevent accidental engine starting. Put a "Do **Not** Operate" tag in the operator's compartment or on the controls.
- Use ONLY the proper engine barring techniques for manually rotating the engine. Do **not** attempt to rotate the crankshaft by pulling or prying on the fan. This practice can cause serious personal injury, property damage, or damage to the fan blade(s) causing premature fan failure.
- If an engine has been operating and the coolant is hot, allow the engine to cool before you slowly loosen the filler cap and relieve the pressure from the cooling system.
- Do **not** work on anything that is supported ONLY by lifting jacks or a hoist. **Always** use blocks or proper stands to support the product before performing any service work.
- Relieve all pressure in the air, oil, fuel and the cooling systems before any lines, fittings, or related items are removed or disconnected. Be alert for possible pressure when disconnecting any device from a system that utilizes pressure. Do **not** check for pressure leaks with your hand. High pressure oil or fuel can cause personal injury.
- To prevent suffocation and frostbite, wear protective clothing and ONLY disconnect fuel and liquid refrigerant (freon) lines in a well ventilated area. To protect the environment, liquid refrigerant systems **must** be properly emptied and filled using equipment that prevents the release of refrigerant gas (fluorocarbons) into the atmosphere. Federal law requires capturing and recycling refrigerant.
- To avoid personal injury, use a hoist or get assistance when lifting components that weigh 23 kg [50 lb] or more. Make sure all lifting devices such as chains, hooks, or slings are in good condition and are of the correct capacity. Make sure hooks are positioned correctly. **Always** use a spreader bar when necessary. The lifting hooks **must not** be side-loaded.
- Corrosion inhibitor, a component of SCA and lubricating oil, contains alkali. Do **not** get the substance in your eyes. Avoid prolonged or repeated contact with skin. Do **not** swallow internally. In case of contact, immediately wash skin with soap and water. In case of contact, immediately flood eyes with large amounts of water for a minimum of 15 minutes. IMMEDIATELY CALL A PHYSICIAN. KEEP OUT OF REACH OF CHILDREN.
- Naptha and Methyl Ethyl Ketone (MEK) are flammable materials and **must** be used with caution. Follow the manufacturer's instructions to provide complete safety when using these materials. KEEP OUT OF REACH OF CHILDREN.
- To avoid burns, be alert for hot parts on products that have just been turned off, and hot fluids in lines, tubes, and compartments.
- **Always** use tools that are in good condition. Make sure you understand how to use them before performing any service work. Use ONLY genuine Cummins or Cummins ReCon® replacement parts.
- **Always** use the same fastener part number (or equivalent) when replacing fasteners. Do **not** use a fastener of lessor quality if replacements are necessary.
- Do **not** perform any repair when fatigued or after consuming alcohol or drugs that can impair your functioning.
- Some state and federal agencies in the United States of America have determined that used engine oil can be carcinogenic and can cause reproductive toxicity. Avoid inhalation of vapors, ingestion, and prolonged contact with used engine oil.

Acronyms and Abbreviations

AFC	Air Fuel Control
API	American Petroleum Institute
ASA	Air Signal Attenuator
ASTM	American Society of Testing and Materials
°C	Celsius
CARB	California Air Resources Board
C.I.D.	Cubic Inch Displacement
CNG	Compressed Natural Gas
CPL	Control Parts List
cSt	Centistokes
ECM	Electronic Control Module
ECS	Emission Control System
EPA	Environmental Protection Agency
EPS	Engine Position Sensor
°F	Fahrenheit
GVW	Gross Vehicle Weight
Hg	Mercury
hp	Horsepower
H_2O	Water
ICM	Ignition Control Module
km/l	Kilometers per Liter
kPa	Kilopascal
LNG	Liquid Natural Gas
LTA	Low Temperature Aftercooling
MIP	Mixer Inlet Pressure
MPa	Megapascal
mph	Miles Per Hour
mpq	Miles Per Quart
N•m	Newton-meter
NG	Natural Gas
OEM	Original Equipment Manufacturer
ppm	Parts Per Million
psi	Pounds Per Square Inch
PTO	Power Takeoff
rpm	Revolutions Per Minute
SAE	Society of Automotive Engineers
SCA	Supplemental Coolant Additive
STC	Step Timing Control
VS	Variable Speed
VSS	Vehicle Speed Sensor

Section E - Engine Identification

Section Contents

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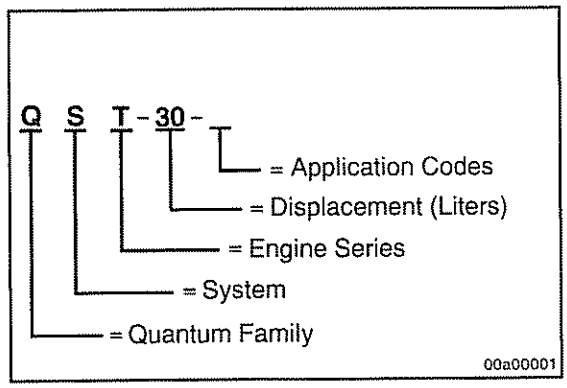
Engine Identification

Cummins Engine Nomenclature

The model name provides identification data for the engine. Refer to the illustration for the model name identification.



The application codes are:

C = Construction

D = Generator Drive

F = Fire Pump

G = Generator Set

L = Locomotive

M = Marine

P = Power Unit

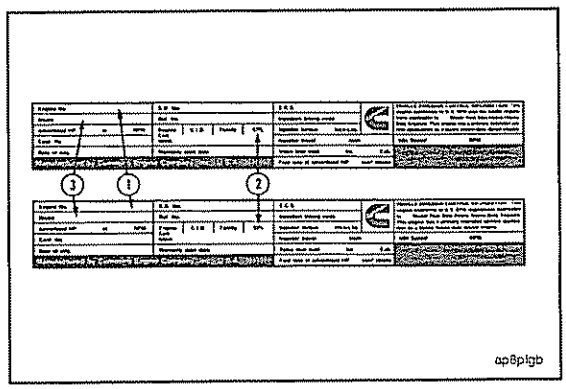
R = Railcar

Engine Dataplate

The engine dataplate shows specific information about your engine. The engine serial number (ESN) (1), Control Parts List (CPL) (2), Model (3), and Horsepower and rpm rating provide information for ordering parts and service needs.

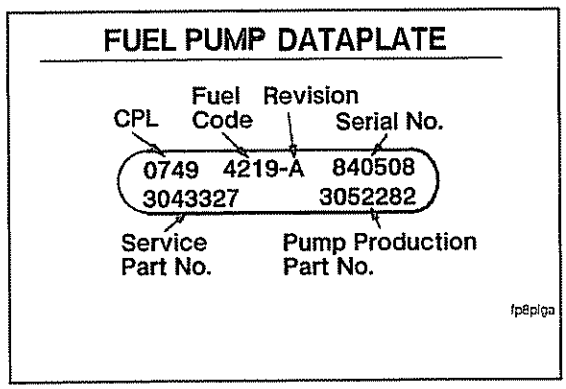
NOTE: The engine dataplate **must not** be changed unless approved by Cummins Engine Company, Inc.

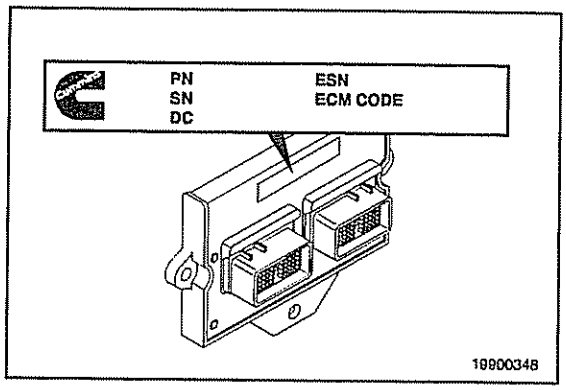
The engine dataplate on the QST30 engines is located on the left bank side of the front gear cover.



Fuel Pump Dataplate

The fuel pump dataplate is located on the side of the fuel pump. The dataplate provides information for fuel pump calibration.





ECM Dataplate

The external ECM dataplate is located on top of the ECM.

The dataplate contains the ECM part number (P/N), the ECM serial number (S/N), the manufacturing date code (D/C), the engine serial number (ESN), and the ECM code.

Specifications

General Specifications

Valve Settings:
- Intake Valve Adjustment ..... 0.43 mm [0.017 in]
- Exhaust Valve Adjustment ..... 0.80 mm [0.032 in]

QST30 Aspiration: ..... Turbocharged and Aftercooled

Bore and Stroke: ..... 140 mm x 165 mm [5.51 in x 6.5 in]

Compression Ratio: 14.0:1

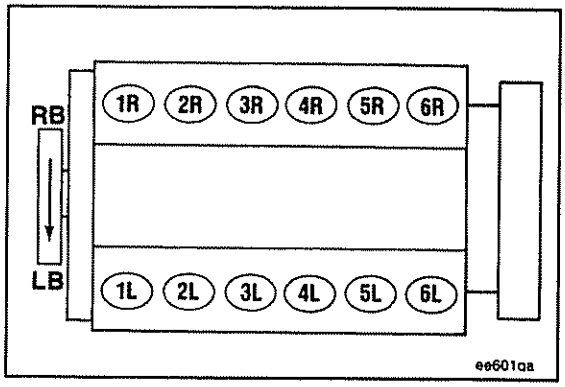
Displacement: ..... 30.5 Liters [1860 cu in]

Firing Order: R1–L1–R5–L5–R3–L3–R6–L6–R2–L2–R4–L4

Type: ..... 4 Cycle, 50 Degree Vee, 12 Cylinder

Weight: ..... 2998 kg [6610 lb]

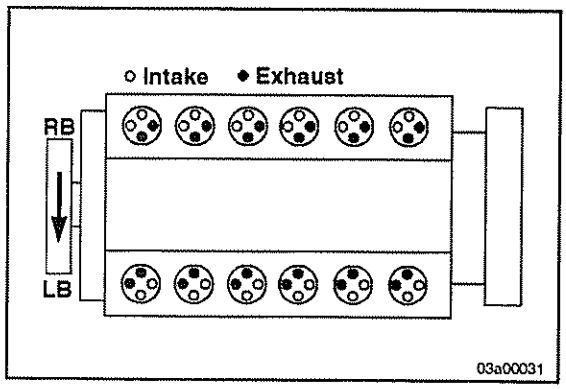
Crankshaft Rotation (Viewed from the front of the engine): ..... Clockwise



Cylinder Numbering Sequence:

RB = Right bank of cylinders

LB = Left bank of cylinders



Intake and Exhaust valve locations.

Fuel System

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

Maximum Allowable Restriction to Pump:
- With clean filter ..... 64 mm Hg [2.5 in Hg]
- With dirty filter ..... 100 mm Hg [4.0 in Hg]

Maximum allowable return line restriction ..... 63 mm Hg [2.5 in Hg]

Maximum allowable return line restriction:
- With check valves and overhead tanks ..... 518 mm Hg [20.4 in Hg]

Minimum allowable fuel tank vent capability:
- With 63 mm Hg [2.5 in Hg] or less back pressure ..... 425 L/hr [15 cu ft/hr]

Lubricating Oil System

Oil Pressure, Main Oil Rifle (15W40 oil at 107°C [225°F]:
- Maximum at Rated RPM: ..... 448 kPa [65 psi]
- Minimum at Rated RPM: ..... 245 kPa [36 psi]
- Minimum at Idle RPM: ..... 98 kPa [14 psi]

Oil Temperature — Maximum ..... 120° C [250° F]

Oil Pan Capacity
- Sump only ..... 76 liter [20 U. S. gal]
- Sump only ..... 132 liter [35 U.S. gal]

Oil Filter Capacity (Each Filter)
- Full flow filter (4 spin-on filters required) ..... 2.65 liter [0.70 U.S. gal]
- Bypass filter (2 spin-on filters required) ..... 2.27 liter [0.60 U. S. gal]

NOTE: The total lubricating oil system capacity is the summation of the oil pan capacity at the high mark on the dipstick, the full flow oil filter capacity, and the capacity of any bypass filters that are used.

Total System Capacity
- When using 75 liter [20 U. S. gal] oil pan: ..... 90 liter [24 U.S. gal]
- When using 132 liter [35 U.S. gal] oil pan: ..... 148 liter [39 U.S. gal]

Cooling System

Coolant Capacity (Engine Only) ..... 85 liters [22.4 U.S. gal]

Standard Modulating Thermostat Range ..... 77 to 90° C [170° to 194° F]

Minimum Pressure Cap ..... 48 kPa [7 psi]

Coolant Temperature
- Minimum Top Tank ..... 71° C [160° F]
- Maximum at Engine Outlet ..... 100° C [212° F]

Maximum Deaeration Time ..... 25 min

Minimum Drawdown
- Of System Capacity ..... 8 %

Air Intake System

NOTE: Engine intake air **must** be filtered to prevent dirt and debris from entering the engine. If the intake air piping is damaged or loose, unfiltered air will enter the engine and cause premature wear.

Maximum Intake Restriction with Heavy Duty Air Cleaner:

With Clean Filter Element ..... 305 mm H_20 [12 in H_20]

With Dirty Filter Element ..... 635 mm H_20 [25 in H_20]

Exhaust System

Back Pressure - Maximum (at rated speed and load) ..... 75 mm Hg [3 in Hg]

Exhaust Pipe Size Normally Acceptable ..... 152 mm [6 in]

Electrical System

Minimum Recommended Battery Capacity

Engine Model	Temperature Range	System Voltage	Cold Cranking Ampere	Ampere Hours	Reserve Capacity
QST30	-18° to 0° C [0° to 32° F]	24 VDC	1800	400	640

NOTE: The number of plates within a given battery size determines reserve capacity. Reserve capacity is the length of time which sustained cranking can occur.

NOTE: CCA ratings are based on two 12 volt batteries in series.

Battery cable sizes — American wire gauge (Maximum length in cranking motor circuit)

24 to 32 volt

No. 00 ..... 6.1 meters [20 ft]
No. 000 ..... 8.2 meters [27 ft]
No. 0000 or two No. 0 (See Note) ..... 10.7 meters [35 ft]
Two No. 00 ..... 13.7 meters [45 ft]

Minimum cranking speed without starting aid ..... 150 RPM

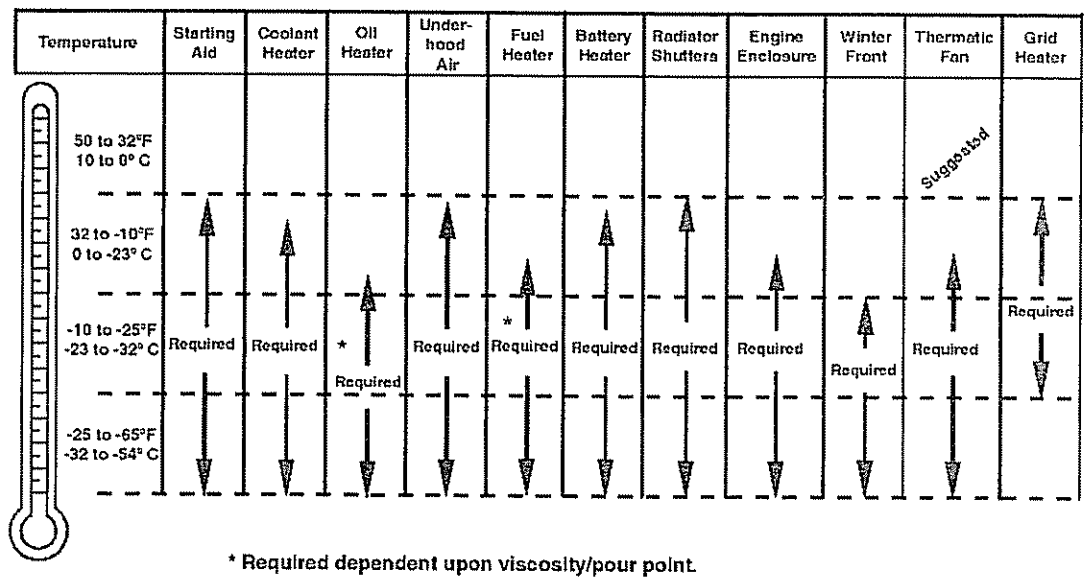
NOTE: Two strands of No. 0 cable can be used in place of one No. 0000 cable providing all connections are carefully made to ensure equal current flow in each parallel cable.

Refer to the following illustration to determine the temperature for which a cold weather starting aid is required.

⚠ WARNING ⚠

NEVER use starting fluid if the grid heater option is used. Use of starting fluid, which contains ether, can cause an explosion, resulting in personal injury and damage to the engine.

Cold Weather Operating Aids



* Required dependent upon viscosity/pour point.

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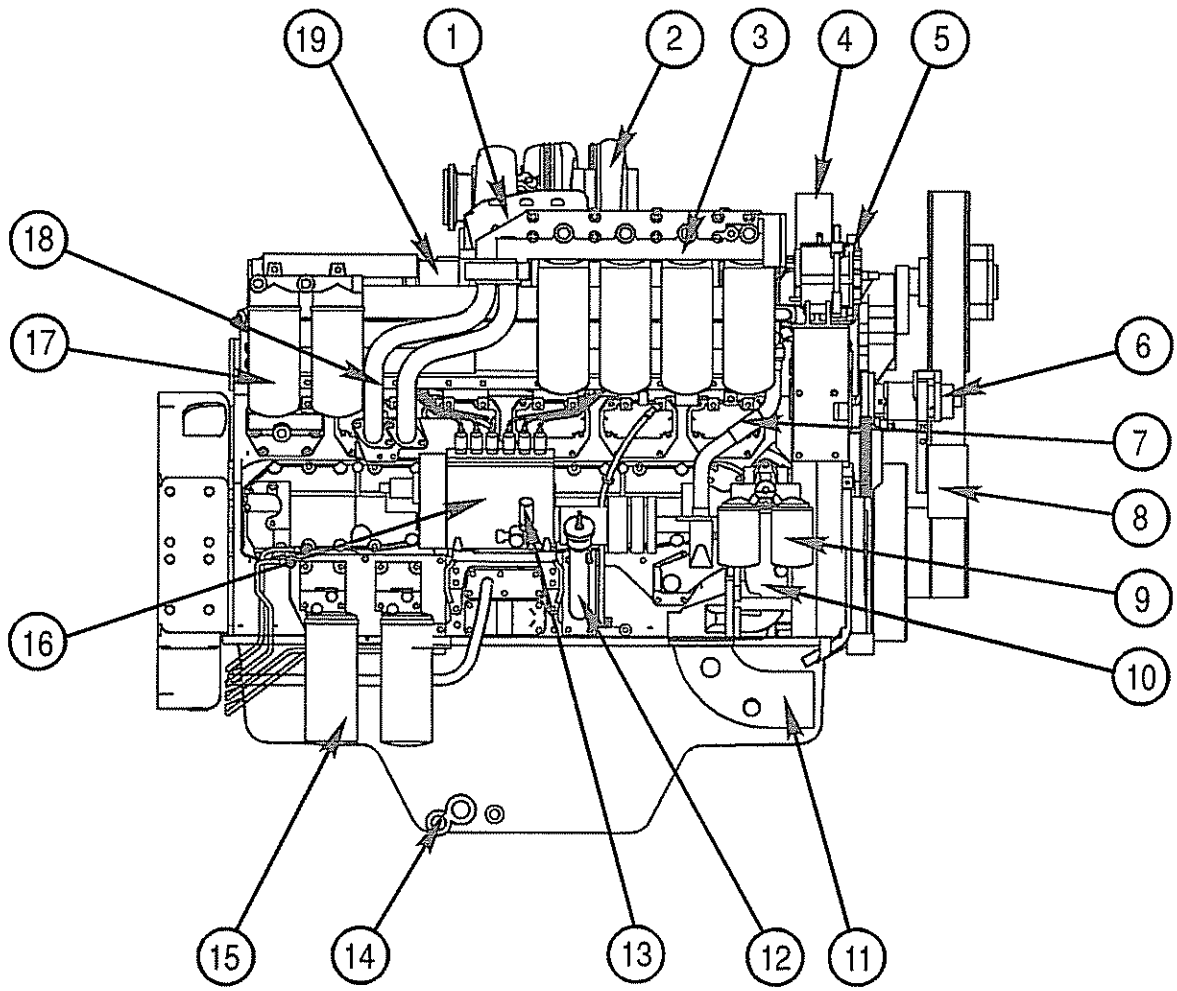
Batteries (Specific Gravity)

Specific Gravity at 27°C [80°F]	State of Charge
1.260 to 1.280	100%
1.230 to 1.250	75%
1.200 to 1.220	50%
1.170 to 1.190	25%
1.110 to 1.130	Discharged

Engine Diagrams

Engine Views

NOTE: The following illustrations contain information about engine components, filter locations, drain points and access locations for instrumentation and engine controls. The information and configuration of components shown in these drawings are of a general nature. Some component locations will vary depending on applications and installations.



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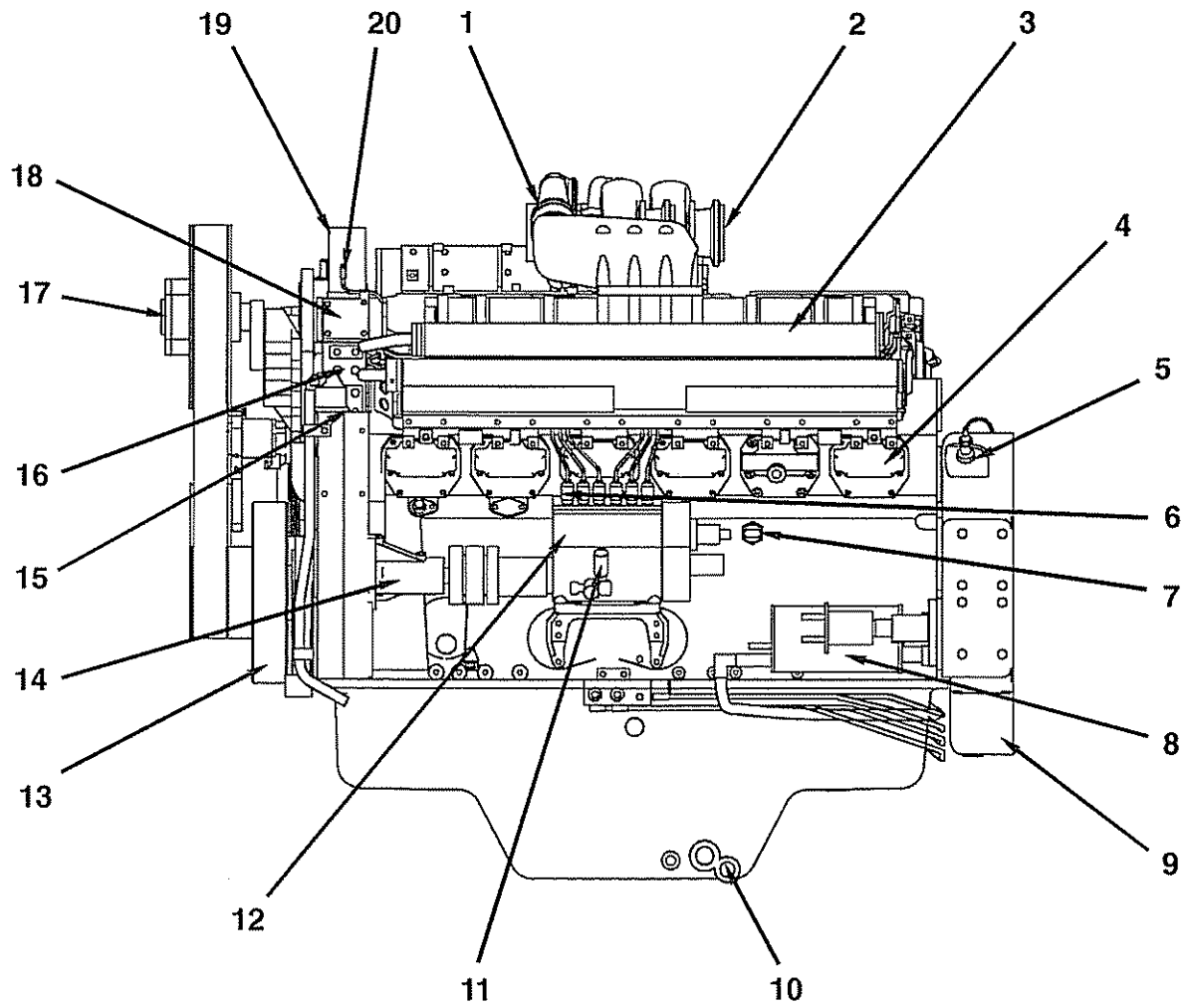
Right Bank

1. Air Crossover Housing
2. Turbocharger
3. Full Flow Oil Filters
4. Water Outlet Connection
5. Lifting Bracket
6. Fan Belt Idler Assembly
7. Aftercooler Water Inlet Tube
8. Fan Belt Idler Pulley
9. Water Filter
10. Water Pump
11. Water Inlet Connection
12. Lubricating Oil Filler Tube
13. Fuel Lift Pump
14. Lubricating Oil Drain
15. Fuel Filters
16. Fuel Injection Pump
17. Lubricating Oil Bypass Filters
18. Lubricating Oil Transfer Tube
19. Air Intake Manifold



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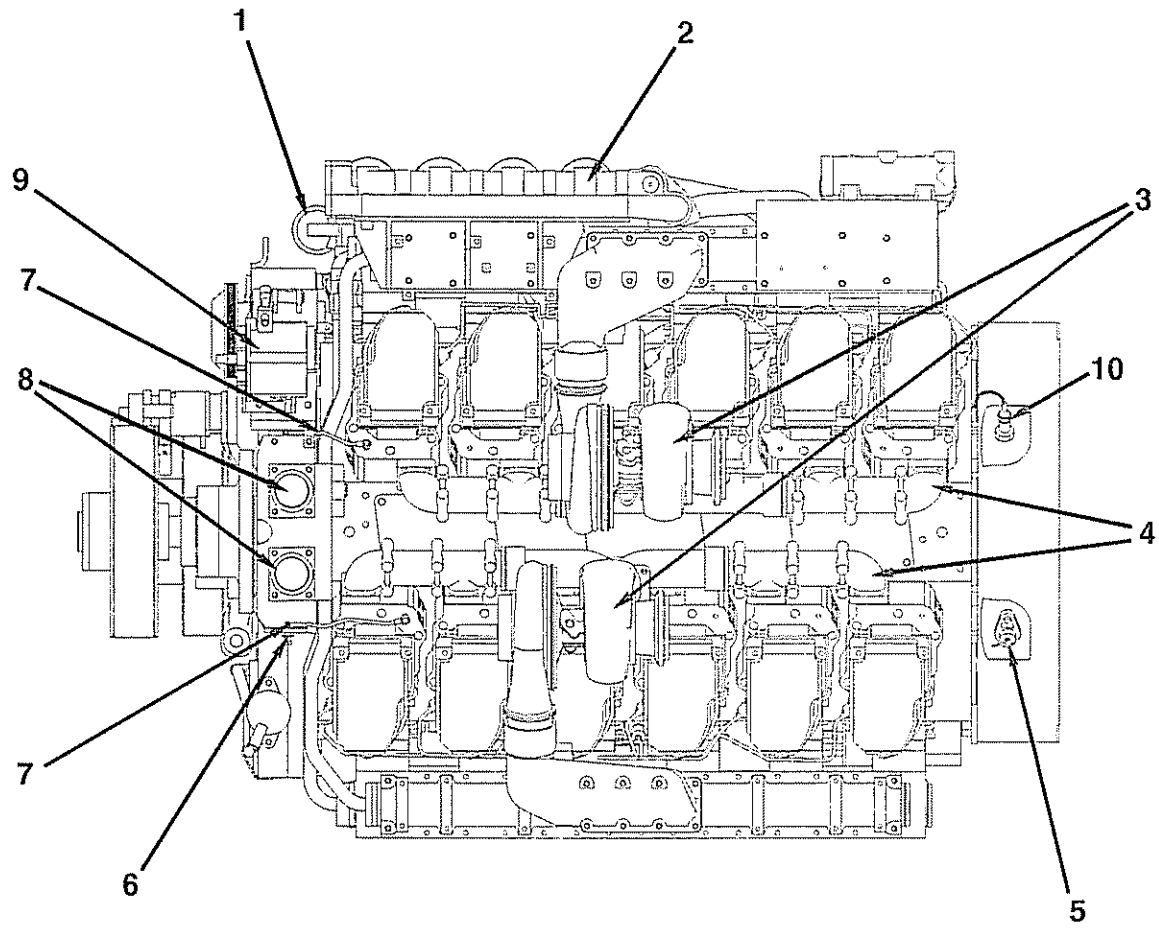
Left Bank

1. Turbocharger Inlet Connection
2. Turbocharger Outlet Connection
3. Aftercooler Housing
4. Cam Follower Cover
5. Engine Speed Sensor
6 . High Pressure Fuel Supply Lines
7. Oil Pressure Sensor
8. Prelubricating Starter
9. Flywheel Housing
10. Lubricating Oil Drain
11. Fuel Lift Pump
12. Fuel Injection Pump
13. Vibration Damper
14. Fuel Pump Drive
15. Coolant Temperature Sensor
16. Crankcase Breather
17. Fan Hub
18. Thermostat Housing
19. Water Outlet Connection
20. Water Vent Tubes



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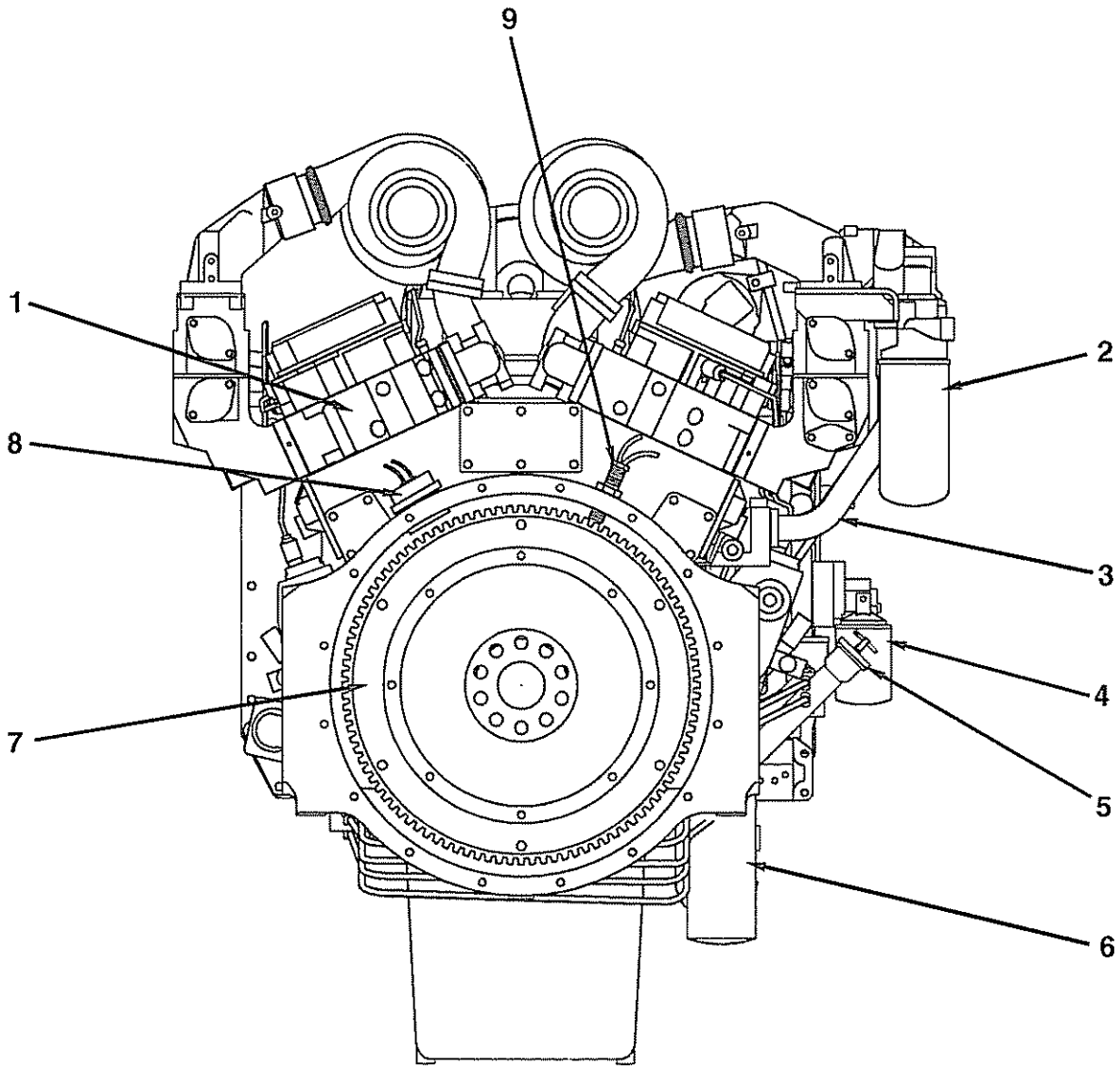
Top View

1. Water Filter
2. Full Flow Oil Filters
3. Turbochargers
4. Exhaust Manifolds
5. Engine Speed Sensor
6. Coolant Temperature Sensor
7. Water Vent Connection
8. Water Outlet Connection
9. Alternator



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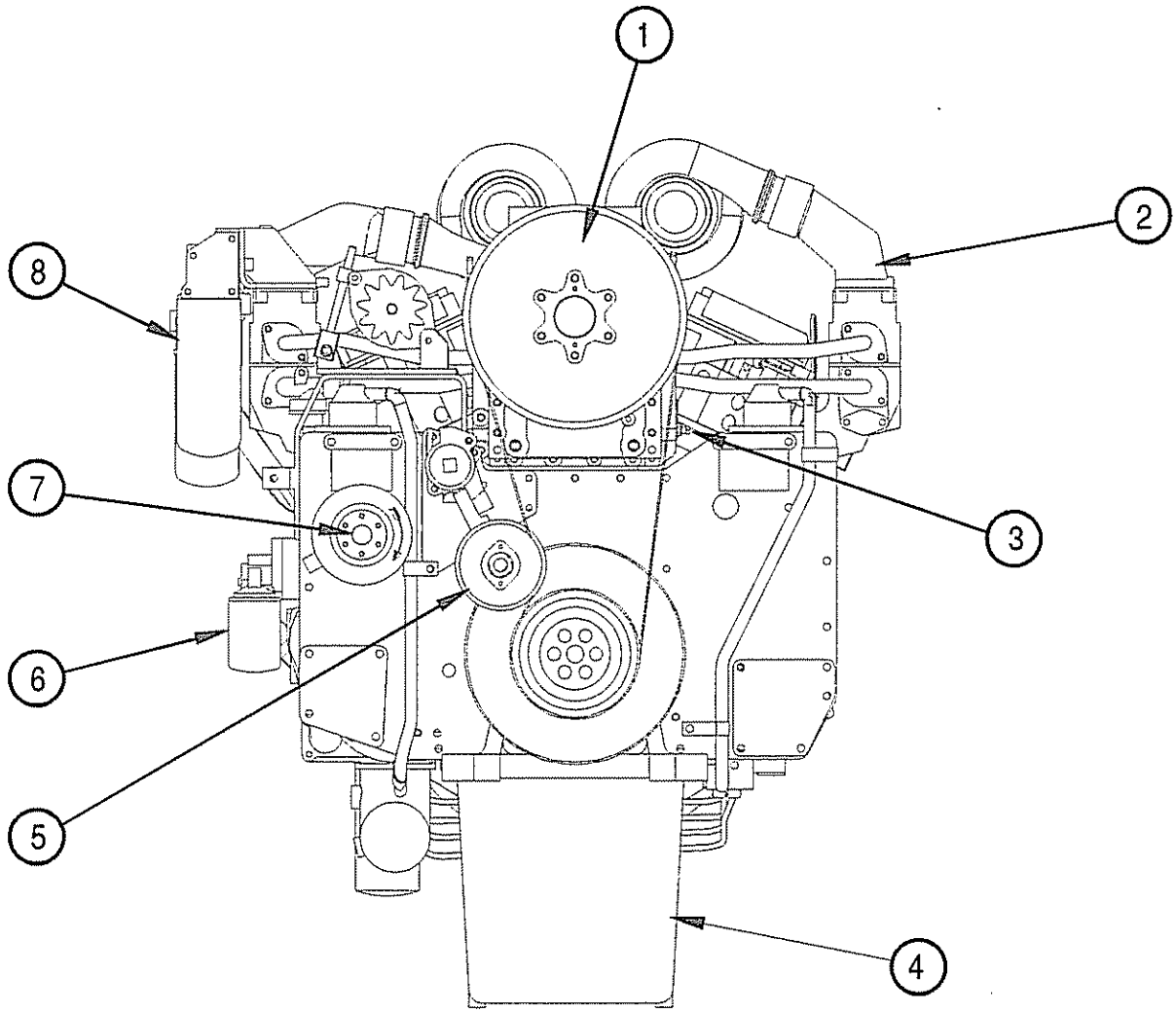
Rear View

1. Cylinder Head
2. Lubricating Oil Bypass Filters
3. Lubricating Oil Transfer Tube
4. Water Filters
5. Lubricating Oil Filler Tube
6. Fuel Filters
7. Flywheel
8. Engine Position Sensor (Industrial)/Engine Speed Sensor (G-Drive, GenSet)
9. Engine Speed Sensor (Industrial)



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Front View

1. Fan Hub
2. Air Crossover
3. Coolant Temperature Sensor
4. Oil Pan
5. Fan Idler Tensioner Pulley
6. Water Filters
7. Accessory Drive
8. Full Flow Oil Filters

NOTES

Section 1 - Operating Instructions

Section Contents

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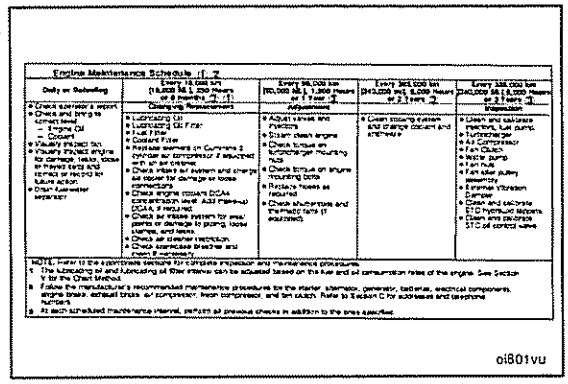
Operating Instructions - General Information

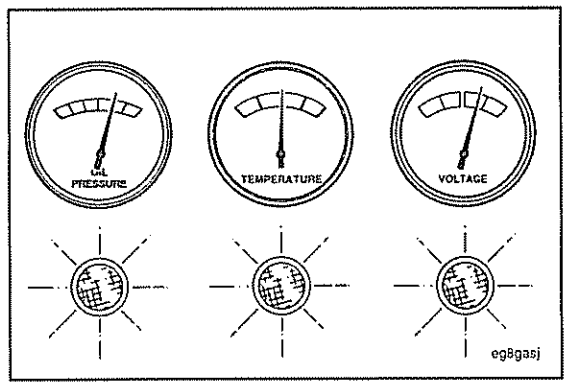
General Information

Correct care of your engine will result in longer life, better performance and more economical operation.

- Follow the daily maintenance checks listed in Maintenance Guidelines, Section 2.

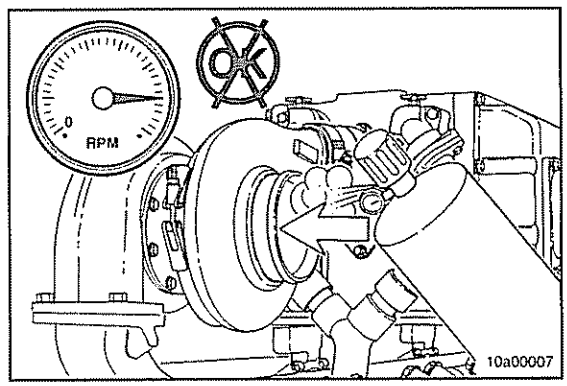


- Check the oil pressure indicators, temperature indicators, warning lights and other gauges daily to make sure they are operational.



⚠ WARNING ⚠

Do not operate a diesel engine where there are or can be combustible vapors. These vapors can be sucked through the air intake system and cause engine acceleration and over-speeding, which can result in a fire, an explosion and extensive property damage. Numerous safety devices are available, such as air intake shutoff devices, to minimize the risk of over-speeding where an engine, due to its application, can operate in a combustible environment, such as due to a fuel spill or gas leak. Cummins Engine Company, Inc. has NO way of knowing the use you have for your engine. The equipment owner and operator are responsible for safe operation in a hostile environment. Consult your Cummins Authorized Repair Location for further information.



Normal Starting Procedure

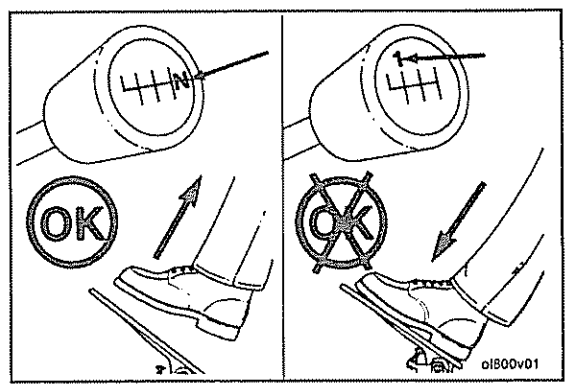
General Information

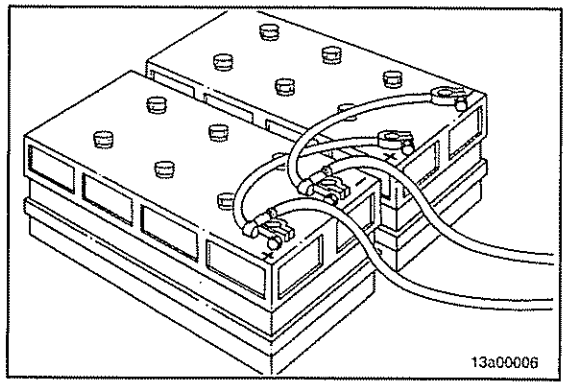
Disengage the driven unit, or if equipped, put the transmission in neutral.

Start the engine with the throttle in the idle position.

Engines equipped with air starters require a minimum of 480 kPa [70 psi] compressed air pressure.

To prevent damage to the starter, do **not** engage the starting motor more than 30 seconds. Wait two (2) minutes between each attempt to start (electrical starting motors only).

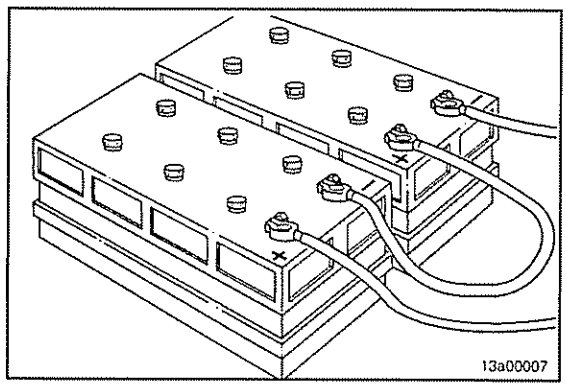




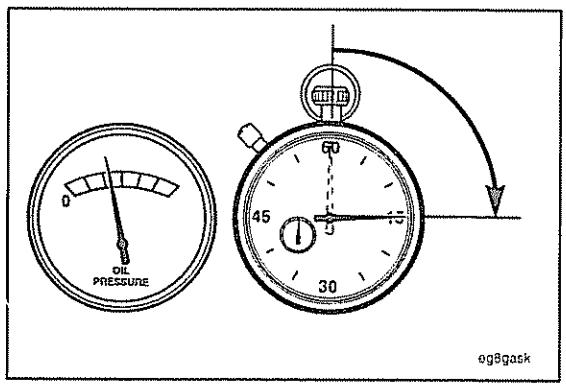
⚠ CAUTION ⚠

When using jumper cables to start the engine, be sure to connect the cables in parallel: positive (+) to positive (+) and negative (-) to negative (-). When using an external electrical source to start the engine, turn the disconnect switch to the OFF position. Remove the key before attaching the jumper cables.

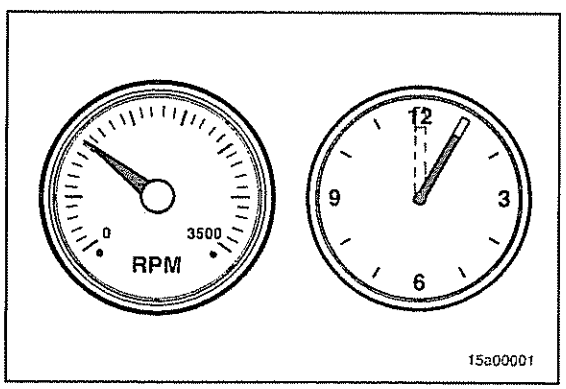
The accompanying illustration shows a typical parallel battery connection. This arrangement doubles the cranking amperage.



This illustration shows a typical series battery connection. This arrangement, positive to negative, doubles the voltage.

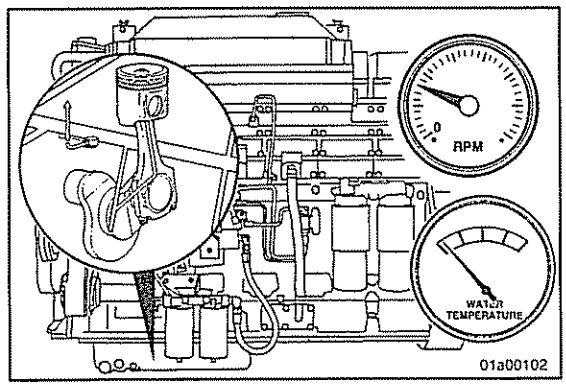


Engine oil pressure **must** be indicated on the gauge within 15 seconds after starting. If oil pressure is **not** registered within 15 seconds, shut off the engine immediately to avoid engine damage. Confirm the correct oil level in the oil pan.

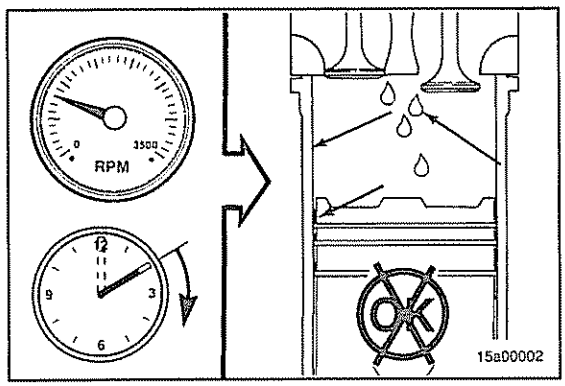


Idle the engine three (3) to five (5) minutes at approximately 1000 rpm before operating with a load.

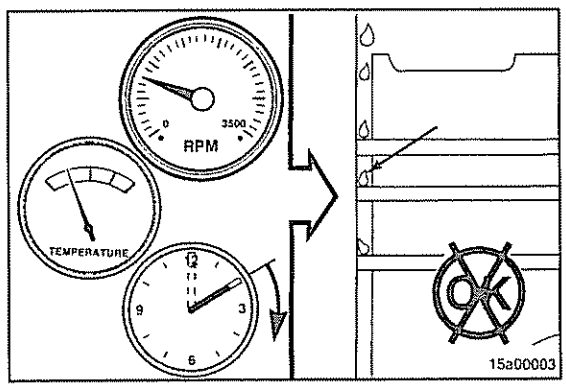
When starting a cold engine, increase the engine speed (rpm) slowly to provide adequate lubrication to the bearings, and to allow the oil pressure to stabilize.



Do **not** idle the engine for excessively long periods. Long periods of idling, more than 10 minutes, can damage an engine because combustion chamber temperatures drop so low the fuel will **not** burn completely. This will cause carbon to clog the injector spray holes and piston rings, and can cause the valves to stick.



If the engine coolant temperature drops to 60°C [140°F] or below, raw fuel will wash the lubricating oil off the cylinder walls and dilute the crankcase oil. Moving parts in the engine will **not** receive the correct amount of lubrication, causing engine damage.



Cold Weather Starting Aids

Operating Aids

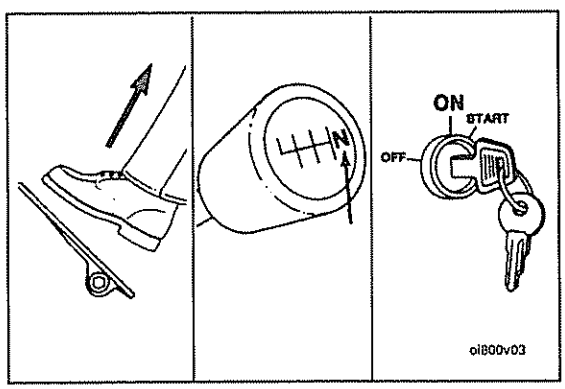
⚠ CAUTION ⚠

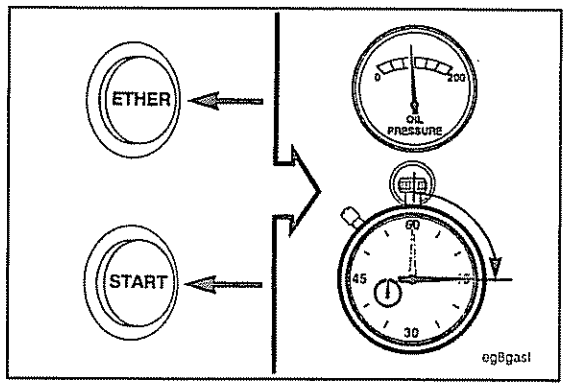
Do not use starting fluid if using grid heaters. This can cause an intake manifold explosion.

Set the throttle at idle.

Disengage the driven unit, or if equipped, put the transmission in neutral.

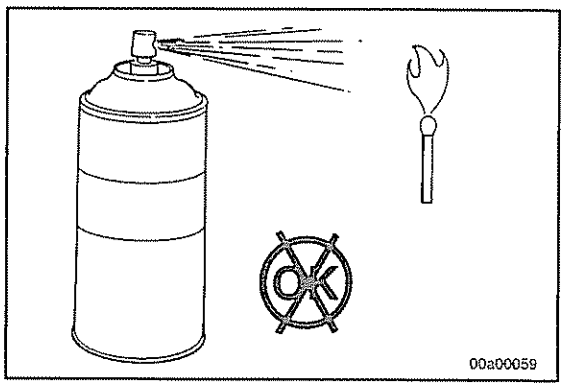
Activate the switch to open the fuel pump shutoff valve.





While cranking the engine, inject a metered amount of starting fluid.

Engine oil pressure **must** be indicated on the gauge within 15 seconds after starting.



Ether Starting Aids

⚠ WARNING ⚠

Starting fluid contains ether and is extremely flammable. Misuse or mishandling can cause an explosion. Never handle starting fluid near an open flame. Never use starting fluid with a preheater, glow plug, flame thrower or other type of electrical starting equipment. Do not breathe the fumes as serious injury to the human respiratory system will result. Do not use volatile cold starting aids in underground mine or tunnel operations due to the potential of an explosion. Check with the local U.S. Bureau of Mines Inspector for instructions.

⚠ CAUTION ⚠

Do not use excessive amounts of starting fluid when starting an engine. Too much starting fluid will cause engine damage.

Due to increased safety hazards and potential for engine damage, Cummins does **not** recommend the use of starting fluid without metering equipment.

Satisfactory performance of a diesel engine operating in low ambient temperature conditions requires modification of the engine, surrounding equipment, operating practices and maintenance procedures. The colder the temperatures encountered, the greater the amount of modification required and yet with the modifications applied, the engines **must** still be capable of operation in warmer climates without extensive changes. The following information is provided to engine owners, operators and maintenance personnel on how the modifications can be applied to get satisfactory performance from their diesel engines.

There are three basic objectives to be accomplished:

1. Reasonable starting characteristics followed by practical and dependable warm-up of the engine and equipment.
2. A unit or installation which is as independent as possible from external influences.
3. Modifications which maintain satisfactory operating temperatures with a minimum increase in maintenance of the equipment and accessories.

If satisfactory engine temperature is **not** maintained, higher maintenance cost will result due to the increased engine wear, poor performance and formation of excessive carbon, varnish and other deposits. Special provisions to overcome low temperatures are definitely necessary, whereas a change to warmer climate normally requires only a minimum of revision. Most of the accessories will be designed in such a way that they can be disconnected so there is little effect on the engine when they are **not** in use.

The two most commonly used terms associated with preparation of equipment for low temperature operation are **Winterization** and **Arctic Specifications**.

Winterization means preparation of the engine and components for operation in the lowest temperature to be encountered. **Winterization** requires:

1. Use of correct materials.
2. Proper lubrication, low temperature lubricating oils. Refer to the Lubricating Oil and Recommendations Specifications, Section V, in this manual.
3. Protection from the low temperature air. The metal temperature does **not** change, but the rate of heat dissipation is affected.
4. Fuel of the proper grade for the lowest temperature.
5. Heating to be provided to increase the engine block and component temperature to a minimum of -32°C [-25°F] for starting in lower temperatures.
6. Proper external heating source available.
7. Electrical equipment capable of operating in the lowest expected temperature.

Arctic specifications refer to the design material and specifications of the components necessary for satisfactory engine operation in extreme low temperatures -54°C [-65°F]. Contact Cummins Engine Company, Inc. or the equipment manufacturer to obtain the special items required.

For additional information on cold weather operation, obtain Service Bulletin No. 3379009, Engine Operation in Cold Weather, from the nearest Cummins Distributor or dealer.

It is possible to operate diesel engines in extremely cold environments if they are properly prepared and maintained. The correct lubricants, fuels and coolant **must** be used for the cold weather range for which the vehicle is being operated. Refer to the chart below for recommendations in different operating ranges.

Winterize 0° to -23°C [32° to -10°F]	**Winterize -23° to -32°C [-10° to -25°F]**	**Artic Specifications -32° to -54°C [-25° to -65°F]**
Use ethylene glycol antifreeze to protect to -29°C [-20°F].	Use 50 percent ethylene glycol antifreeze, 50 percent water mixture.	Use 60 percent ethylene glycol antifreeze, 40 percent water mixture.
Use multi-viscosity oils. Refer to Section V for lubricating oil recommendations.	Use multi-viscosity oil. Refer to Section V for lubricating oil recommendations.	Use Artic oil. Refer to Section V for lubricating oil recommendations.
Fuel to have maximum cloud and pour points 6°C [10°F] lower than ambient temperature in which engine operates.	Fuel to have maximum cloud and pour points 6°C [10°F] lower than ambient temperatures in which engine operates.	Fuel to have maximum cloud and pour points 6°C [10°F] lower than ambient temperature in which engine operates.

Cold weather operations may require some or all of the following aids:

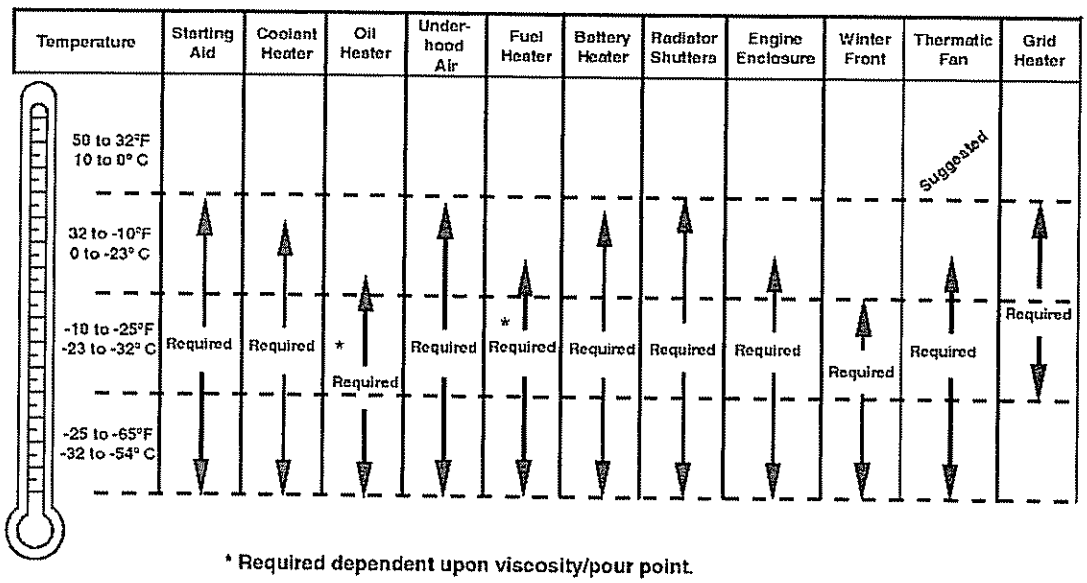
- Starting aid
- Coolant heater
- Oil heater
- Underhood air
- Fuel heater
- Battery heater
- Radiator shutters
- Engine enclosure
- Winter front
- Thermatic fan
- Grid heaters

⚠ WARNING ⚠

NEVER use starting fluid if the grid heater option is used. Use of starting fluid, which contains ether, can cause an explosion, resulting in personal injury and damage to the engine.

The chart below shows the temperature range in which each operating aid is required.

Cold Weather Operating Aids



* Required dependent upon viscosity/pour point.

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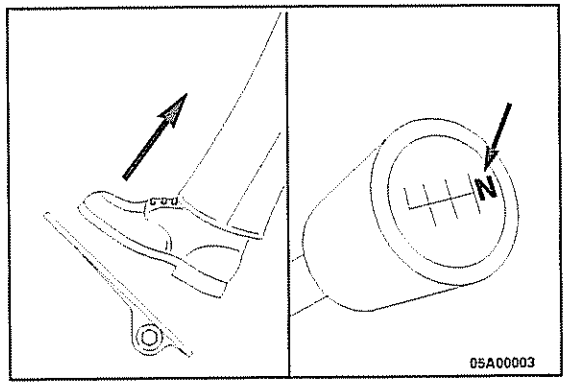
Grid Heater

When using a grid heater:

- set the throttle to the 'IDLE' position
- set the transmission in 'NEUTRAL' or disengage the drive unit
- set the fuel control in the 'ON' position

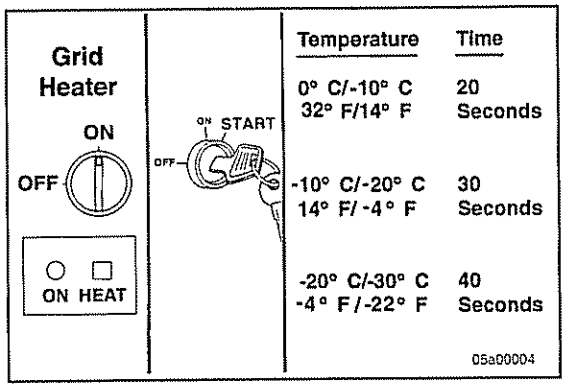


⚠ WARNING ⚠

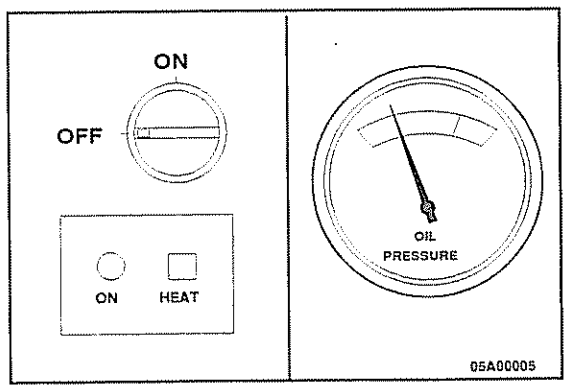
Starting fluid contains ether and is extremely flammable. Misuse or mishandling can cause an explosion. Never handle starting fluid near an open flame. Never use starting fluid with a preheater, glow plug, flame thrower or other type of electrical starting equipment. Do not breathe the fumes as serious injury to the human respiratory system will result. Fuel oil or volatile fuel cold starting aids are not to be used in underground mine or tunnel operations.

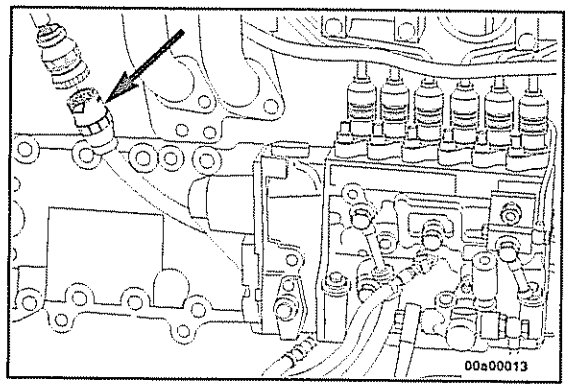
- turn the preheater switch to 'ON' (automatic optional)
- crank the engine when the monitor indicates the heating is complete

The grid heating cycle time will vary with the ambient temperature.



After the engine starts, turn the preheater to the 'OFF' position and allow the engine to idle. The engine oil pressure **must** be indicated on the gauge.





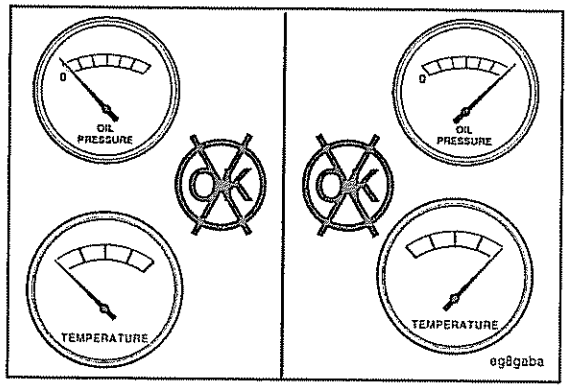
Starting Procedure After Extended Shutdown or Oil Change

General Information

NOTE: This step is not required for engines equipped with a prelubricating starter system.

Complete the following steps after each oil change, or after the engine has been shut off for more than five (5) days to make sure the engine receives the correct oil flow through the lubricating oil system:

- Disconnect the multi-pin cable from the fuel pumps.
- Rotate the crankshaft, using the starting motor, until oil pressure appears on the gauge or the warning light goes out.
- Connect the multi-pin cable to the fuel pumps.
- Start the engine. Refer to Normal Starting Procedures within this section.

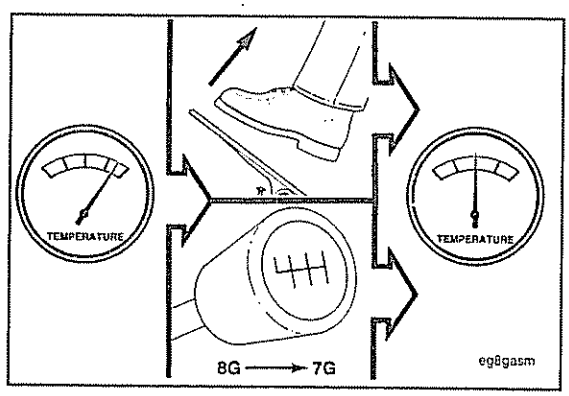


Operating the Engine

General Information

NOTE: Continuous operation with low coolant temperature, below 60°C [140°F], or high coolant temperature, above 100°C [212°F], can damage the engine.

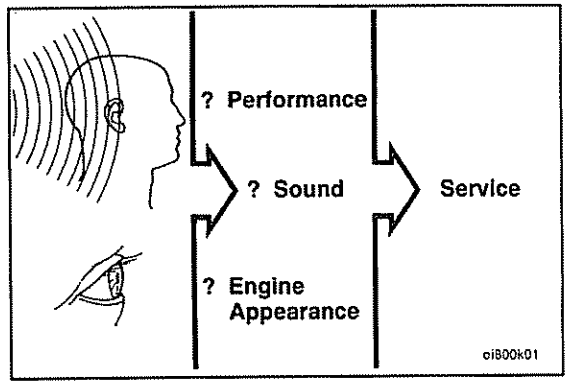
Monitor the oil pressure and coolant temperature gauges frequently. Refer to Lubricating Oil Recommendations and Specifications or Cooling Recommendations and Specifications, Section V, for recommended operating pressures and temperatures. Shut off the engine if any pressure or temperature does **not** meet the specifications.



If an overheating condition starts to occur, reduce the power output of the engine by releasing the throttle pressure or shifting the transmission to a lower gear or both until the temperature returns to normal operating range. If the engine temperature does **not** return to normal, shut off the engine and refer to the Troubleshooting Section, Section T, or contact a Cummins Authorized Repair Location.

Most failures give an early warning. Look and listen for changes in performance, sound or engine appearance that can indicate service or engine repair is needed. Some changes to look for are as follows:

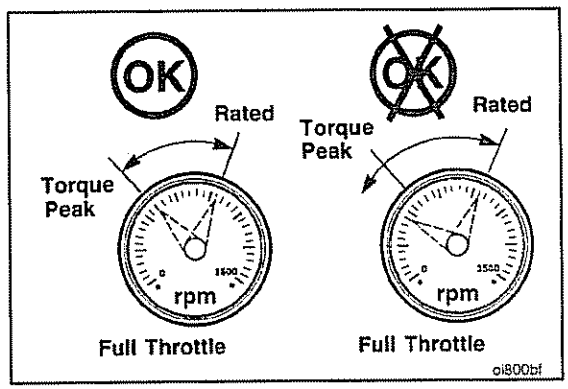
- Engine misfires
- Vibration
- Unusual engine noises
- Sudden changes in engine operating temperature or pressure
- Excessive smoke
- Loss of power
- An increase in oil consumption
- An increase in fuel consumption
- Fuel, oil or coolant leaks



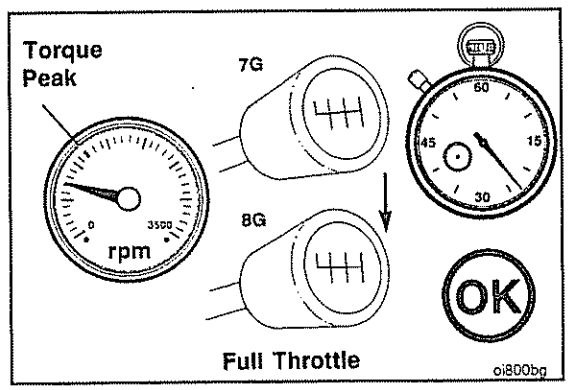
Engine Operating Range

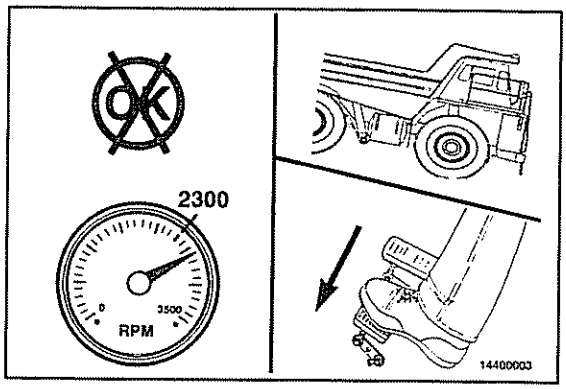
General Information

Excessive full throttle operation below peak torque rpm (lugging) will shorten engine life to overhaul, can cause serious engine damage and is considered engine abuse. Cummins engines are designed to operate successfully at full throttle under transient conditions down to peak torque engine speed.



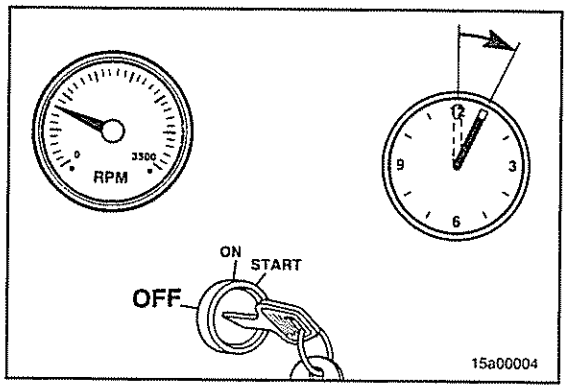
Operation of the engine below peak torque rpm can occur during gear shifting due to the difference of ratios between transmission gears, but the engine operation **must not** be sustained more than 30 seconds at full throttle below peak torque rpm.





⚠ CAUTION ⚠

Operating the engine beyond high idle speed can cause severe engine damage. The engine speed must not exceed 2,400 rpm under any circumstances. When descending a steep grade, use a combination of transmission gears and vehicle braking systems to control the vehicle and engine speed.



Engine Shutdown

General Information

Allow the engine to idle three (3) to five (5) minutes after a full load operation before shutting it off. This allows the engine to cool gradually and uniformly.

Turn the ignition key switch to the 'OFF' position.

Electronic Controlled Fuel System

Quantum System Description

G-Drive Engines

The QST fuel system is an electronic engine control system designed to optimize engine control and reduce exhaust emissions. This system consists of two in-line fuel injection pumps (one for each engine bank) controlled by one electronic control module (ECM). The QST fuel system controls engine fueling by placing the fuel pump racks in the correct position for the desired fueling.

Industrial Engines

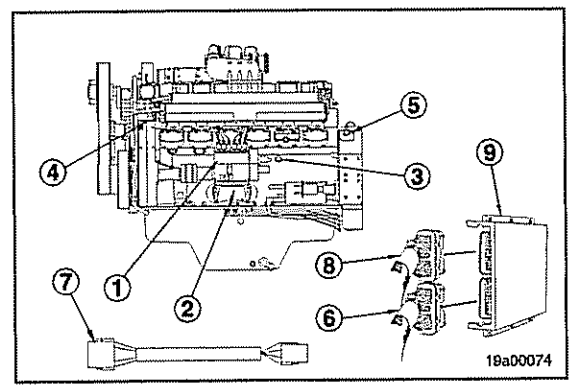
The QST fuel system is an electronic control system designed to optimize engine control and reduce emissions. This system consists of two in-line fuel injection pumps (one for each engine bank) and two electronic control modules (ECM). These modules work in a master/slave arrangement; the left bank module being the master and the right bank module the slave. The master module controls fueling and timing for the left bank pump, and also commands the slave module how to control the right bank fuel pump. These controls and commands are based on sensor input.

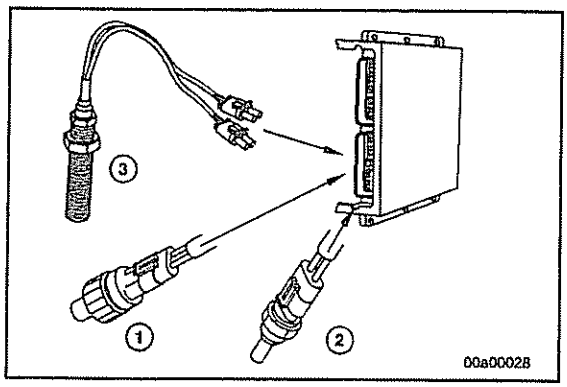
Quantum System Components

G-Drive QST System

The QST system on a G-Drive engine consists of:

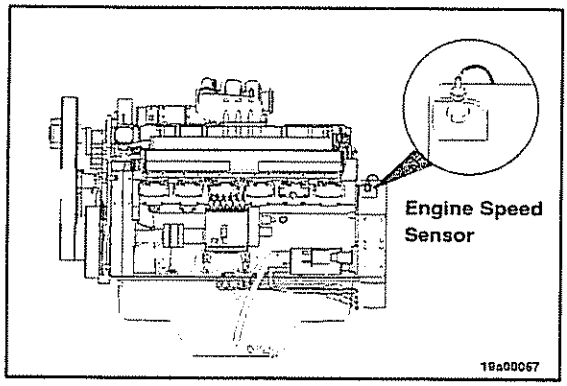
1. Fuel Pumps (2)
2. Fuel Shut Off Valves (2)
3. Oil Pressure Sensor
4. Coolant Temperature Sensor
5. Engine Speed Sensor
6. Engine Harness
7. Engine Harness Adaptor Cable
8. OEM Harness
9. Electronic Control Module (ECM)



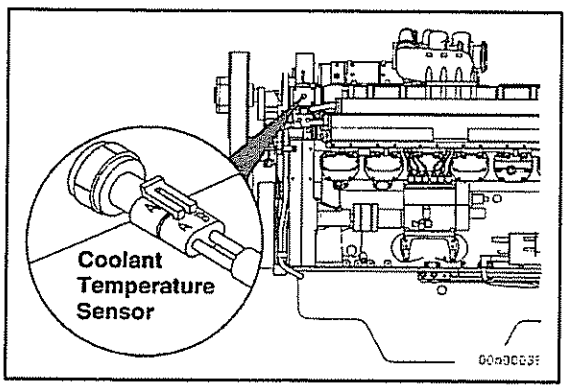


ECM Inputs

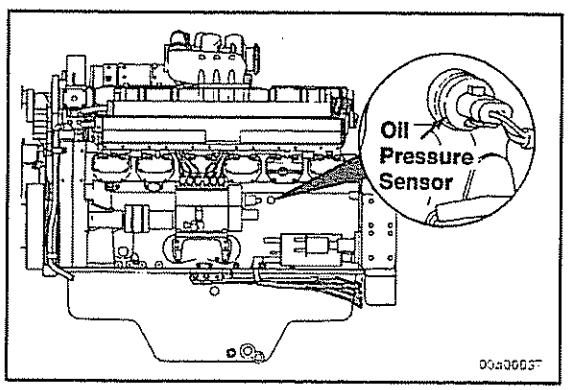
1. Oil Pressure Sensor
2. Coolant Temperature Sensor
3. Engine Speed Sensor



The engine speed sensor provides engine speed information. The sensor is located in the flywheel housing.



The engine coolant temperature sensor sends signals to the ECM for the engine protection system. The coolant temperature sensor is located in the upper casing of the thermostat housing.

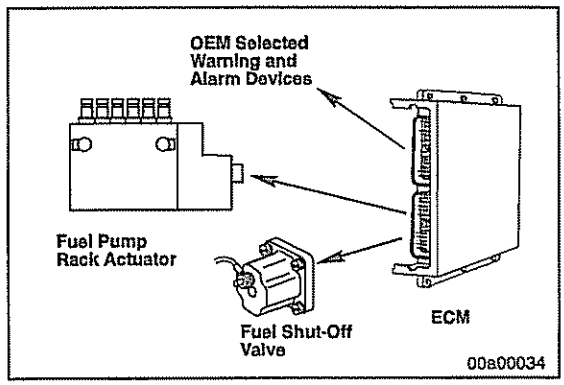


The oil pressure sensor sends signals to the ECM for the engine protection system. The sensor is on the left bank side of the engine block behind the fuel pump.

ECM Outputs

The ECM processes all of the input data and then controls these output parts:

- — Fuel Shut Off Valves
- — Common Warning Circuit
- — Common Alarm circuit
- — Fuel Pump Rack Actuator
- — Relay Drivers
- — Meter Drivers

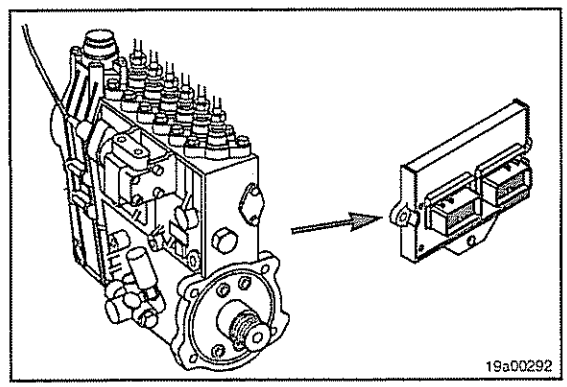


Industrial QST System

The QST Fuel System on an industrial engine consists of two RP39 fuel injection pumps, the fuel injectors, the fuel shut off valves (part of the EHAB, which is integral to to RP39 fuel pump), two ECMs, the wiring harnesses, and sensors which provide input to the ECM.

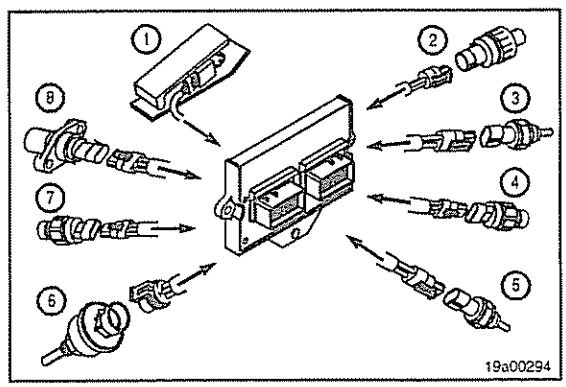
The QST30 industrial fuel system uses Bosch RP39 fuel pumps. These pumps contain actuators that control the timing sleeves and fueling racks. Varying the current supply to these actuators via the ECM allows the QST30 fuel system to regulate engine timing and fuel metering. The ECM supply current is based on various sensor inputs it receives.

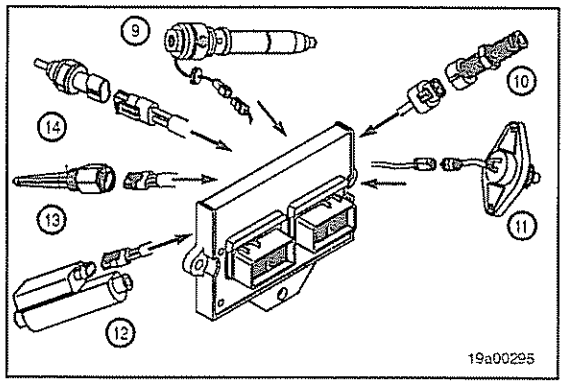
The ECM processes the information it receives from the sensors and controls the opening and closing of the actuators. This action controls timing and fuel metering and then produces the correct horsepower and torque for the latest engine condition.



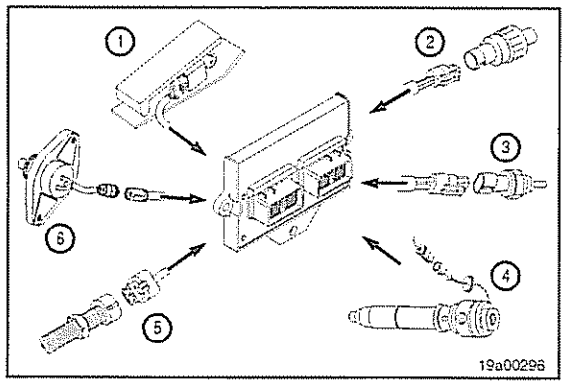
ECM Sensor Inputs

1. Throttle Position Sensor
2. Intake Manifold Pressure Sensor
3. Intake Manifold Temperature Sensor
4. Oil Pressure Sensor
5. Coolant Temperature Sensor
6. Coolant Level Sensor
7. Coolant Pressure Sensor
8. Ambient Air Pressure Sensor



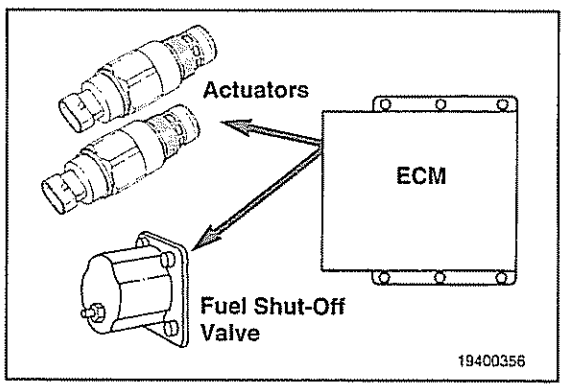


9. Needle Movement (#1 Injector) Sensor (right and left bank)
10. Engine Speed Sensor
11. Engine Position Sensor
12. Optional: Crankcase Blowby Flow Sensor
13. Optional: Oil Level Sensor
14. Optional: Oil Temperature Sensor



Slave ECM Inputs

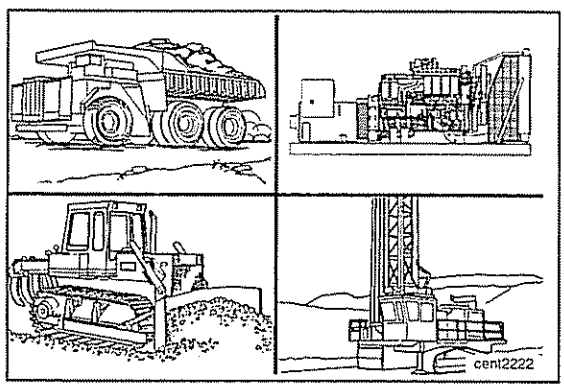
1. Throttle Position Sensor
2. Intake Manifold Pressure Sensor
3. Intake Manifold Temperature Sensor
4. Needle Movement Sensor
5. Engine Speed Sensor
6. Engine Position Sensor



ECM Outputs

The ECM processes all of the input data and then controls these output parts:

- Rack Position Actuator (integral to the RP39 fuel pump)
- Sleeve Position Activator (integral to the RP39 fuel pump)
- Fuel Shutoff Valve



Programmable Features

The QST fuel system has been designed to be flexible to support a wide variety of engine control requirements for off-highway equipment. The electronic control module (ECM) can be programmed to support specific applications.

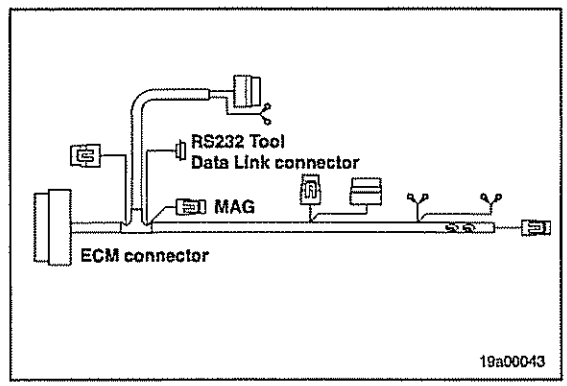
G-Drive Engines

The following section describes the programmable features available on QST30 G-Drive applications. These features are different, in many cases, from the features offered on industrial applications.

Diagnostic Mode—G-Drive

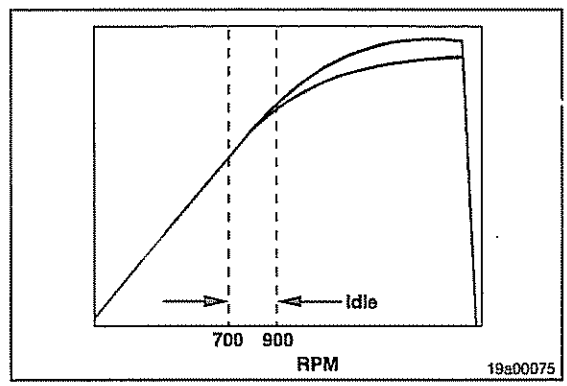
Adjusting the QST30 G-Drive programmable features described below requires the INSITE™ service tool, Part No. 3825145. The ECM must be in diagnostic mode to perform these adjustments.

Enter the diagnostic mode by removing the diagnostic connector shorting cap from the engine harness.



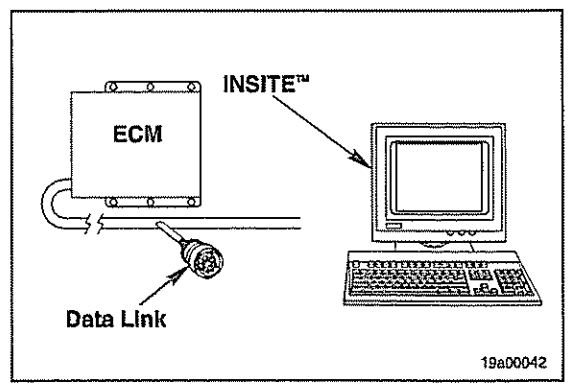
Idle Speed—G-Drive

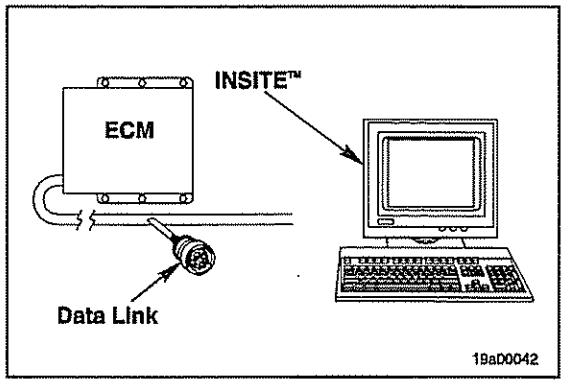
The Idle Speed feature allows the engine idle speed to be adjusted between 700 rpm and 900 rpm.



Governor Gain Adjust—G-Drive

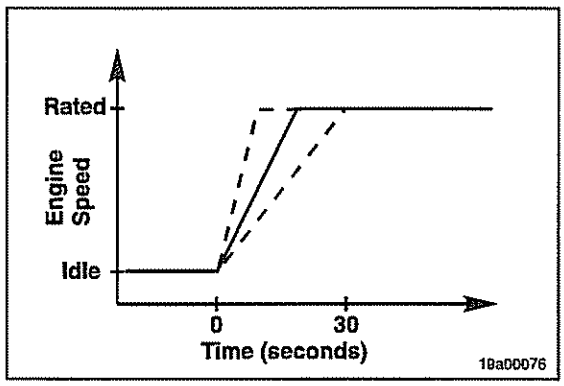
This feature allows the governor gain to be adjusted for optimum engine performance. Adjust the gain at rated speed. The idle speed gain is then automatically calculated from the rated speed gain.





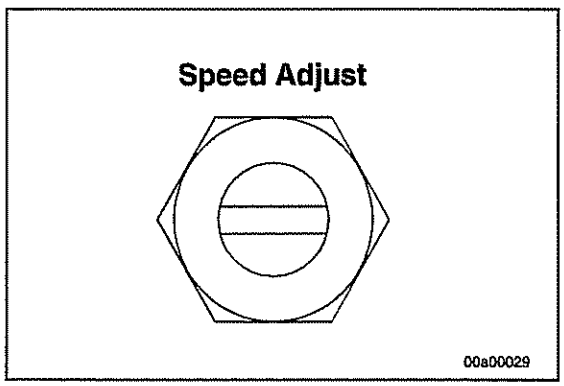
Speed Bias Input Type—G-Drive

This feature allows the ECM to be configured to either Woodward or Barber-Colman speed bias inputs.



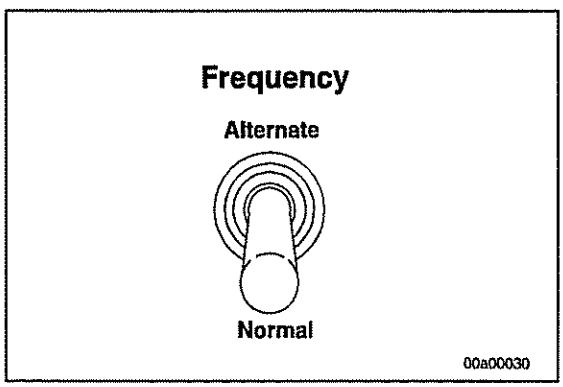
Ramp Time—G-Drive

This feature allows the acceleration ramp time to be adjusted from 0 to 30. The acceleration ramp time is the amount of time it takes for the engine speed to accelerate from idle to rated speed or from crank to rated speed. For actual ramp time, refer to the table of ramp times in Bulletin No. 3666196, INSITE™ G-Drive User's Manual (QST30).



Speed Adjust Knob—G-Drive

The Speed Adjust Knob allows the adjustment of rated engine speed by ±6 percent using a potentiometer with a range of 500 to 5000 ohms. This ECM input can be enabled with INSITE™.



Alternate Frequency Switch—G-Drive

The Alternate Frequency switch settings can be configured using INSITE™. The switch options are:

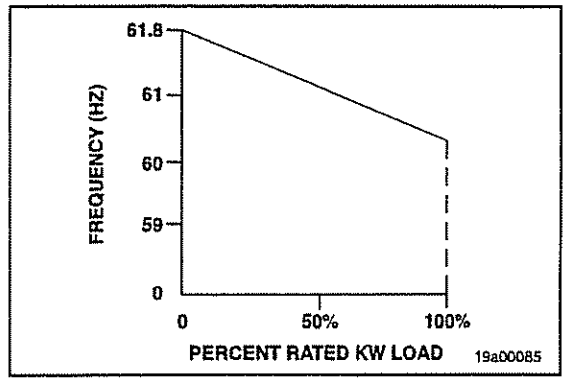
1. Normal = 50 Hz; Alternate = 60 Hz
2. Normal = 60 Hz; Alternate = 50 Hz
3. Always 50 Hz
4. Always 60 Hz

To change frequencies, the engine **must** first be shutdown or brought to idle, then back to rated speed.

Governor Droop—G-Drive

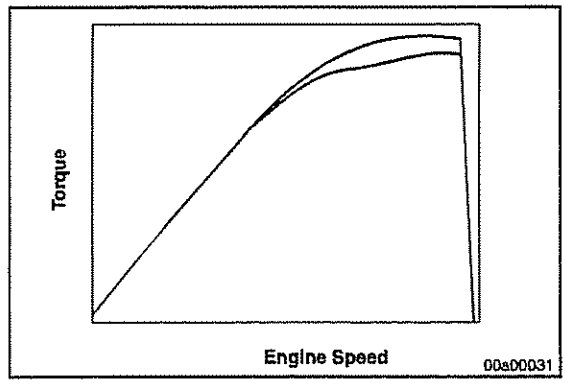
The Governor Droop feature allows the engine speed governor droop to be adjusted from 0 to 10 percent.

Speed Droop (%) = [(no load speed - full load speed)/full load speed] x 100



Torque Curve Adjustment—G-Drive

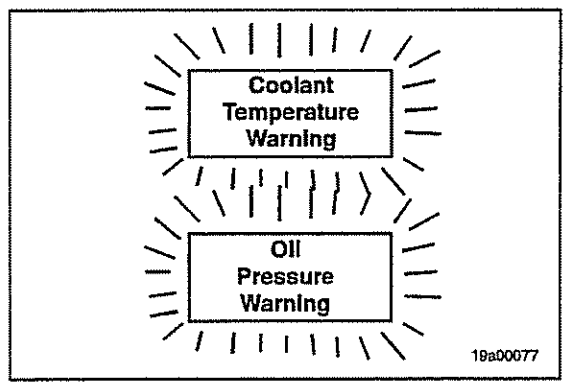
The Torque Curve Adjustment feature allows the torque curve to be adjusted slightly in order to fine tune the engine output power with alternator input requirements.



Warning Threshold Adjustment—G-Drive

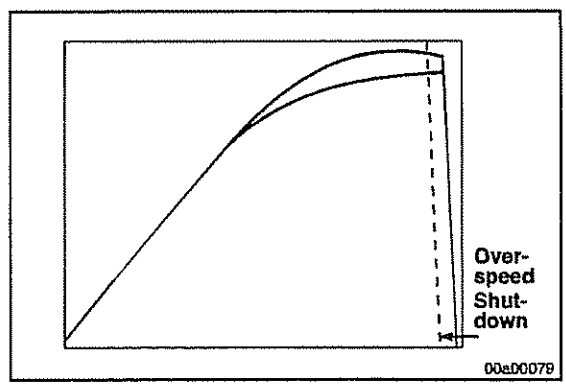
Warning thresholds are engine parameter values at which the ECM will record and report a warning fault condition. The following warning thresholds are adjustable using INSITE™:

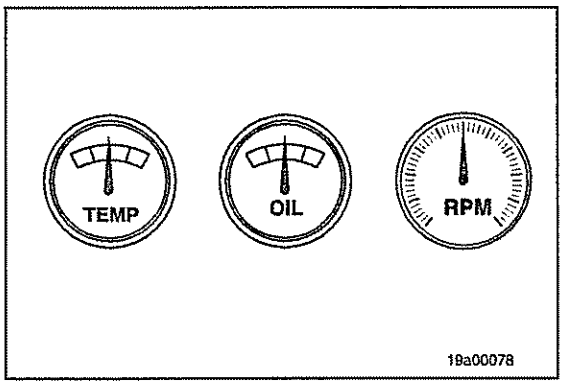
1. High coolant temperature warning
2. Low oil pressure warning at idle
3. Low oil pressure warning at rated rpm



Overspeed Shutdown Adjustment—G-Drive

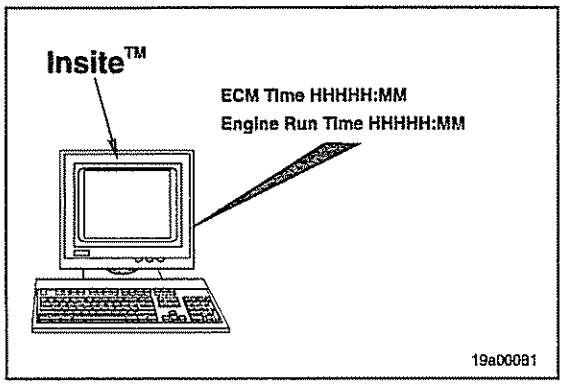
The Overspeed Shutdown Threshold is the engine speed value at which the ECM will shut off fueling to the engine. This value can be adjusted down from the factory default value.





Meter Calibration—G-Drive

The Meter Calibration feature allows the generator OEM installed meters for engine speed, coolant temperature and oil pressure to be calibrated to the ECM meter drivers (0 to 1 mA).

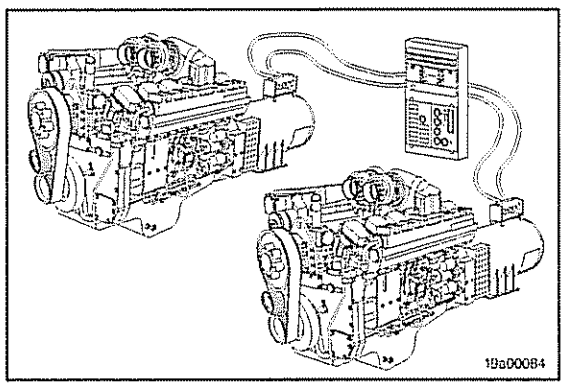


ECM Time and Engine Run Time—G-Drive

ECM Time is the amount of time the ECM has been powered up (run mode or diagnostic mode), expressed in Hours:Minutes.

Engine Run Time is the amount of time the engine has been running (rpm > 0), expressed in Hours:Minutes.

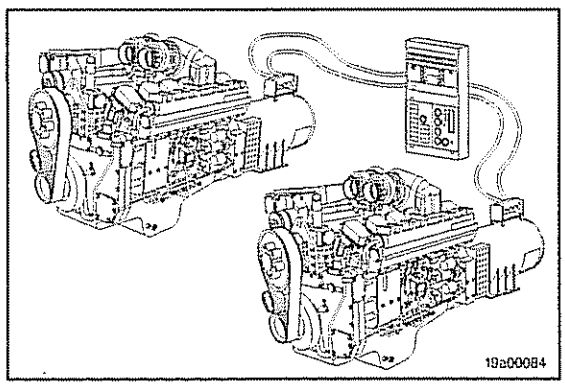
Both of these values can be displayed using INSITE™.



Barber-Colman Scale Factor—G-Drive

The Barber-Colman Scale Factor allows the ECM to be adjusted for optimum paralleling operation with Barber-Colman paralleling equipment.

NOTE: Do **not** adjust this parameter unless absolutely necessary.



Woodward Scale Factor—G-Drive

The Woodward Scale Factor allows the ECM to be adjusted for optimum paralleling operation with Woodward paralleling equipment.

NOTE: Do **not** adjust this parameter unless absolutely necessary.

Industrial

The following section describes the programmable features available on QST30 industrial engines. These features are different, in many cases, from the features offered on generator set applications.

Adjusting the QST30 G-Drive programmable features described below requires the INSITE™ service tool, Part No. 3162261. The ECM must be in diagnostic mode to perform these adjustments.

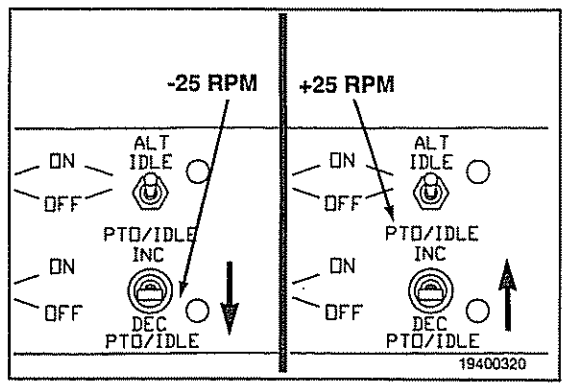
Enter the diagnostic mode by removing the diagnostic connector shorting cap from the engine harness.

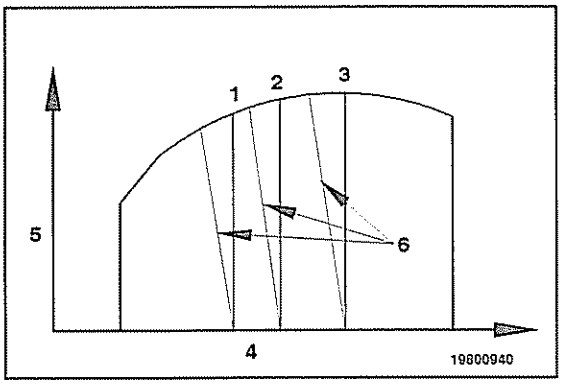
Governor Type-Industrial Applications

The QST30 offers a choice of engine governors. The automotive governor provides a calibrated fueling for a given throttle position (engine speed varies with load). The variable speed governor maintains a constant engine speed for a given throttle position under varying load conditions. Governor type can be selected by using the INSITE™.

Low Idle Adjustment-Industrial Applications

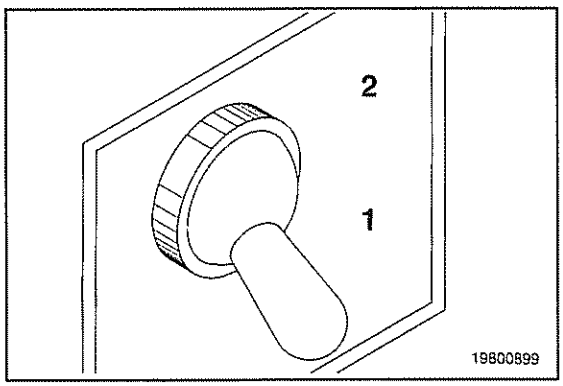
This feature allows the idle or intermediate speed control 1 (ISC1) speed to be increased or decreased in 25 rpm increments through an operator controlled switch. This switch can be disabled using INSITE™. If this feature is turned off, the low idle speed can still be adjusted using INSITE™.



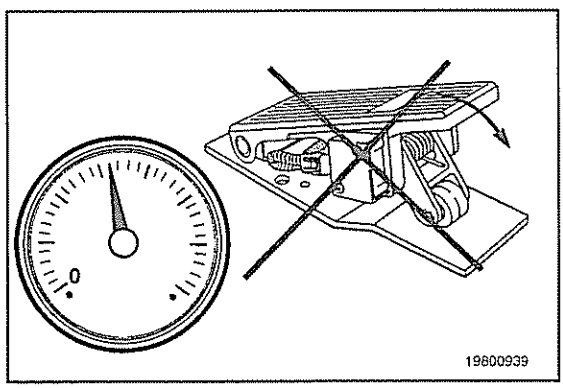


Intermediate Speed Control (ISC)-Industrial Applications

The ISC feature controls the engine at a constant engine rpm. Up to 3 different ISC set speeds (1, 2, 3) can be selected depending on OEM availability. (4 = engine speed, 5 = torque, 6 = droop)

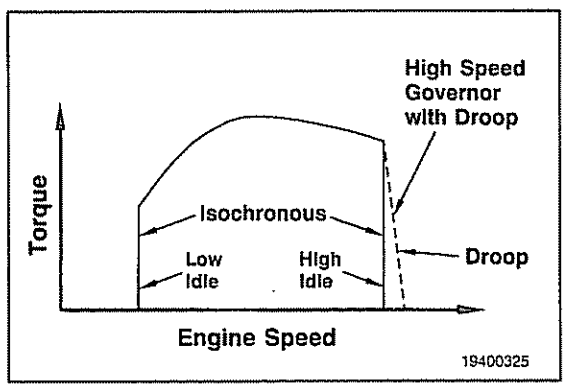


The ISC feature, depending on OEM availability, provides the ability to select an ISC set speed by way of an OEM provided switch. (1 = OFF, 2 = ON)



This feature will override the throttle and control the engine speed to the ISC setting.

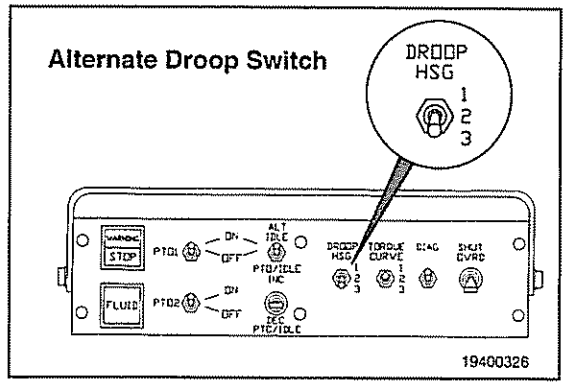
The ISC can be enabled or disabled by an electronic service tool.



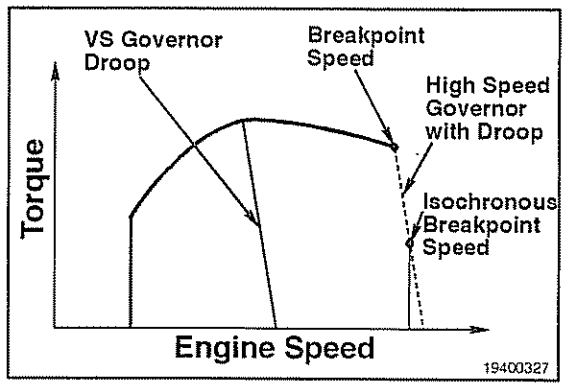
Alternate Droop-Industrial Applications

The Alternate Droop feature allows the Droop characteristics to be changed for the High Speed Governor (HSG) and for the VS Governor. Droop is usually expressed as a percentage. This graph illustrates the isochronous (0 percent droop) and droop (more than 0 percent droop) governor characteristics. Less governor droop provides a more responsive governor for more precise engine control. More Governor droop provides smoother shifting and smoother mechanical clutch engagement.

The alternate droop feature, depending on OEM availability, provides the ability to select up to two additional alternate droop settings by way of an OEM provided switch.

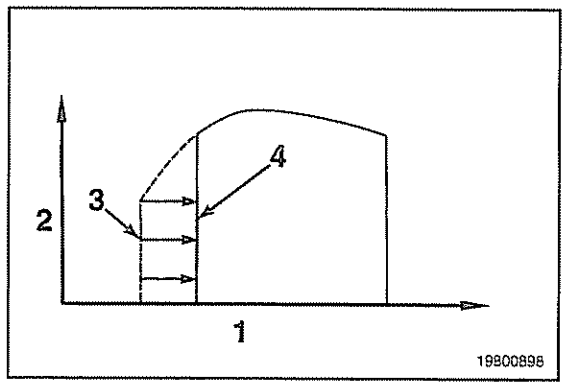


Each alternate droop setting provides the ability to select the break point speed and droop percent for the HSG and droop percent for VS Governor. The break point speed determines at what position on the engine torque curve where HSG will start to limit engine torque output.

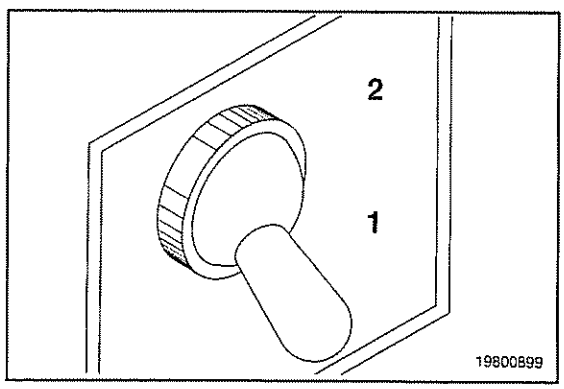


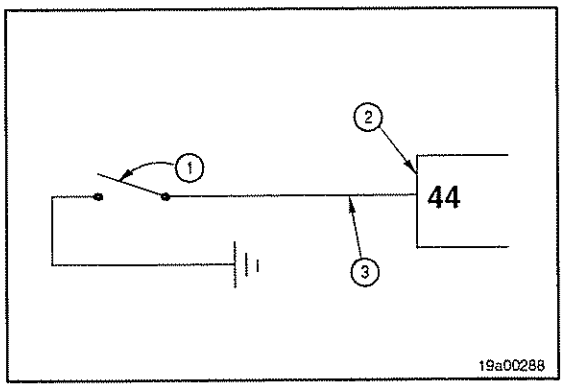
Alternate Low Idle Control-Industrial Applications

This feature allows the operator to switch between the low idle speed setting (3) and an alternate low idle speed setting (4). (1 = engine speed, 2 = torque)

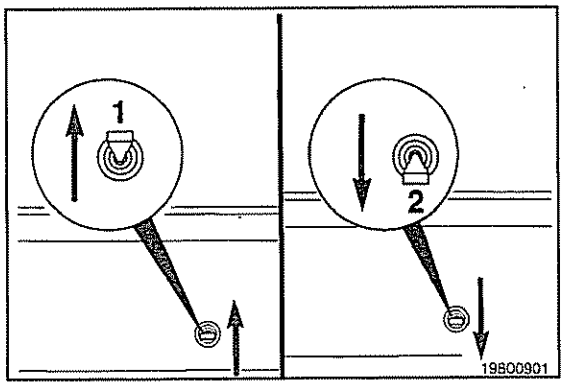


The alternate low idle speed control feature provides depending on OEM availability the ability to select an alternate idle speed by way of an OEM provided switch. (1 = OFF, 2 = ON)

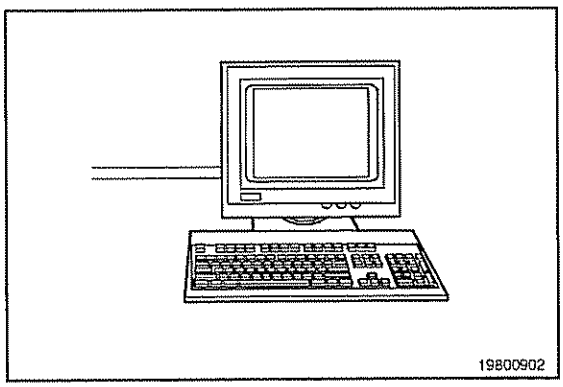




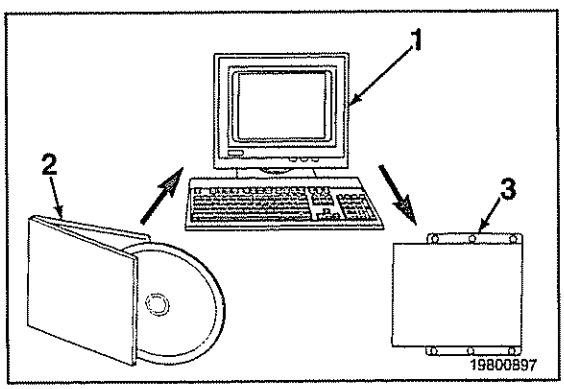
The alternate low idle feature is activated whenever the normally open alternate low idle switch (1) is closed and 0 volts are detected by the ECM (2) on the alternate low idle signal line (3) on pin 44.



The alternate low idle speed can **not** be adjusted by the Idle/ISC increment (1) / decrement (2) switch.



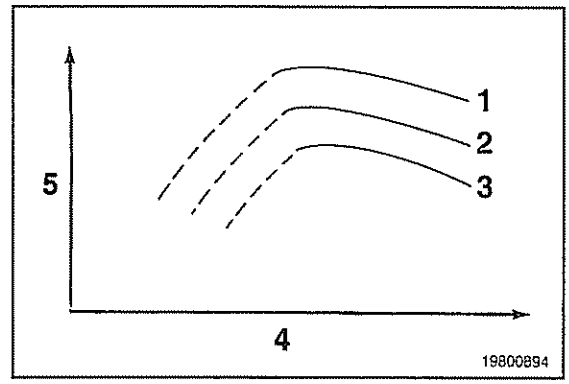
The alternate low idle speed can only be adjusted with an electronic service tool.



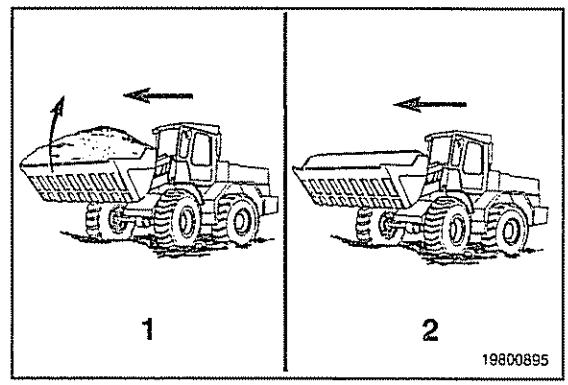
This feature can only be enabled or disabled by calibration. An electronic service tool (1) will be required to download a calibration (2) to the electronic control module (3). If this feature needs to be enabled or disabled.

Alternate Torque Control-Industrial Applications

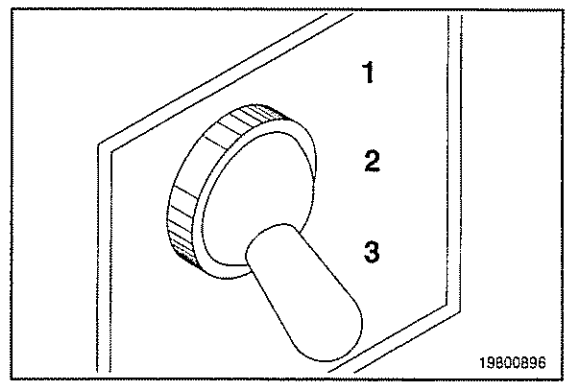
The Alternate Torque Control Feature allows the operator to switch between the 100 percent Throttle Torque Curve 1 and up to two derated torque curves 2 and 3. (4 = engine speed, 5 = torque)



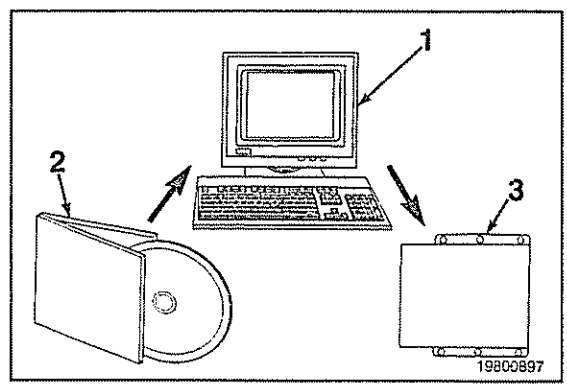
This feature improves operating efficiency in loaded (1) versus unloaded (2) conditions.

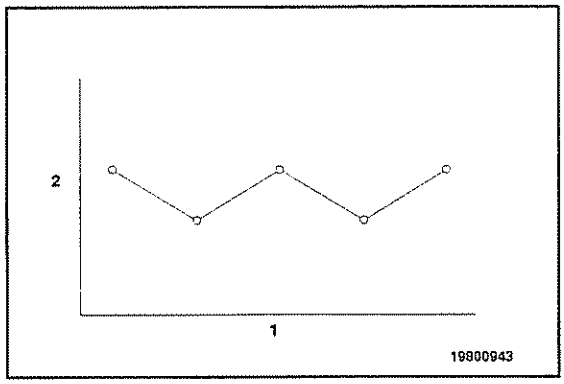


The alternate torque control feature, depending on OEM availability, provides the ability to select up to two additional derated torque curves by way of an OEM provided switch.



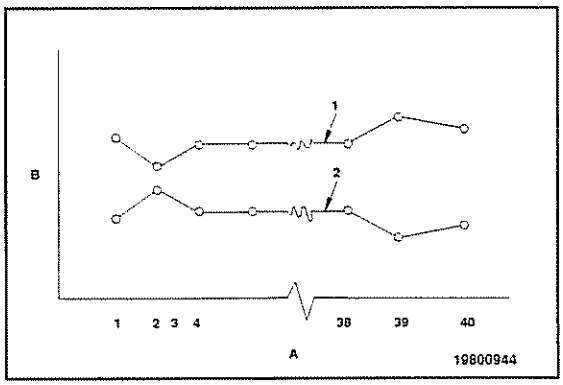
This feature can only be enabled or disabled by calibration. An electronic service tool (1) will be required to download a calibration to the electronic control module (3) if this feature needs to be enabled or disabled.





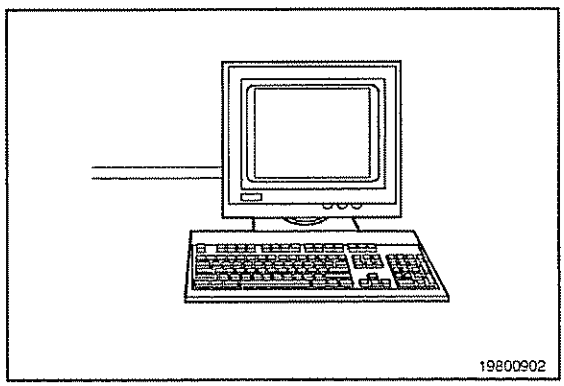
Fuel Consumption Rate-Industrial Applications

The Fuel Consumption Rate Feature allows an electronic service tool to access fuel consumption data. (1 = time, 2 = gallons/hour)



This feature provides two 40 hour fuel consumption periods (1 and 2). Each period records fuel consumption data in 40 one hour segments. These 40 data segments can be graphed to show fuel consumption over both 40 hour periods. (A = hours, B = gallons/hour)

NOTE: These time periods can be reset using INSITE™.

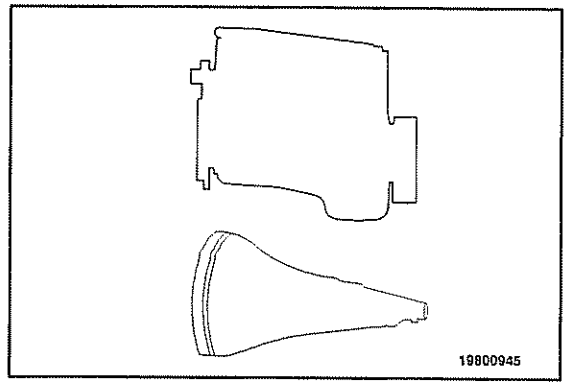


An instantaneous fuel consumption rate and a lifetime or running average fuel consumption rate are available on the monitor screen of an electronic service tool.

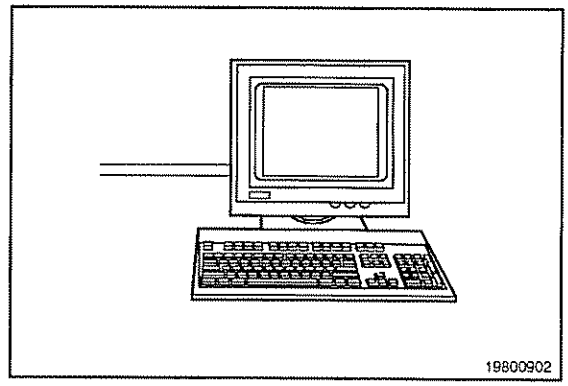
Dedicated PWM Output-Industrial Applications

This feature enables the engine to produce a Pulse Width Modulated (PWM) output signal which is proportional to either engine speed, engine torque, or throttle position.

The output signal is intended to be used to control an engine or transmission that rely on an analog signal input.

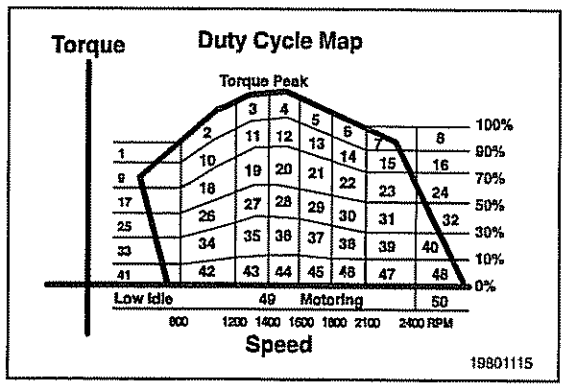


The output driver signal type and signal duty cycle can be monitored with an electronic service tool. The signal availability and type is **not** adjustable by an electronic service tool. This feature can only be enabled or disabled by a calibration, **not** an electronic service tool.

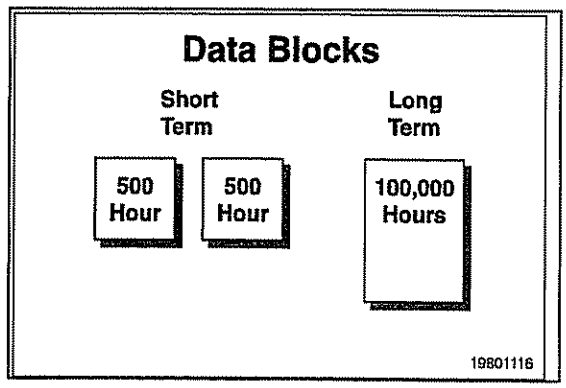


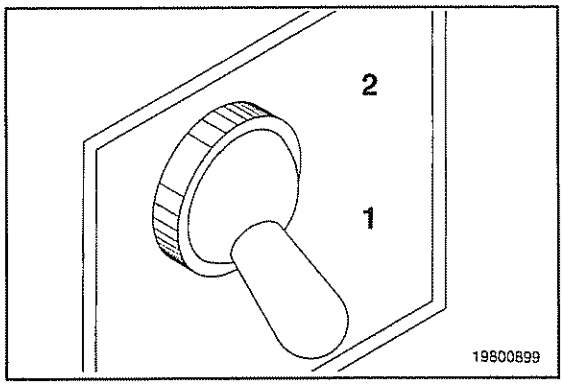
Duty Cycle Monitor-Industrial Applications

The duty cycle monitor tracks the time the engine spends in 50 different operating regions. These operating regions are based on engine speed and engine torque.



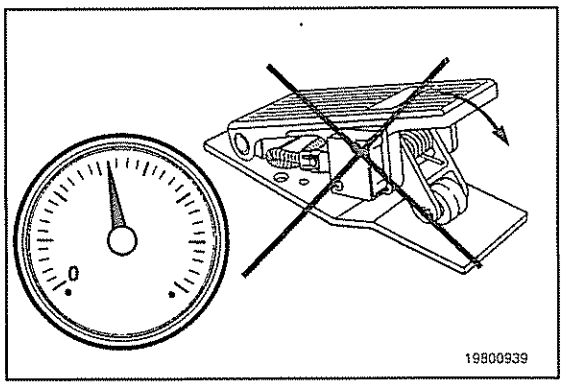
This feature provides two short term 500 hour resettable data blocks and one long term 100,000 hour non-resettable data block.



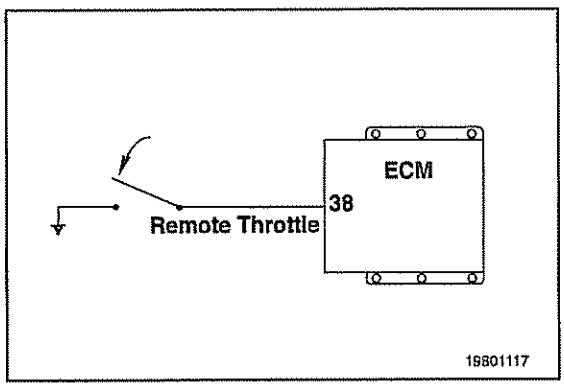


Remote Throttle-Industrial Applications

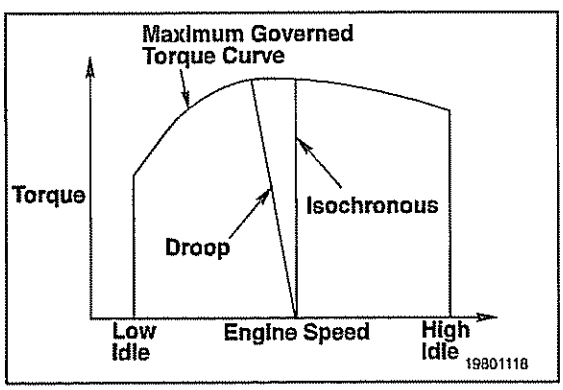
The remote throttle feature allows the operator to control the engine from a position other than the driver's seat. This feature is selected by the operator through an OEM mounted switch.



This feature will override the primary throttle control and control the engine speed to the remote throttle setting.

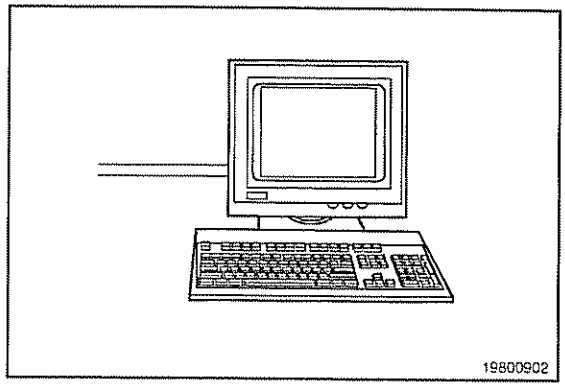


The remote throttle feature is activated whenever the normally open remote throttle select switch is closed and less than one volt is detected by the electronic control module.



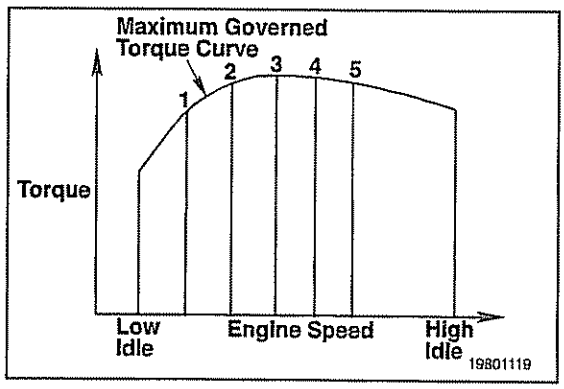
The remote throttle feature provides for droop adjustment. This droop adjustment is independent of all other selectable droops and is enforced during remote throttle operation only.

The remote throttle feature can be enabled, disabled, and adjusted by an electronic service tool.



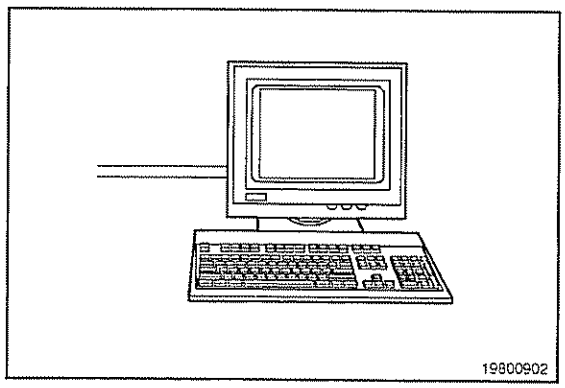
Switched Speed Input-Industrial Applications

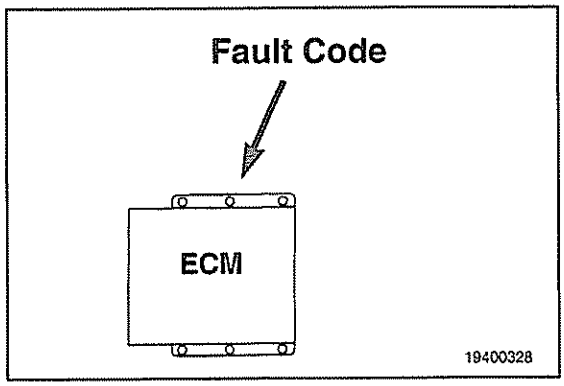
The switched speed input feature allows the remote throttle to be configured to operate as a switched input with up to five selectable set speeds.



The switched speed input feature allows for the adjustment of up to five set speeds by an electronic service tool. These set speeds are independent of all other set speeds.

The switched speed input feature can be enabled or disabled by an electronic service tool.



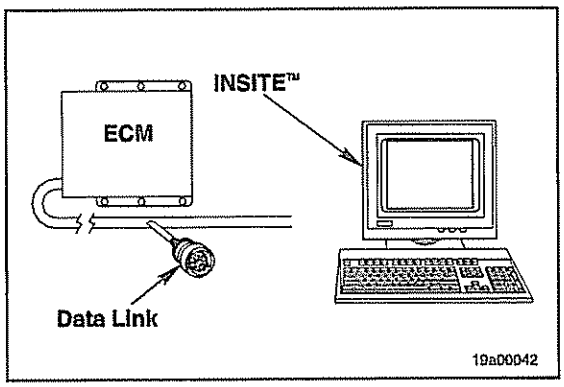


Diagnostic Fault Codes

The QST30 fuel system can record and display certain detectable fault conditions. These failures are displayed as fault codes to simplify troubleshooting efforts. The fault codes are stored in the Electronic Control Module (ECM) and can be viewed either with an INSITE™ service tool or on the control panel of a G-Drive, depending on your application. A fault code summary is also available on the G-Drive wiring diagram, Bulletin No. 3666185.

There are two types of fault codes. There are engine electronic fuel system fault codes and engine protection system fault codes.

All fault codes recorded will either be active (fault code is presently active on the engine) or inactive (fault code was active at some previous time, but is not presently active).

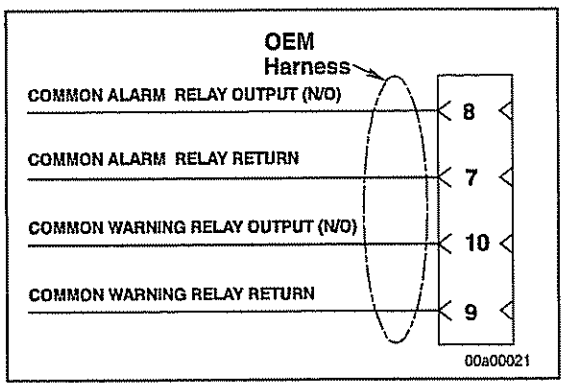


Inactive fault codes can **only** be viewed using INSITE™.

To read the fault codes, the ECM must be powered up in either the "Run" or "Diagnostic" mode.

To enter the diagnostic mode, remove the diagnostic connector shorting cap from the engine harness.

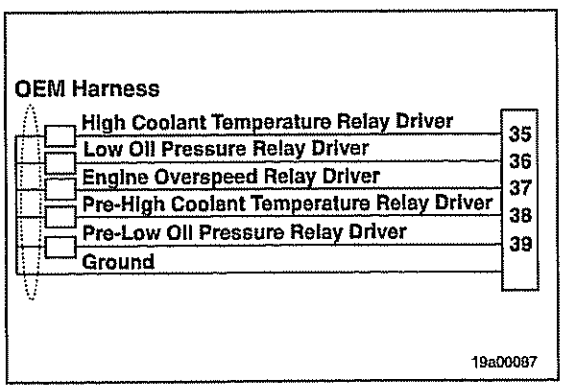
To clear fault codes, the engine **must not** be running and the ECM must be in the diagnostic mode.



The fault conditions will cause the Common Warning or Common Alarm relay outputs (2A @ 30 VDC) to be energized by the ECM. Generator OEM selected devices, using these circuits, will make the operator aware that a fault condition exists.

A Common Warning relay output will still allow the engine to be operated. However, if a common warning is caused by a bad sensor, engine protection will be lost for that parameter. The condition **must** be repaired as soon as convenient.

A Common Alarm relay output will shut down the engine and will **not** allow it to be operated until the Stop/Run switch is cycled.



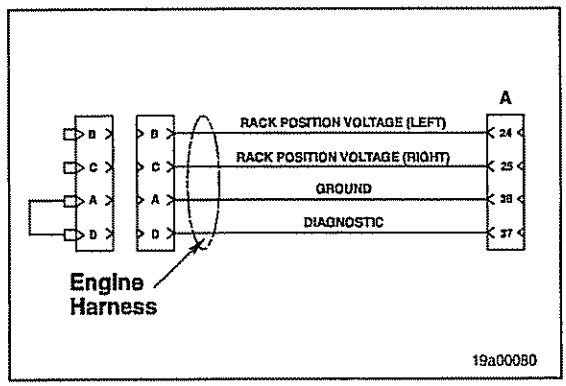
The conditions will cause the Relay Driver (200 mA @ 24 VDC) to be energized by the ECM. Generator OEM selected devices, using these circuits, will make the operator aware which fault condition exists.

The Common Warning, Common Alarm and relay driver outputs will remain energized (even if the fault code goes inactive) until the "alarm reset" button is pushed.

The engine protection system records separate fault codes when an out-of-range condition is found for any of the sensors in the engine protection system.

For explanation of fault codes and procedures for correcting them, contact your Cummins Authorized Repair Location.

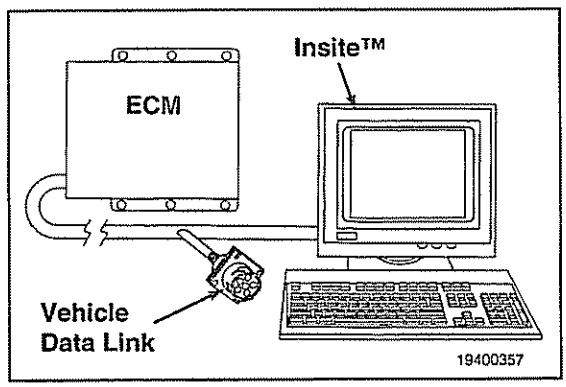
To exit the diagnostic mode, install the shorting plug in the diagnostic connector.



Fault Code Snapshot Data

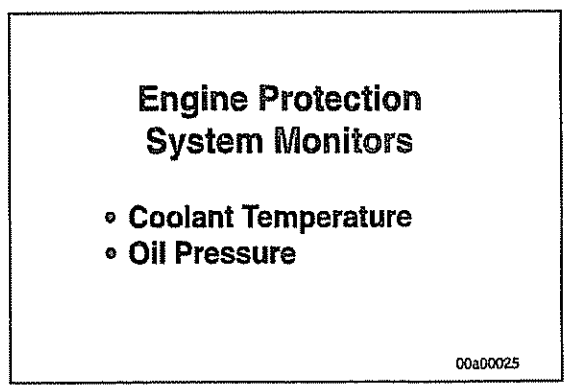
When a diagnostic fault code is recorded in the ECM, the input and output data is recorded from all sensors and switches. Snapshot data allows the relations between ECM inputs and outputs to be views and used during troubleshooting.

Fault code snapshot data can only be viewed on the INSITE™ service tool.



Engine Protection System

QST engines are equipped with an engine protection system. The system monitors critical engine speeds, temperature and pressure, and will log diagnostic faults when an over- or under-normal operating range condition occurs. If an out-of-range condition exists, the Common Warning circuit is energized. The operator will be alerted by an OEM selected device. The Common Alarm circuit will be energized when an out-of-range condition continues to get worse and engine shutdown occurs.



NOTES

Section 2 - Maintenance Guidelines

Section Contents

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Maintenance Guidelines - General Information

General Information

Cummins Engine Company, Inc. recommends that the engine be maintained according to the Maintenance Schedule on page 2-3.

If the engine is operating in ambient temperatures consistently below -18° C [0° F] or above 38° C [100° F], perform the maintenance at shorter intervals. Shorter maintenance intervals are also required if the engine is operated in a dusty environment or if frequent stops are made. Refer to the Cummins Authorized Repair Location for recommended intervals.

NOTE: Some of these maintenance procedures require special tools or **must** be done by qualified personnel. These procedures are outlined in the specific manuals as follows:

Procedure	Bulletin No.	Description
• Adjust the Valves	3666190	QST30 Preliminary Shop Manual
• Clean and Calibrate the Injectors	Bosch®	
• Clean and Calibrate the Fuel Pump	Bosch®	Fuel Pump

If your engine is equipped with a component or an accessory **not** manufactured by Cummins Engine Company, Inc., refer to the component manufacturer's maintenance recommendations. A listing of suppliers' addresses and telephone numbers is provided in Component Manufacturers, Section M.

Use the chart provided on page 2-5 as a convenient way to keep a record of the maintenance performed.

Tool Requirements

General Information

Most of the maintenance operations described in this manual can be performed with common hand tools (SAE wrenches, sockets, and screwdrivers).

The following is a list of special service tools required for some maintenance operations:

Tool Part No.	Description
3375049	Oil Filter Wrench
3376592	Inch Pound Torque Wrench
3376807	Water/Fuel Filter Wrench
3822524	Belt Tension Gauge (Click-Type)
3822525	Belt Tension Gauge (Click-Type)
ST-1293	Belt Tension Gauge (v-belts)
ST-1274	Belt Tension Gauge (Kriket)

Refer to the appropriate sections for a description of the tools and how to use them.

Contact the nearest Cummins Authorized Repair Location for the required service tools.

Maintenance Schedule

MAINTENANCE SCHEDULE QST30 Engine	Equipment No. Mechanic Time Spent Parts Order No. Engine Serial No. Hours, Calendar Check Performed Date

Daily (Section 3)	Weekly (Section 4)	Note [1] 250 Hours or 6 Months (Section 5)	Notes [1], [2] 2,000 Hours or 1 Year (Section 6)	Note [2] 6,000 Hours or 2 Years (Section 7)	Note [1] Other (Section 8)
☐ Check engine operator report ☐ Check engine: • oil level • coolant ☐ Inspect engine for : • damage • leaks • loose or damaged belts • unusual noises ☐ Check fuel water separator ☐ Inspect and clean air cleaner pre-cleaner ☐ Clean raw water strainer ☐ Check electronic engine controls (fault code lamp)	*Repeat Daily Check* ☐ Check • air intake piping • air intake restriction • air cleaner (element) ☐ Drain air tanks	*Check Daily and Weekly Intervals* ☐ Change lubricating oil ☐ Change filters • full flow • bypass • fuel (spin-on) • coolant • prefilter (fuel) ☐ Check and clean crankcase breather tube ☐ Check drive belts ☐ Check belt tension ☐ Measure SCA concentration ☐ Check cooling fan	*Check Previous Intervals* ☐ Steam clean engine ☐ Adust • crossheads • valves ☐ Check fan drive idler pivot arm assembly ☐ Adjust fan belt ☐ Check engine hoses ☐ Grease fan drive idler pivot arm assembly ☐ Check cold starting aids: • engine oil heater • coolant heater ☐ Check batteries ☐ Check engine mounting bolts ☐ Measure crankshaft end clearance ☐ Check raw water heat exchanger	*Repeat Previous Intervals* ☐ Inspect: • turbocharger • vibration damper • water pump • coolant thermostats and seals • air compressor ☐ Clean (flush): cooling system ☐ Check: • belt driven fan hub • fan drive idler pulley assembly	☐Note: For listed components, follow the manufacturer's recommended maintenance procedure. ☐ Alternator ☐ Generator ☐ Starter ☐ Air compressor (Non-Cummins) ☐ Electrical connections ☐ Batteries ☐ Fan shaft bearings ☐ Clutch or marine gear ☐ Freon compressor ☐ Fuel injection pump ☐ Injectors

Under circumstances where hours of operation are **not** accumulated at a fast rate, use hours **or** calendar time, whichever comes first.

Cummins Engine Company, Inc. recommends the use of dry type air cleaners.

Note [1] Refer to Section V for extended oil drain interval information.

Note [2] Cummins has found that engines in most applications will **not** experience significant valve train wear after an initial adjustment is made at 2,000 hours. After this adjustment, it is recommended that the valves **not** be adjusted again prior to the 6,000 hours or 2 year interval.

Maintenance Record Form

Maintenance Record	
Engine Serial No.:	Engine Model:
Owner's Name:	Equipment Name/Number:

Date	km [Miles], Hours or Time Interval	Actual km [Miles] or Hours	Maintenance Check Performed	Check Performed By	Comments

NOTES

Page References for Maintenance Instructions

For your convenience, listed below are the page numbers that contain specific instructions for performing the maintenance checks listed in the maintenance schedule.

+ Follow the manufacturer's recommended maintenance procedures on these components. Refer to Section M, Component Manufacturers.

Section 3 - Maintenance Procedures at Daily Interval

Section Contents

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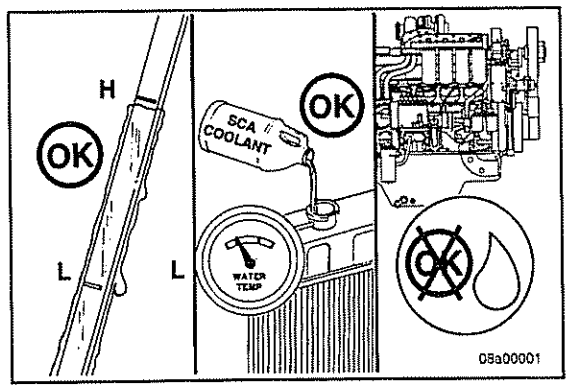
Daily Maintenance Procedures - General Information

General Information

Preventive maintenance begins with day-to-day awareness of the condition of the engine and its systems.

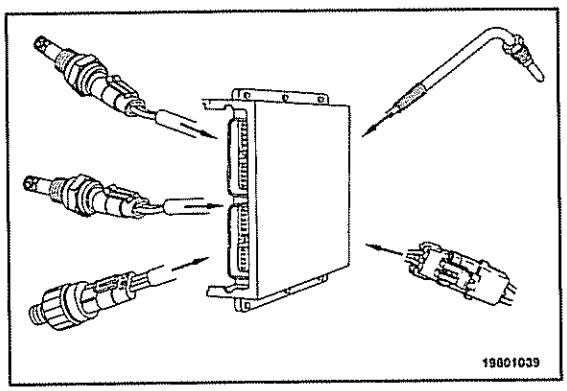
Before starting the engine, check the oil and coolant levels. Look for:

- Leaks
- Loose or damaged parts
- Worn or damaged belts
- Any change in engine appearance



Engine Protection System

Check the engine protection system daily for fault lamps. Visually check for any loose or frayed wiring.

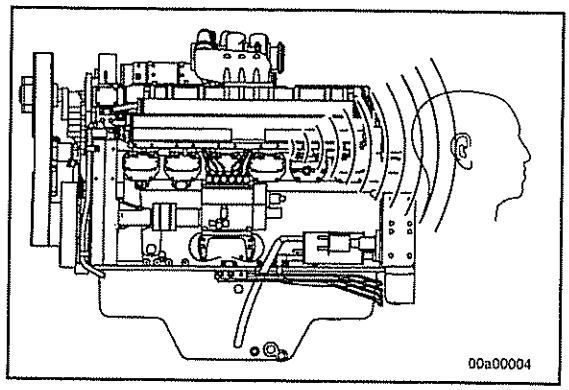


Engine Operation Report

General Information

The engine **must** be maintained in top mechanical condition if the operator is to get optimum satisfaction from its use. The maintenance department needs daily running reports from the operator to make necessary adjustments in the time allotted and to make provisions for more extensive maintenance work as the reports indicate the necessity.

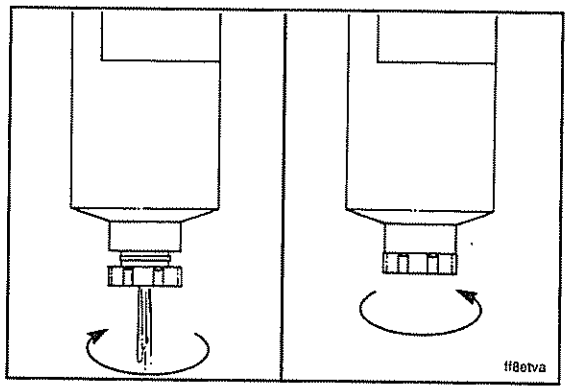
Comparison and intelligent interpretation of the daily report along with a practical follow-up action will eliminate most failures and emergency repairs.



Report to the Maintenance Department any of the following conditions:

- Low lubricating oil pressure
- Low power
- Abnormal water or oil temperature
- Unusual engine noise
- Excessive smoke
- Excessive use of coolant, fuel or lubricating oil
- Unusual vibration
- Any fuel, coolant or lubricating oil leaks.

During the daily maintenance check, listen for any unusual engine noise which can indicate that service is required.



Fuel-Water Separator

Maintenance Check

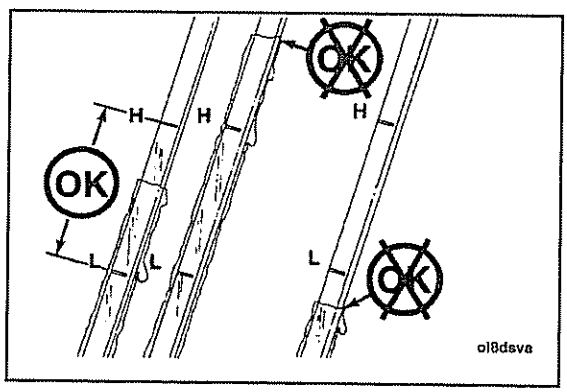
If the engine is equipped with a fuel-water separator, drain the water and sediment from the separator daily.

Shut off the engine. Use your hand to open the drain valve. Turn the valve **counterclockwise** approximately 1-1/2 to 2 turns until draining occurs. Drain the filter sump of water until clear fuel is visible.

⚠ CAUTION ⚠

Do not overtighten the valve. Overtightening can damage the threads.

Turn the valve **clockwise** approximately 1-1/2 to 2 turns to close the drain valve.



Lubricating Oil Level

Maintenance Check

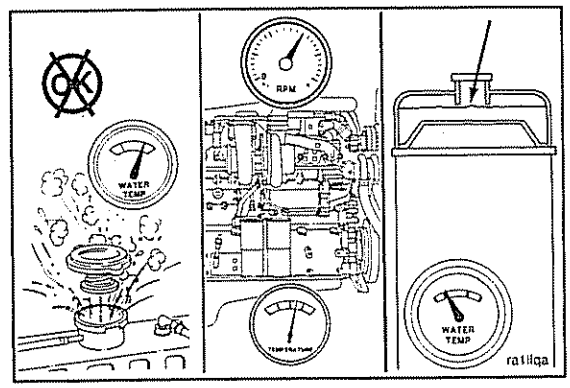
Check the oil level daily.

Never operate the engine with the oil level below the 'L' (Low) mark or above the 'H' (High) mark. Wait at least 5 minutes after shutting off the engine to check the oil. This allows time for the oil to drain to the oil pan.

The vehicle **must** be level when checking the oil level to make sure the measurement is correct.

Coolant Level

Maintenance Check



⚠ WARNING ⚠

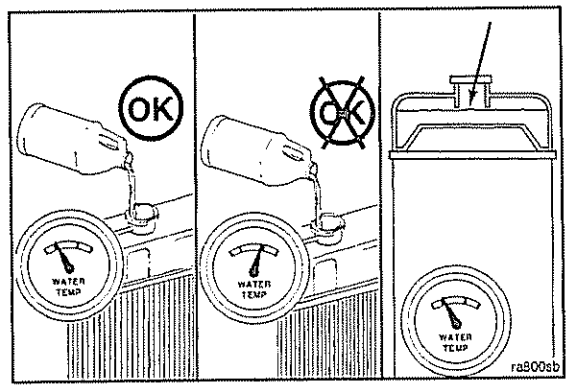
Do not remove the radiator cap from a hot engine. Wait until the temperature is below 50° C [120° F] before removing the pressure cap. Failure to do so can result in personal injury from heated coolant spray or steam. Remove the filler cap slowly to relieve coolant system pressure.

Do **not** use a sealing additive to stop leaks in the cooling system. This can result in the cooling system plugging and inadequate coolant flow.

The coolant level **must** be checked daily.

Cummins Engine Co., Inc. does **not** recommend the use of water and an SCA without antifreeze.

Refer to Coolant Recommendations/Specifications in Section V for antifreeze, water, and SCA specifications.

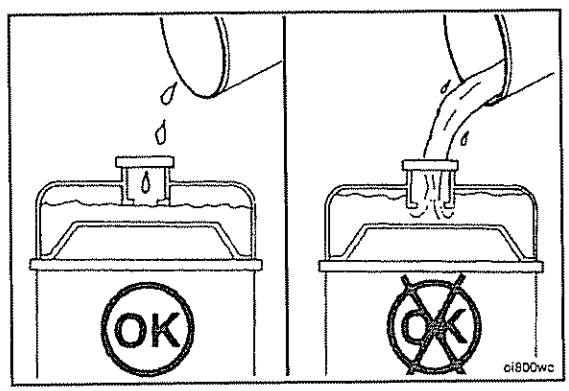


△ CAUTION △

Do not add cold coolant to a hot engine. Engine castings can be damaged. Allow the engine to cool to below 50° C [120° F] before adding coolant.

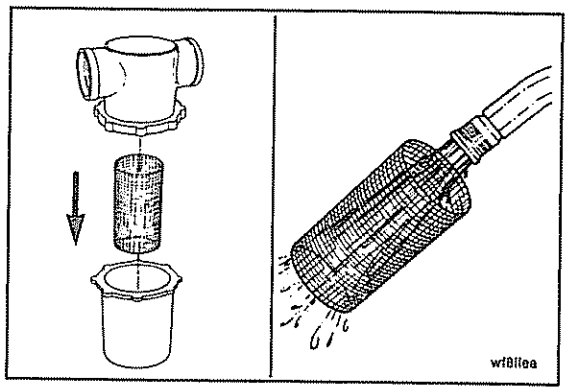
Fill the cooling system with coolant to the bottom of the fill neck in the radiator fill or expansion tank.

NOTE: Some radiators have two fill necks, both of which **must** be filled when the cooling system is drained.



△ CAUTION △

Any time a significant amount of coolant is added, the SCA concentration must be checked. If the concentration is low, engine damage will result.

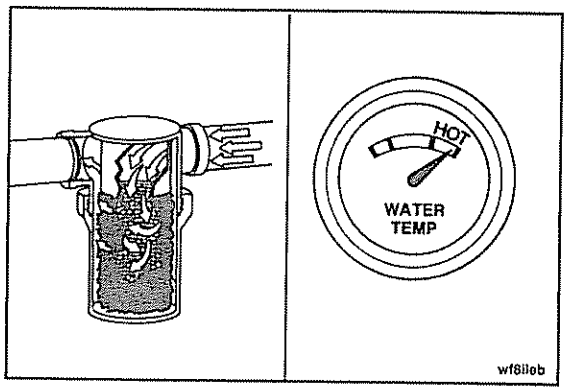


Raw Water Strainer

Maintenance Check

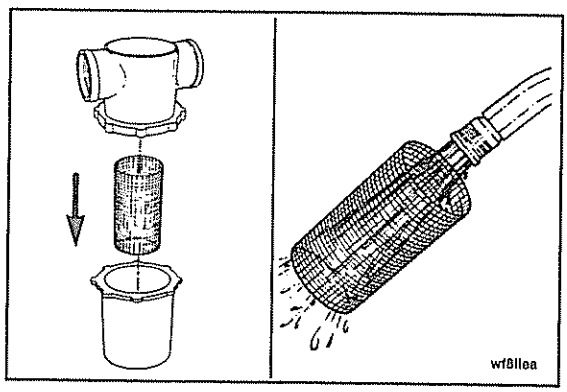
This picture illustrates a typical raw water strainer.

Depending on the operating environment, clean the raw water strainer daily or as required. Some units can be operated up to, but no longer than 6 months, before cleaning.



⚠ CAUTION ⚠

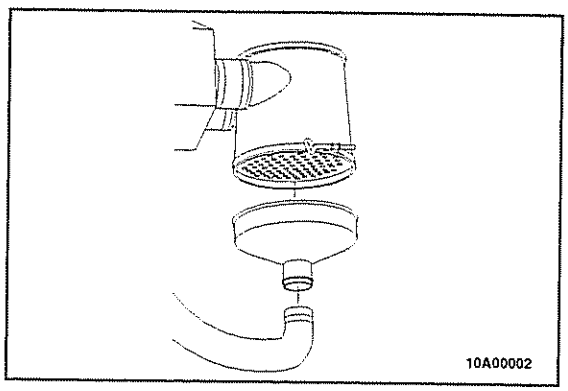
A restricted or clogged strainer will result in hotter than normal, or over heated, engine coolant and marine gear oil temperatures.



Clean

Use a wrench to remove the raw water strainer.

Clean the strainer with high-pressured water or air. Replace if necessary.



Air Cleaner Precleaner

Maintenance Check

Under extremely dirty conditions an air precleaner can be used. Clean the precleaner jar and dry type air cleaner dust pans daily or more often, as necessary, depending on operating conditions.

Maintenance Procedures at Weekly Interval

Section Contents

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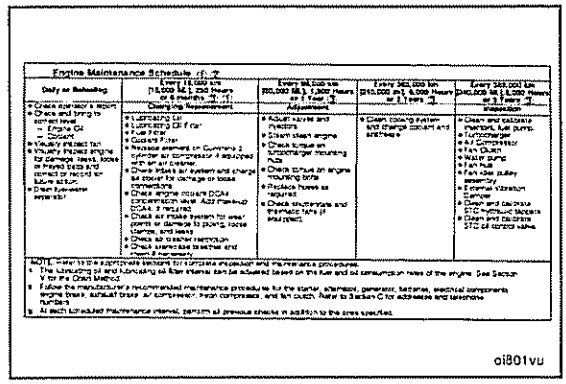
Weekly Maintenance Procedures - General Information

General Information

All checks or inspections listed under the daily maintenance interval **must** also be performed at this time in addition to those listed under this maintenance interval.

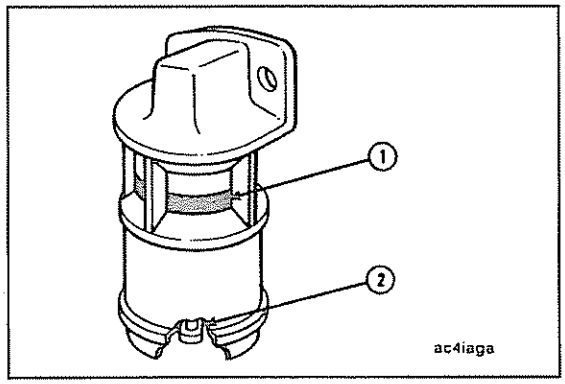


Air Intake Restriction

Maintenance Check

Mechanical Indicator

A mechanical restriction indicator is available to indicate excessive air restriction through a dry-type air cleaner. This instrument can be mounted in the air cleaner outlet or on the vehicle instrument panel. The red flag (1) in the window gradually rises as the cartridge loads with dirt. After changing or replacing the cartridge, reset the indicator by pushing the reset button (2).

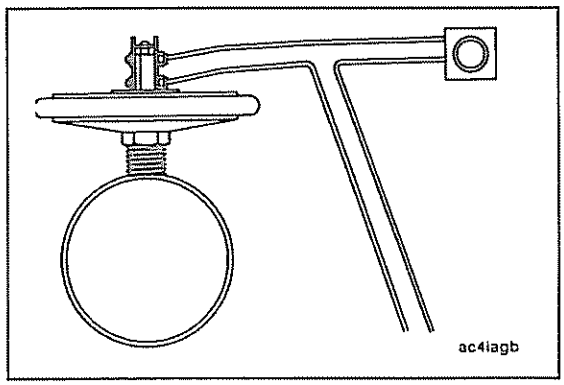


Mechanical restriction or vacuum indicators are to be installed as close as possible to the turbocharger air inlet in order to obtain a true indication of restrictions.

NOTE: Do **not** remove the felt washer from the indicator. The felt washer absorbs moisture.

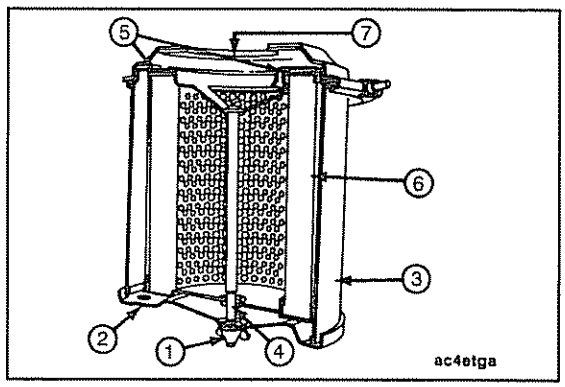
Vacuum Indicator

Vacuum switches actuate a warning light on the instrument panel when the air restriction becomes excessive.



Vacuum indicators are to be installed as close as possible to the turbocharger air inlet in order to obtain a true indication of restrictions.

Air restriction on turbocharged engines **must not** exceed 635 mm [25 in] of water under full power conditions.

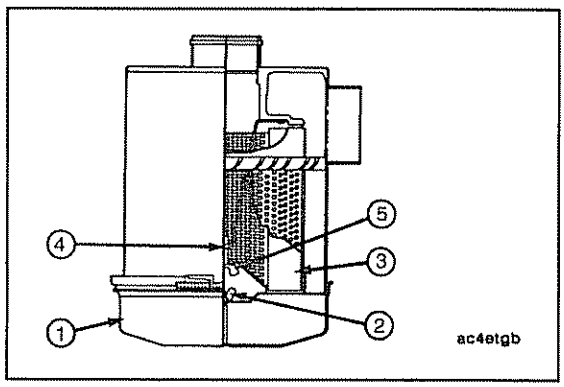


Air Cleaner Element

General Information

NOTE: The illustrations in this section show typical dry type air cleaner parts. The particular engine parts can vary.

Replace the element if the inlet restriction or vacuum at full power is found to exceed 25 inches of water. Changing filters or breaking the seal on the intake system more than necessary will result in excess dirt in the engine and **must** be avoided.



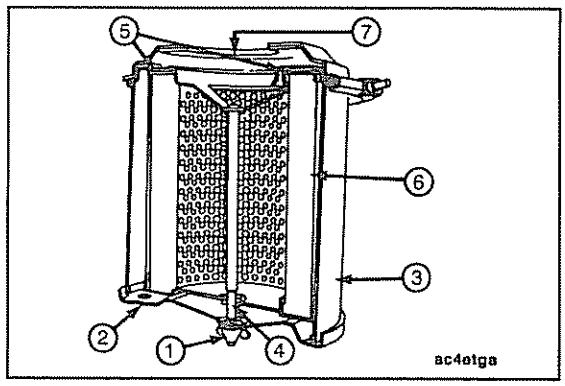
△ CAUTION △

Holes, loose end seals, dented sealing surfaces and other forms of damage render the cleaner inoperative and require immediate element replacement.

△ CAUTION △

Cleaning an air filter element with excessive compressed air pressure can damage the filter media and lead to engine damage

NOTE: Refer to the air filter manufacturer's instructions for element cleaning instructions. If manufacturer's instructions are **not** available, replace the element.



Air Cleaner Element, Paper Type

Maintenance Service

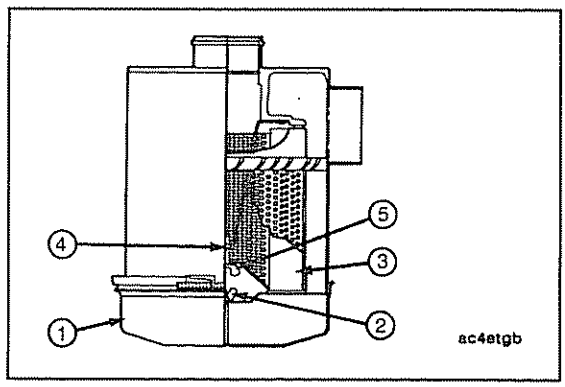
Remove the wing nut (1) that secures the bottom cover (2) to the cleaner housing (3). Remove the cover.

Pull the element (6) down from the center bolt (4).

△ CAUTION △

Pull the cover and the element straight out when removing them from the housing to avoid damage to the element.

Remove the gasket (5) from the outlet end (7) of the housing. Inspect the gasket. Replace the gasket if necessary. Assemble the bottom cover to the cleaner housing.



Air Cleaner Element, Single Heavy Duty Dry Type

Maintenance Service

Heavy duty air cleaners combine centrifugal cleaning with element filtering before air enters the engines.

Before disassembly, wipe dirt from the cover and the upper portion of the air cleaner.

Loosen the wing bolt, remove the band clamp securing the dust pan (1).

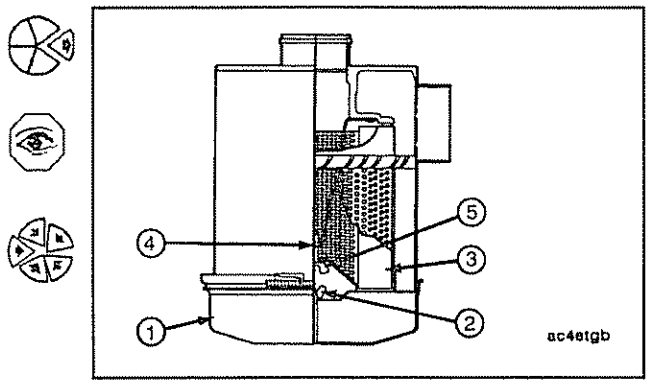
Loosen the wing nut (2). Remove the dust shield (3) from the dust pan (1). Clean the dust pan and shield.

Remove the wing nut (5) that secures the air cleaner primary element in the air cleaner housing. Inspect the rubber sealing washer under the wing nut (4). Remove the dirty cleaner element.

Install the new primary element.

Make sure the rubber sealing washer is in place under the wing nut before tightening.

Assemble the dust shield and dust pan again. Position them to the air cleaner housing and secure with the band clamp.



Air Cleaner Element, Dual Heavy Duty Dry Type

Maintenance Service

Heavy duty air cleaners combine centrifugal cleaning with element filtering before air enters the engines.

Before disassembly, wipe dirt from the cover and the upper portion of the air cleaner.

Loosen the wing nut (3), remove the band clamp (1) securing the dust pan (2).

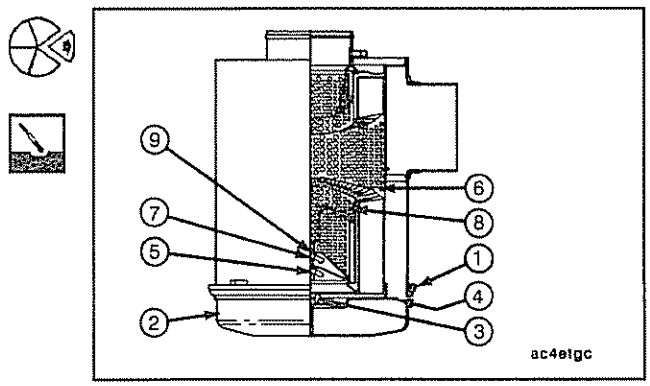
Loosen the wing nut (3). Remove the dust shield (4) from the dust pan (2). Clean the dust pan and shield.

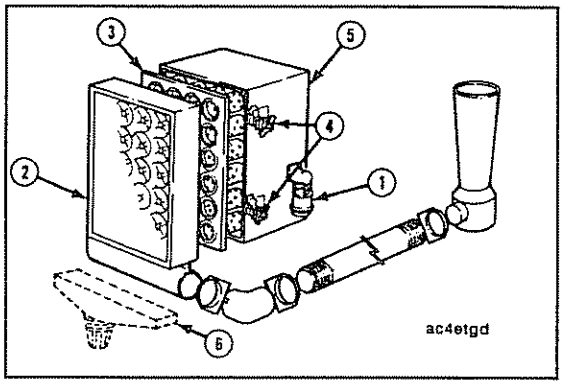
Remove the wing nut (5) that secures the air cleaner primary element (6) in the air cleaner housing. Inspect the rubber sealing washer on the wing nut.

Remove the dirty primary cleaner element (6). If the inner safety element (8) is being replaced based on high intake restriction, remove the wing nut (7) and replace the inner safety element.

Install the inner safety element (8) and secure with the wing nut (7). Check the seals.

Install the dust plan (2) and band clamp (1). Operate the engine at rated speed and power and record the intake restriction.





Air Cleaner Element, Cartridge Type

Maintenance Service

Loosen the wing nuts (4) on the air cleaner housing (5) to remove the precleaner panel with the dust bin (6). To remove the precleaner panel (2) equipped with an exhaust aspirator, loosen the u-bolt clamp securing the precleaner to the aspirator tubing.

Remove the dirty Pamic cartridge (3), by inserting your fingers in the cartridge opening (loosen all four corners of the cartridge, one at a time) and pulling it straight out.

With the larger cartridge, it might be necessary to break the seal along the edges of the cartridge. After the seal has been broken, pull the cartridge straight out and slightly up so the cartridge will clear the sealing frame and edges of the air cleaner housing.

Clean the precleaner openings (2) of all soot, oil film and any other objects that can become lodged in the openings. Remove any dust or dirt in the lower portion of the precleaner and aspirator tubing. Inspect the inside of the air cleaner housing for foreign material.

Inspect the dirty cartridge for soot or oil. If there is soot inside the Pamic tubes, check for leaks in the engine exhaust system, exhaust blow-back into the air intake and exhaust from other equipment. If the cartridge appears oily, check for fumes escaping from the crankcase breather. Excessive oil mist shortens the life of any dry-type cartridge. Troubleshooting at this point can appreciably lengthen new cartridge life.

⚠ CAUTION ⚠

Holes, loose end seals, dented sealing surfaces and other forms of damage render the cleaner inoperative and require immediate element replacement.

⚠ CAUTION ⚠

Cleaning an air filter element with excessive compressed air pressure can damage the filter media and lead to engine damage

NOTE: Refer to the air filter manufacturer's instructions for element cleaning instructions. If manufacturer's instructions are **not** available, replace the element.

Inspect clamps and flexible hose or tubing to make sure all fittings are air tight on cleaners with exhaust aspirators.

The precleaner dust bin (6) is self-cleaning.

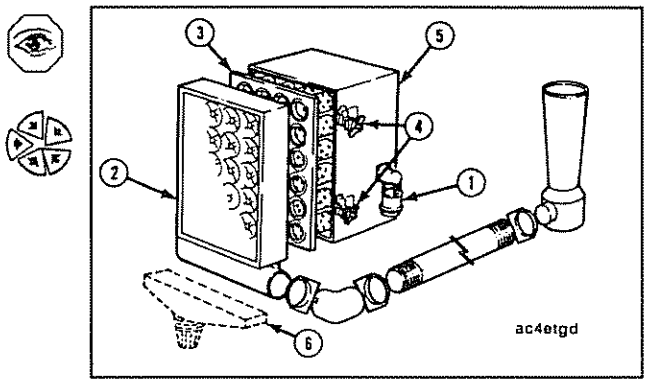
Inspect the new filter cartridge for shipping damage before installing.

To install a new cartridge, hold the cartridge (3) in the same manner as when removing it from the housing. Insert the clean cartridge into the housing, avoiding hitting the cartridge tubes against the sealing flange on the edges of the air cleaner housing.

The cleaner requires no separate gaskets for seals. Make sure that the cartridge seats properly within the cleaner housing. Firmly press all edges and corners of the cartridge with your fingers to effect a positive air seal against the sealing flange of the housing. The cartridge **must not** be pounded or pressed in the center to seal.

Replace the precleaner panel (2) and tighten the wing nuts (4) by hand. For final tightness turn the wing nuts 1 to 1 1/2 turns with a small adjustable wrench. Do **not** tighten too much. On a precleaner with an exhaust aspirator, assemble the aspirator tube to the precleaner panel and tighten the U- bolt.

Care **must** be taken to keep the cleaner face unobstructed.



Air Intake Piping

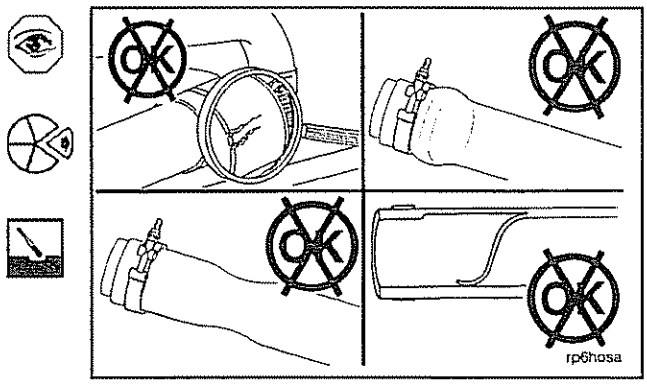
Maintenance Check

Inspect the intake piping for cracked hoses, loose clamps, or punctures which can damage the engine.

Tighten or replace parts as necessary to make sure the air intake system does **not** leak.

Check for corrosion of the intake system piping under the clamps and hoses. Corrosion can allow corrosive products and dirt to enter the intake system. Disassemble and clean as required.

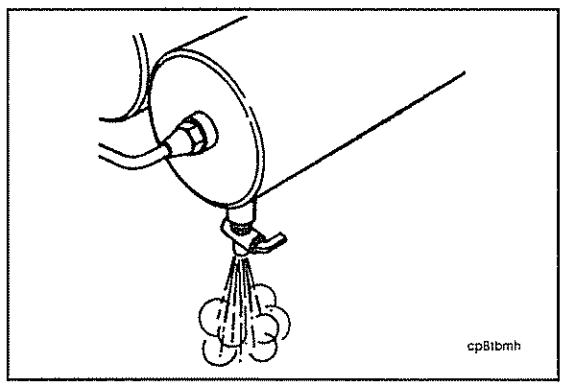
All hoses on the intake piping **must** be double clamped or use t-bolt type clamps.



Air Tanks and Reservoirs

Drain

Drain the moisture from the air system wet tank weekly.



NOTES

Maintenance Procedures at 250 Hours or 6 Months

Section Contents

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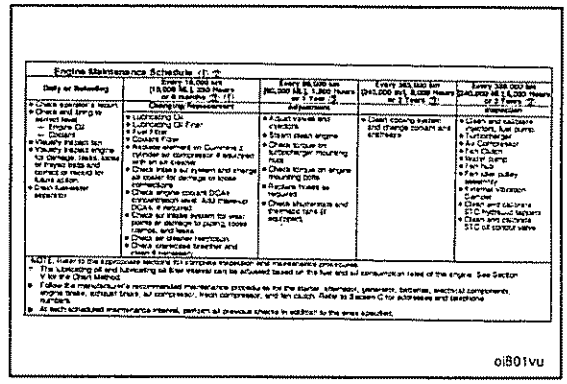
Maintenance Procedures - General Information

General Information

All checks or inspections listed under the previous maintenance intervals **must** also be performed at this time in addition to those listed under this maintenance interval.



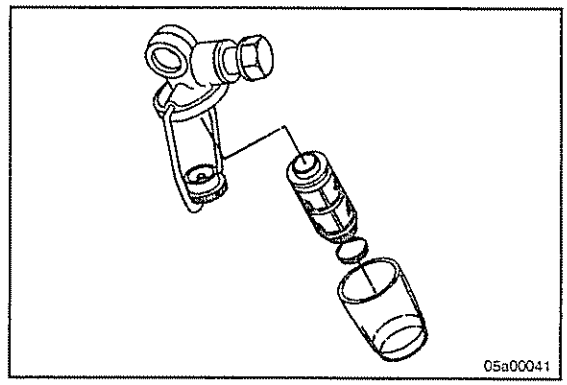
Fuel Lift Pump Inlet Screen

Maintenance Check

NOTE: The G-Drive fuel lift pump inlet screen, or prefilter, filters fuel before it enters the lift pump. The prefilter consists of a filter head with glass bowl and plastic strainer. The glass bowl may be removed by means of a thumbscrew when it is necessary to clean the prefilter.

Perform a visual check of the prefilter daily for water and debris.

Remove the strainer and clean with compressed air or replace every 6 months or 250 hours, or at the oil change interval. Clean the strainer more frequently if required.



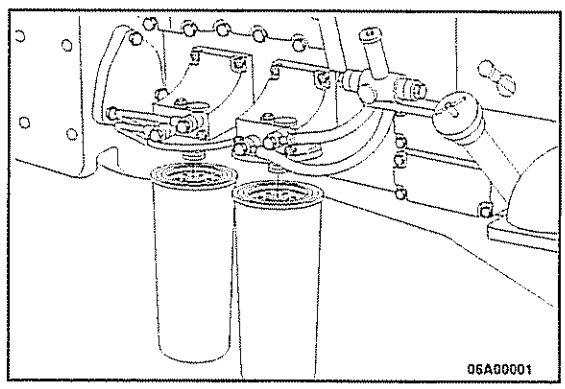
Fuel Filter (Spin-On Type)

Remove

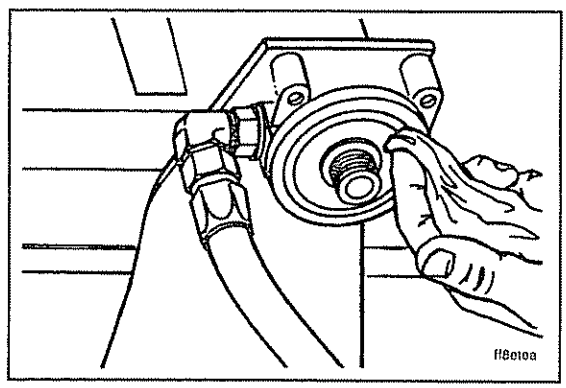
Every 250 hours or 6 months, whichever comes first, the fuel filter **must** be replaced.

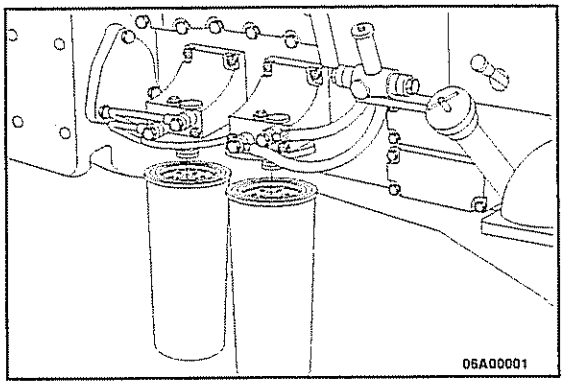
Clean the area around the fuel filter head and filter.

Remove the fuel filter with filter wrench, Part No. 3375049.



Use a clean, lint-free towel to clean the filter head gasket surface.

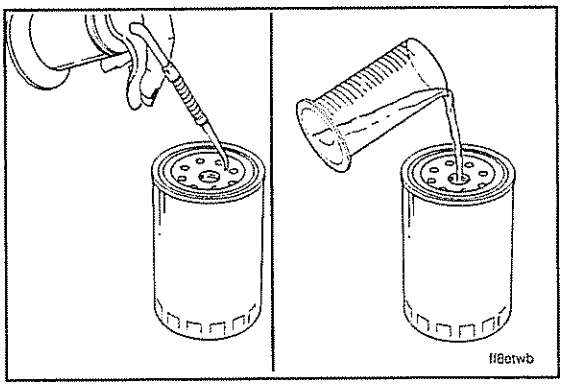




Install

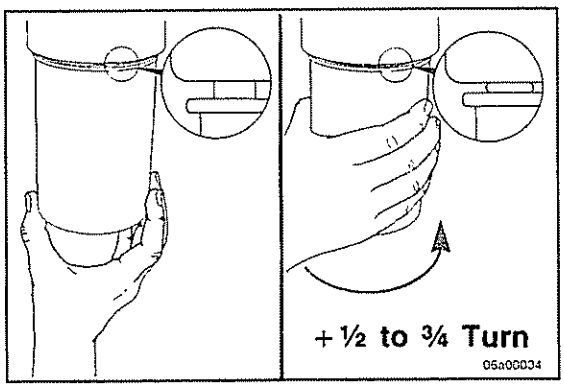
Use the correct filters for your engine.

- Cummins Part No. 3313306
- Fleetguard® Part No. FF202



Apply a light film of clean engine oil to the filter gasket surface.

Fill the filter(s) with clean fuel and lubricate the o-ring seal with clean 15W-40 engine lubricating oil.



⚠ CAUTION ⚠

To prevent fuel leaks, make sure the fuel filter is installed tightly but not overtightened. Mechanical overtightening of the filter can distort the threads or damage the filter element seal.

Install the filter on the filter head. Turn the filter until the gasket contacts the filter head surface.

Tighten the filter an additional one-half to three-fourths of a turn after the gasket contacts the filter head surface, or as specified by the filter manufacturer.

After installing the filter(s), vent the fuel system manually. Refer to Section A.

NOTE: If the fuel filters are the only fuel system element removed and installed, **only** the fuel filter head should require venting.

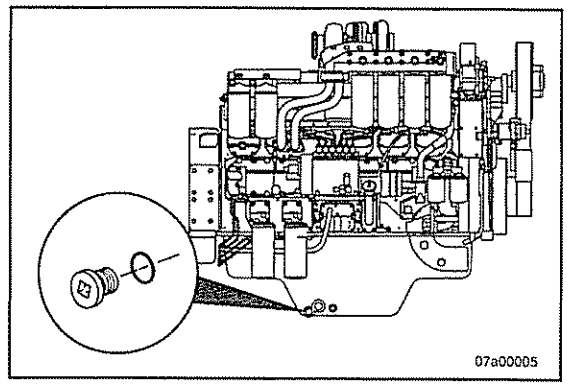
Lubricating Oil and Filters

Drain

Change the lubricating oil and filter(s) at the specified oil change interval. Refer to Lubricating Oil Recommendations and Specifications, Section V, to find the correct change interval for your application.

⚠ WARNING ⚠

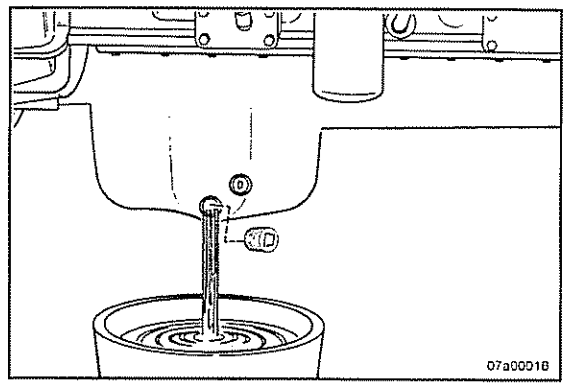
Some state and federal agencies in the United States of America have determined that used engine oil can be carcinogenic and can cause reproductive toxicity. Avoid inhalation of vapors, ingestion, and prolonged contact with used engine oil.



⚠ CAUTION ⚠

Avoid direct contact of hot oil with your skin. Hot oil can cause personal injury.

Operate the engine until the water temperature reaches 60° C [140° F]. Shut off the engine. Remove the oil drain plug from the bottom of the lubricating oil pan. Do **not** remove the upper plugs on either side of the oil pan to drain the oil. They will **not** allow the oil to drain completely.

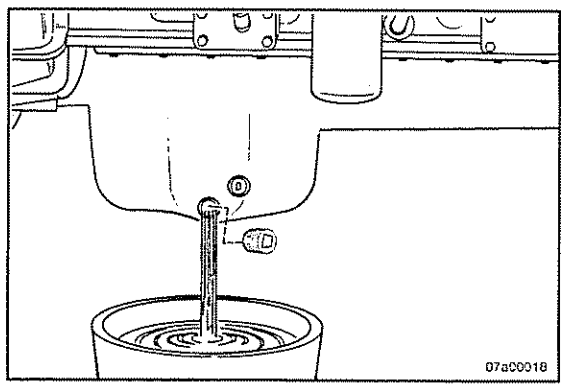


NOTE: Fittings used in the bottom drain opening of the oil pan other than Cummins specified parts **must not** exceed the following size and weight limits:

Oil Drain Fitting (non-Cummins Part)

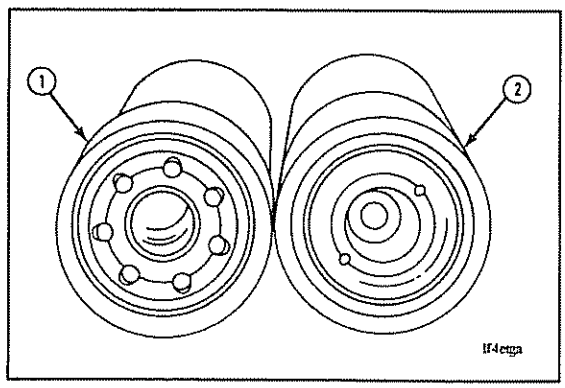
Length	63.50 mm	[2.500 in]
Diameter	41.28 mm	[1.625 in]

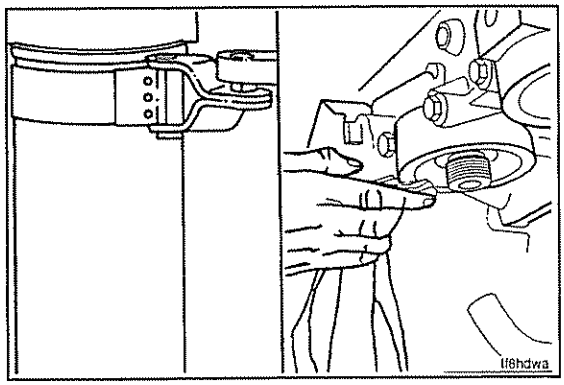
On standby generator applications, Cummins Engine Company, Inc. recommends oil sampling and analysis at the time of oil change to monitor oil contaminant levels.



The QST30 engine uses four full-flow and two bypass filters on each engine. The external appearance of the full-flow (1) and the bypass (2) filter is the same. This graphic illustrates the difference between the two filters.

NOTE: The full-flow filter contains 1-1/2 16 inch threads. The bypass filter contains 1-3/8 16 inch threads.



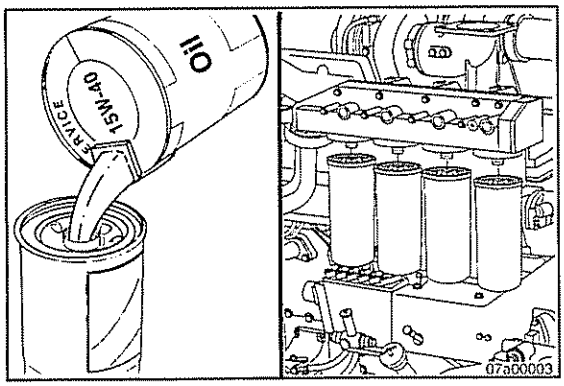


Use an oil filter wrench, Part No. 3375049, or equivalent. Remove the oil filters.

Clean the area around the lubricating oil filter head. Clean the gasket surface of the filter head.

NOTE: The o-ring can stick on the filter head. Make sure the o-ring is removed.

Discard the filters in accordance with local environmental requirements.



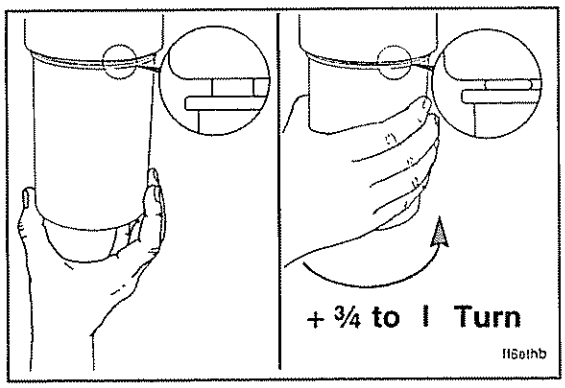
Fill

⚠ CAUTION ⚠

The lack of lubrication caused by the delay while the filter is pumped full of oil at startup is harmful to the engine.

Use clean 15W-40 oil to coat the gasket surface of the filter.

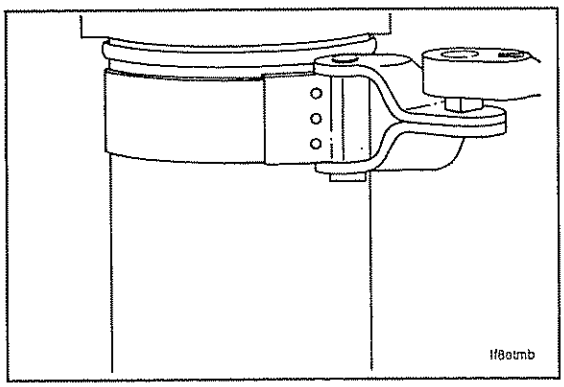
Fill the filter with clean 15W-40 oil.



⚠ CAUTION ⚠

Mechanical overtightening of the filter can distort the threads or damage the filter element seal.

Install the filter on the filter head. Tighten the filter until the gasket contacts the filter head surface.

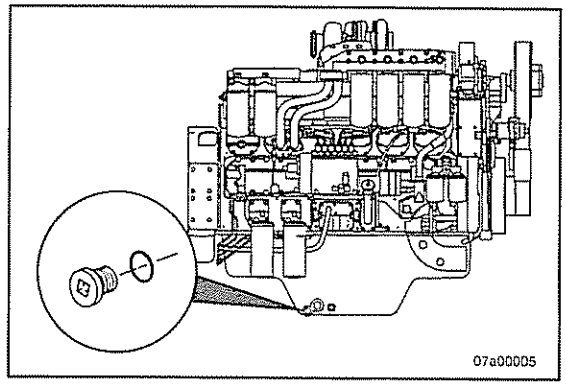


Use oil filter wrench, Part No. 3375049, to tighten the filter to the specifications supplied by the filter manufacturer.

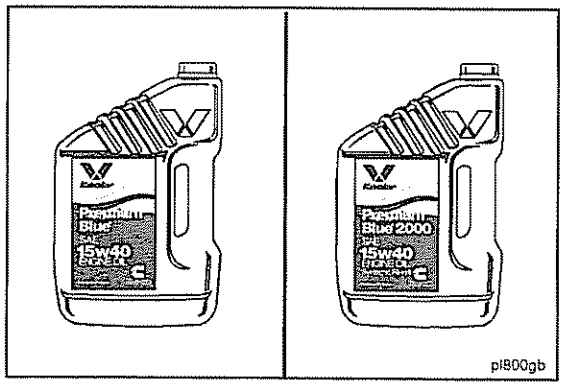
Clean and check the oil drain plug threads and the seal surface.

Install the oil drain plug in the lubricating oil pan.

Torque Value: 47 N•m [35 ft-lb]



Choose the correct oil for your operating climate. Refer to Section V for engine oil recommendations.



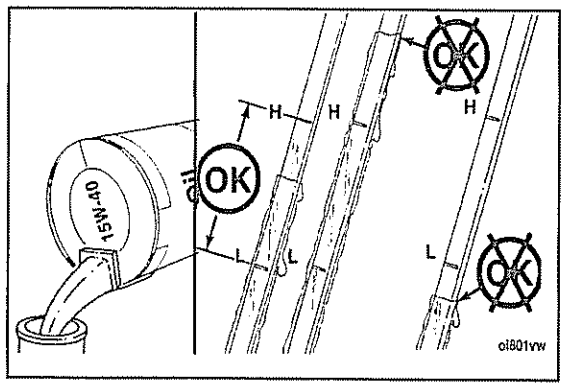
Fill the engine with clean oil to the correct level.

NOTE: Two oil pan capacities are available.

Standard (High)	76 liters	[20 U.S.gal]
Standard (Low)	61 liters	[16 U.S.gal]
Option (High)	132 liters	[35 U.S.gal]
Option (Low)	117 liters	[31 U.S.gal]

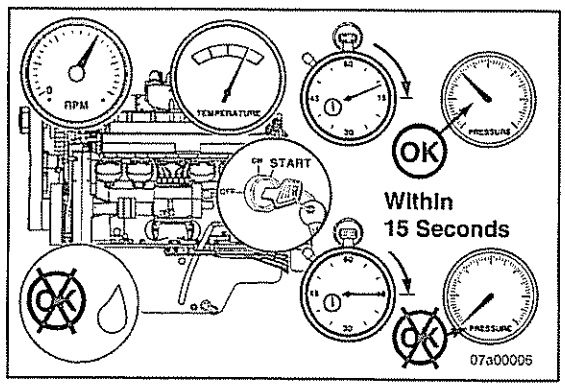
The capacity for the full-flow and the bypass oil filters are different.

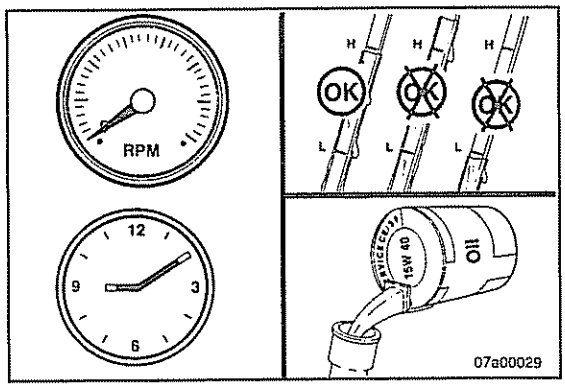
Full-flow	2.6 liters	[0.7 U.S.gal]
Bypass	2.3 liters	[0.6 U.S.gal]



Operate the engine at idle speed to inspect for leaks at the filter(s) and the drain plug.

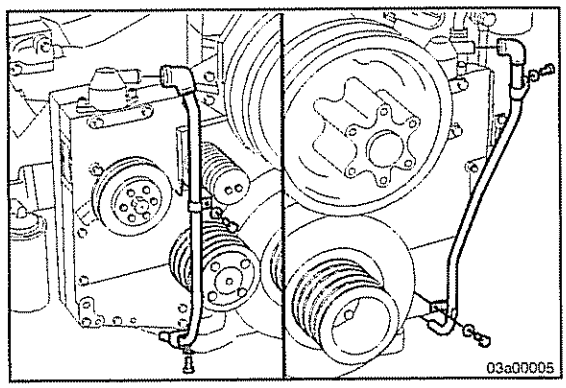
NOTE: Engine oil pressure **must** be indicated on the gauge within 15 seconds after starting. If oil pressure is **not** registered within 15 seconds, shut off the engine immediately to avoid engine damage. Confirm the correct oil level in the oil pan.





Shut off the engine. Wait approximately 5 minutes for the oil to drain back from the upper parts of the engine to the oil pan.

Check the oil level again. Add oil as necessary to bring the level up to the 'H' (high) mark on the dipstick.



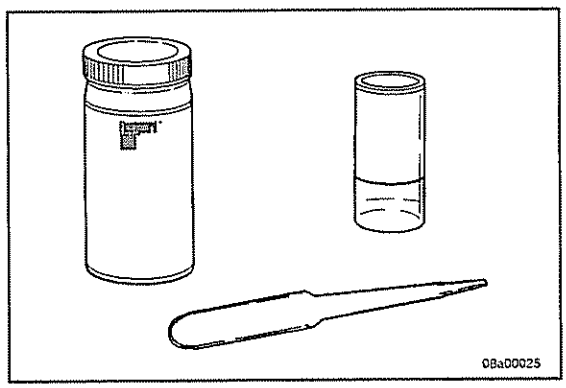
Crankcase Breather Tube

Maintenance Check

Every 250 hours or 6 months, check and clean the crankcase breather tube or hose.

The tube is to be removed and checked internally for obstructions or sludge buildup.

If the tube is blocked, it is to be cleaned or replaced to prevent excess crankcase pressure buildup.



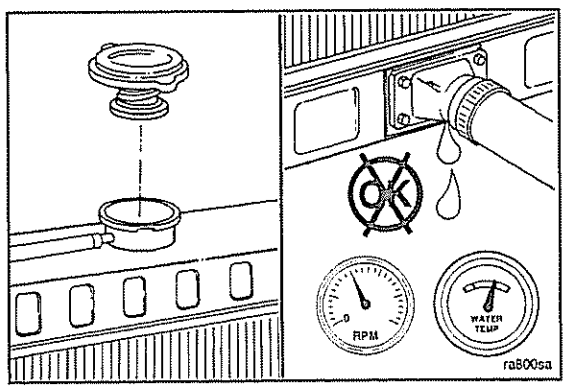
Supplemental Coolant Additive (SCA)

Maintenance Check

NOTE: Cummins Engine Company Inc. recommends DCA4 as the Supplemental Coolant Additive. DCA4 is compatible with all permanent-type antifreeze except Methoxy Propanol. If Methoxy Propanol antifreeze is used, reduce the amount of DCA4 by one-third. This will prevent inhibitor loss due to precipitation, cause by chemical incompatibility.

Check the DCA4 concentration level whenever coolant is added to the cooling system between filter changes.

Use Fleetguard® coolant test kit, CC2626, to check the concentration level. Instructions are included with the test kit.



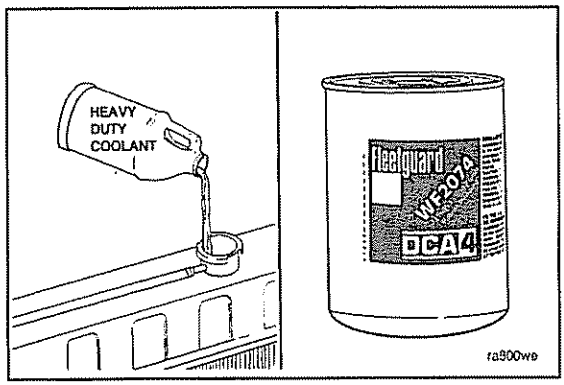
⚠ WARNING ⚠

Check the coolant level only when the engine is stopped. Wait until the coolant temperature is below 50° C [120° F] before removing the pressure cap. Failure to do so can cause personal injury from heated coolant spray.

Operate the engine and check for coolant leaks.

After the air has been purged from the system, check the coolant level again.

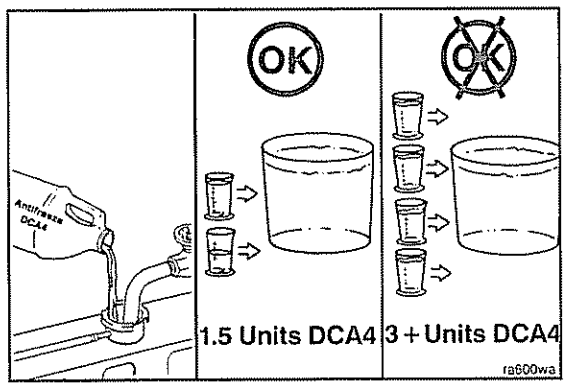
A supplemental coolant additive (DCA4) is used to prevent the buildup of corrosion and scale deposits in the cooling system.



⚠ CAUTION ⚠

Inadequate concentration of coolant additives can result in liner pitting and system corrosion. Excessive concentration can result in water pump seal leakage.

The recommended concentration level of supplemental coolant additives is 1.5 units per 3.8 liters [1 U.S. gal] of coolant. The additive level **must never** drop below 1.2 units or exceed 3 units per 3.8 liters [1 U.S. gal] of coolant.

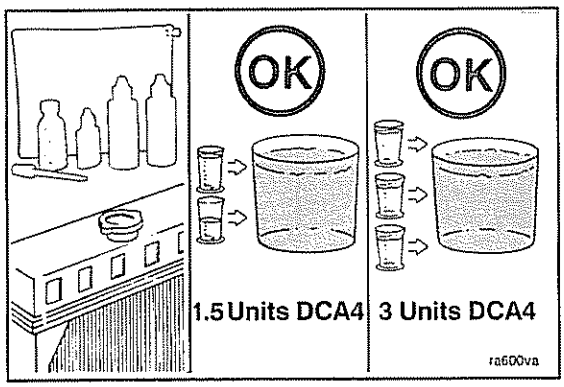


When changing the coolant, the initial DCA4 concentration **must** be between 1.5 units and 3 units per 3.8 liters [1 U.S. gal] of coolant (initial charge).

NOTE: The cooling system **must** be clean before adding DCA4.

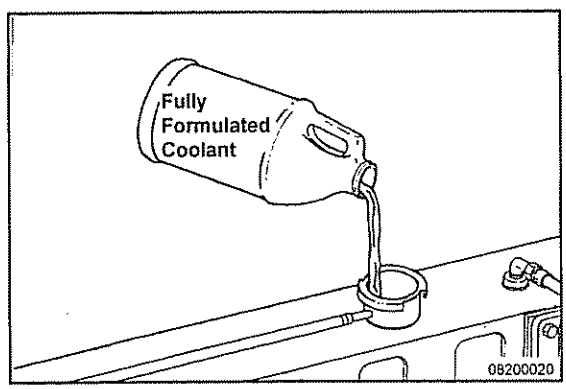
Refer to Section V for cleaning instructions.

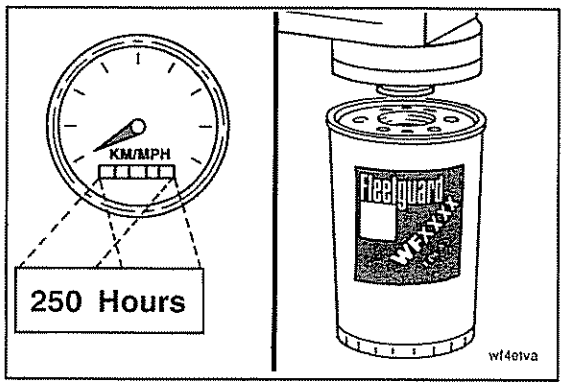
If coolant is added between drain intervals, additional DCA4 will be required unless the added coolant is precharged with additives as described in this section.



If coolant is added between drain intervals, additional SCA (or equivalent) will be required.

Cummins Engine Company, Inc. recommends using either a 50/50 mixture of good quality water and fully formulated antifreeze, or fully formulated coolant when filling the cooling system. The fully formulated antifreeze or coolant **must** meet TMC RP 329 or TMC RP 330 specifications. Refer to Coolant Recommendations and Specifications in Section V.





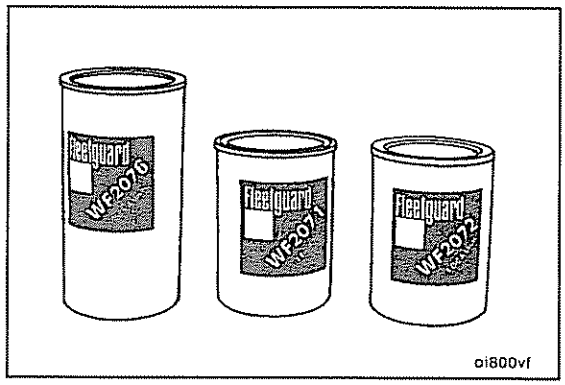
Coolant Filter

Maintenance Check

Use the correct Fleetguard® coolant filter to maintain the correct DCA4 concentration in the system.

Maintain the correct concentration by changing the service coolant filter at each oil drain interval.

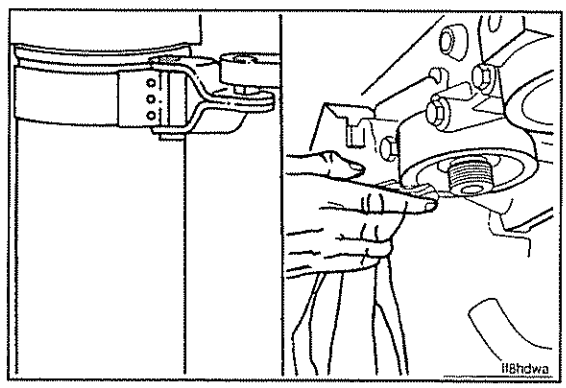
Refer to Coolant Recommendations/Specifications in Section V for the Fleetguard® Coolant Filter listing.



Change the service coolant filter at every oil and filter change interval.

The correct service coolant filter to be used is determined by the total cooling system capacity and other operational factors.

Refer to the DCA4 Maintenance Guide in Section V for the correct filter selection.



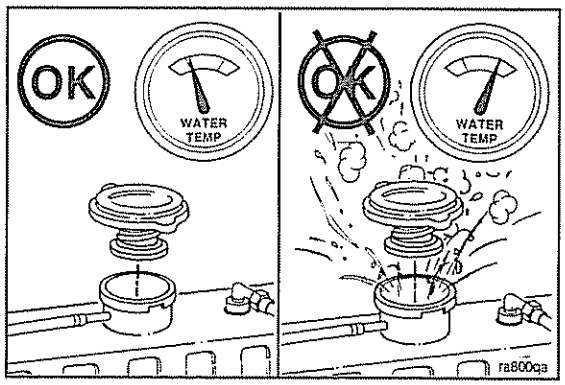
Remove

Remove the water filters.

Clean the area around the filter head. Clean the gasket surface of the filter head.

NOTE: The o-ring can stick on the filter head. Make sure the o-ring is removed.

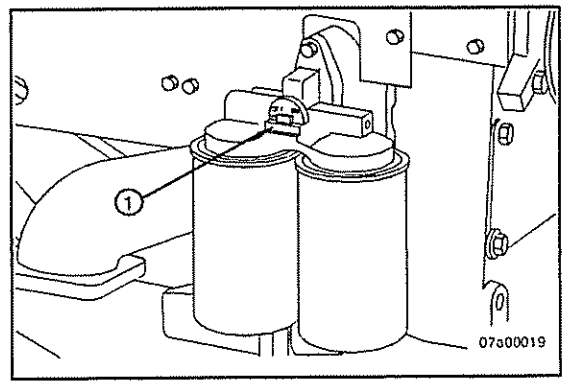
Discard the filters.



⚠ WARNING ⚠

Do not remove the radiator cap from a hot engine. Hot steam will cause serious personal injury. Remove the coolant system pressure cap and close the shutoff valve(s), if equipped, before removing the coolant filter. Failure to do so can result in personal injury from heated coolant spray.

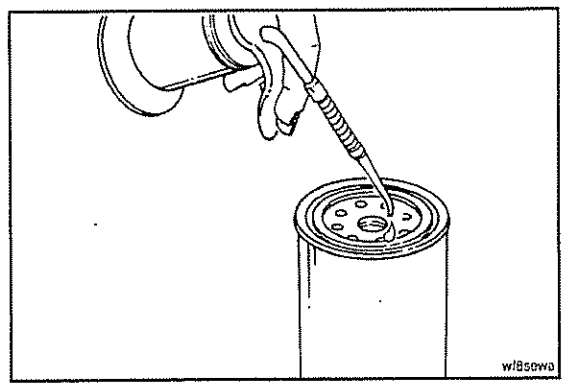
Close the valve (1) on the filter head to prevent water loss.



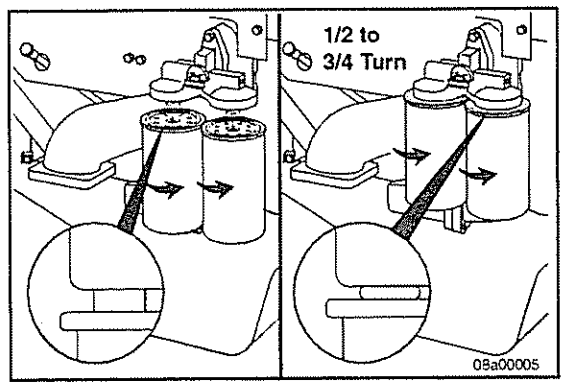
Install

Lubricate the seal on the new filter with clean engine lubricating oil.

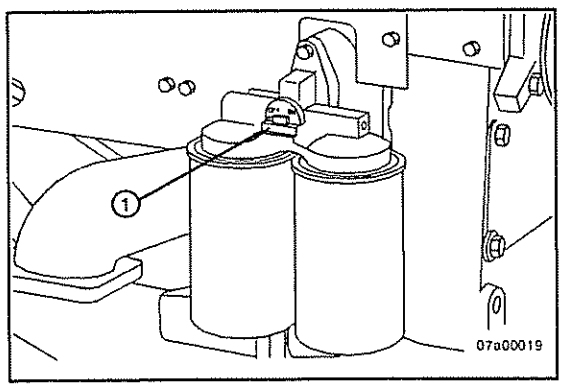
NOTE: Do **not** allow oil to get in the filter, it will adversely affect the DCA.

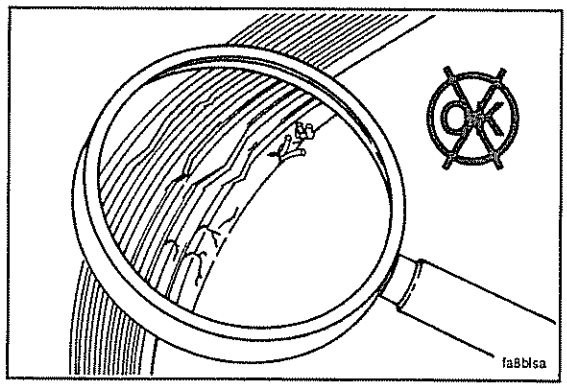


Install the new coolant filter. Turn the filter until the seal touches the filter head. Turn the filter an additional 1/2 to 3/4 of a turn after contact.



Open the valve (1) on the filter head.





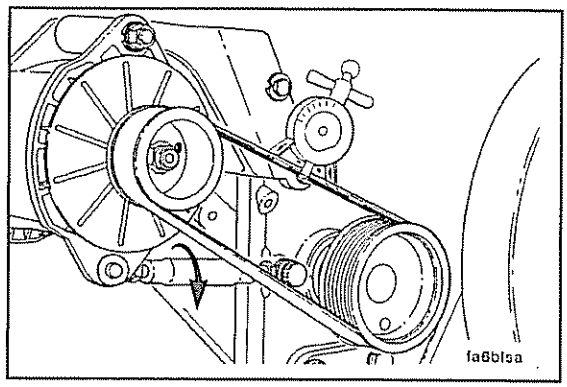
Drive Belts

Maintenance Check

Visually check the belts every 250 hours or 6 months. Replace the belts that are cracked or frayed. Adjust belts that have a glazed or shiny surface which indicates belt slippage. Correctly installed and tensioned belts will show even pulley and belt wear.

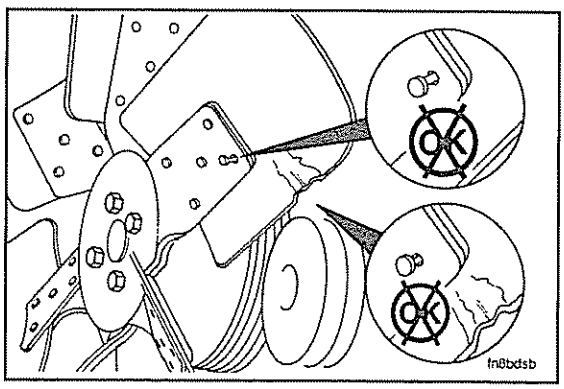
Belt damage can be caused by:

- Incorrect tension
- Incorrect size or length
- Pulley misalignment
- Incorrect installation
- Severe operating environment
- Oil or grease on the belts



Measure the belt tension in the center span of the pulleys. Refer to the manufacturer's recommendations for the use of the belt tension gauge. Refer to Section V in this manual for the correct gauge and tension value for the belt width used and for additional needed information.

Do **not** measure the belt tension when using a fan idler pulley. The spring loaded idler used on this design maintains the correct belt tension.



Fan, Cooling

Maintenance Check

⚠ WARNING ⚠

Personal injury can result from a fan blade failure. Never pull or pry on the fan. This can damage the fan blade(s) and cause fan failure.

NOTE: Rotate the crankshaft by using the engine barring gear only.

Check the cooling fan every 250 hours or 6 months. Check for cracks, loose rivets, and bent or loose blades. Check the fan to make sure it is securely mounted. Tighten the capscrews if necessary. Replace any fan that is damaged.

Refer to Section A, Fan Belt, of this manual for adjustment procedures.

Maintenance Procedures at 2,000 Hours or 1 Year

Section Contents

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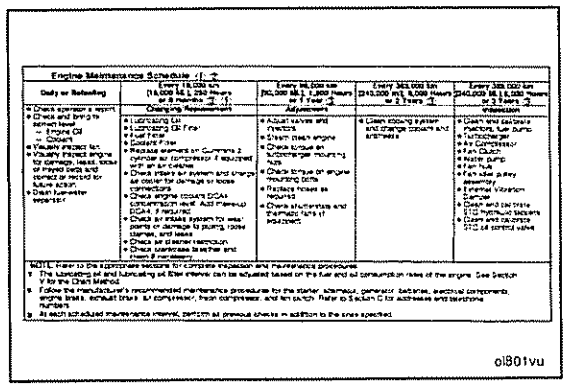
Maintenance Procedures - General Information

General Information

All checks or inspections listed under the previous maintenance intervals **must** also be performed at this time in addition to those listed under this maintenance interval.



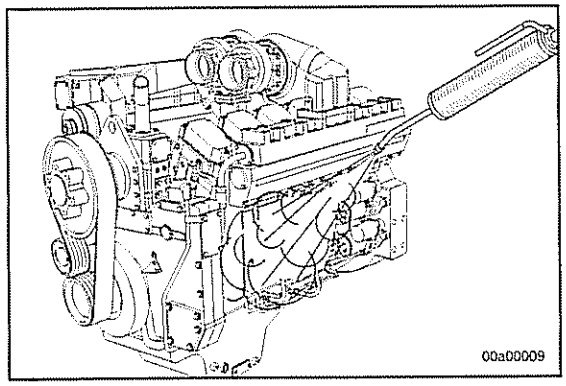
Engine Steam Cleaning

⚠ CAUTION ⚠

Cover all engine openings and electrical equipment to prevent water damage.

Steam clean the engine **before** conducting any 2,000 hour maintenance. Steam is the best method of cleaning a dirty engine or a piece of equipment. If steam is **not** available, use a solvent to wash the engine.

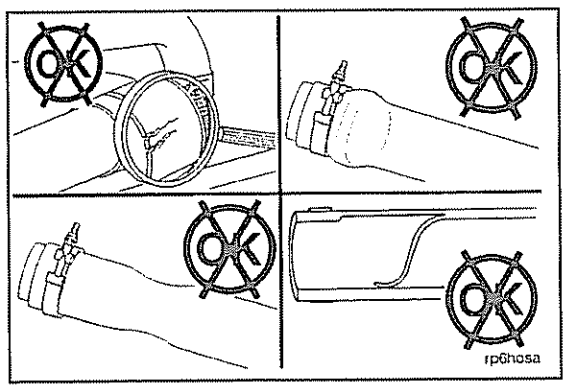
Protect all electrical components, openings, and wiring from the full force of the cleaner spray nozzle.



Hoses, Engine

Maintenance Check

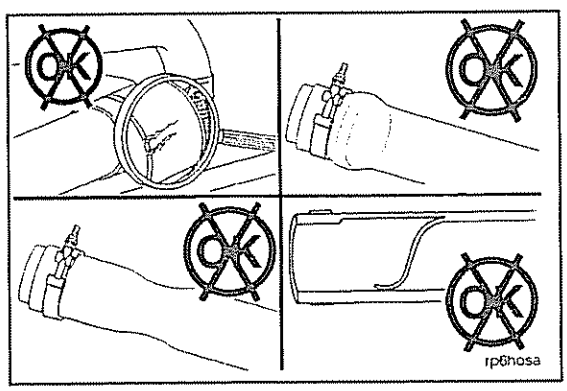
Annually inspect the bypass oil filter and cooling system hoses and hose connections for leaks or deterioration. Particles of deteriorated hose can be carried through the cooling system or lubricating system and restrict or clog small passages, especially radiator core, and lubricating oil cooler, and partially stop circulation. Replace as necessary.

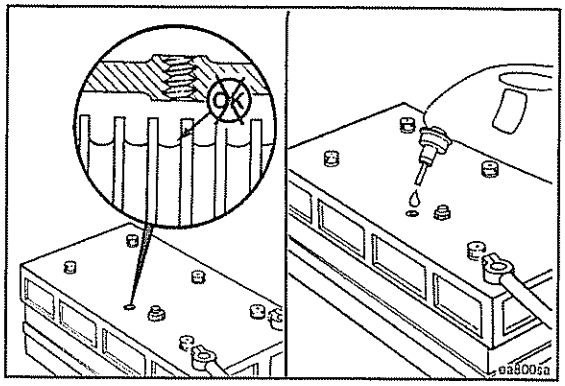


Water line hoses can balloon when a remote, high mounted radiator is used. The radiator height above the crankshaft centerline **must not** exceed the maximum specification.

MAX 18.8 m [60 feet]

Water hoses do **not** normally collapse, but this can occur if the radiator tubes become clogged with scale or debris.





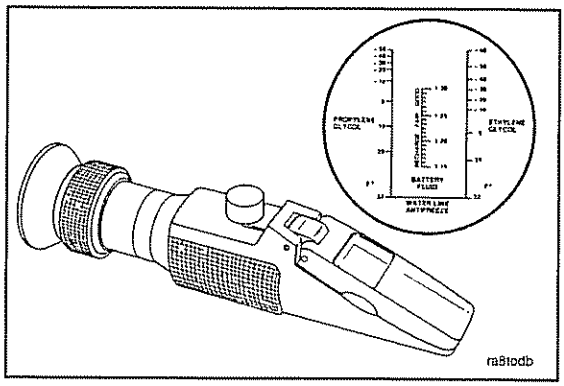
Batteries

Maintenance Check

If conventional batteries are used, remove the cell caps or covers and check the electrolyte (water and sulfuric acid solution) level.

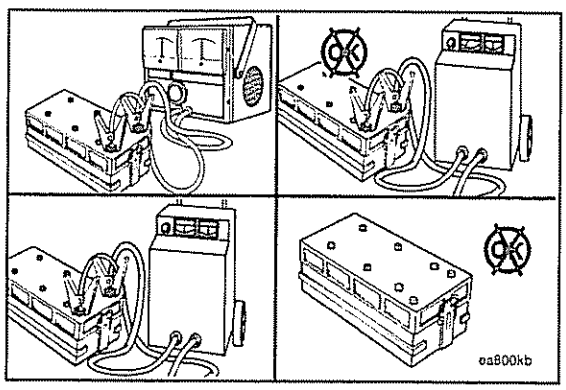
Maintenance-free batteries are sealed and do **not** require the addition of water.

Fill each battery cell with distilled water. Refer to the manufacturer's specifications.



Use the Fleetguard® refractometer, Part No. CC-2800, to check the condition of the battery.

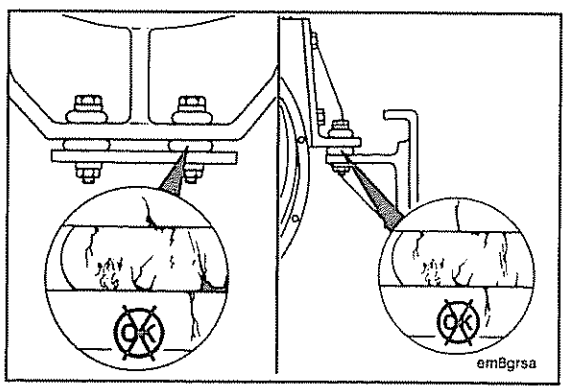
Refer to the battery fluid column in the refractometer to determine the state-of-charge of each battery cell.



Use battery tester, Part No. 3377193, to test the state-of-charge of maintenance-free batteries.

If the state-of-charge is low, use a battery charger to charge the battery. Refer to the manufacturers instructions. Refer to Section A for battery connection information.

Replace the battery if it will **not** charge to the manufacturer's specifications or will **not** maintain a charge.



Engine Mounts

Maintenance Check

Check the torque on the nuts and bolts annually. Tighten any that are loose. Inspect the rubber for deterioration and age hardening. Replace any broken or lost bolts, capscrews or damaged rubber.

Capscrew size and grade vary with the flywheel housing and mounting arrangement. Determine the size and grade of the mounting bolts. Refer to the capscrew torque values in Section V of this manual.

Crankshaft

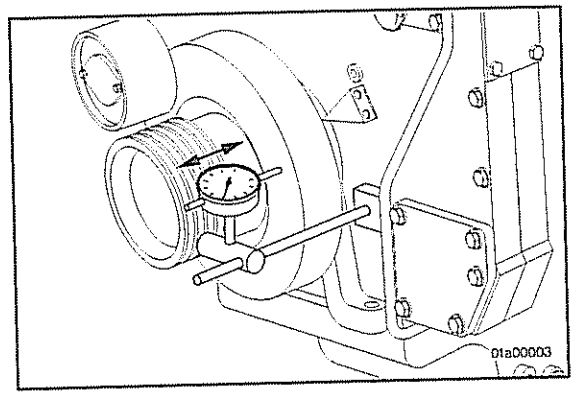
Measure

End Clearance

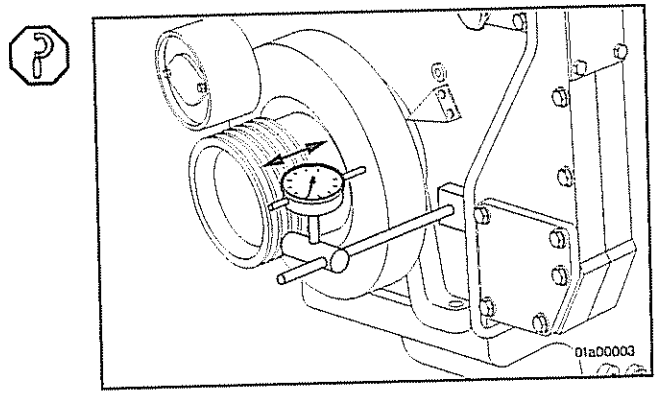
The check can be made by attaching an indicator to rest against the damper or pulley, while prying against the front cover and inner part of the pulley or damper. End clearance **must** be present with the engine mounted in the unit and assembled to the transmission or converter.

⚠ CAUTION ⚠

Extreme care MUST be used in prying against the viscous damper. Sharp pry bars can damage the damper casing, resulting in a leak of the viscous fluid and ultimate failure of the damper.



Use a dial indicator to measure the crankshaft end clearance. Measure the clearance.



Crankshaft End Clearance		
mm		in
0.14	MIN	0.006
0.32	MAX	0.013

If the clearance is **not** within specifications, contact your Cummins Repair Location.

Overhead Set

General Information

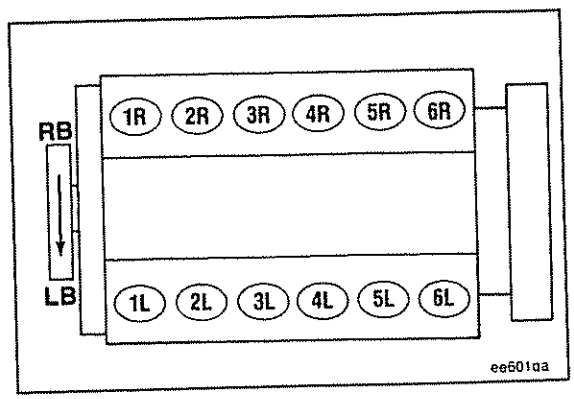
Valves **must** be adjusted correctly for the engine to operate efficiently. Valve adjustment **must** be performed using the values listed in this section.

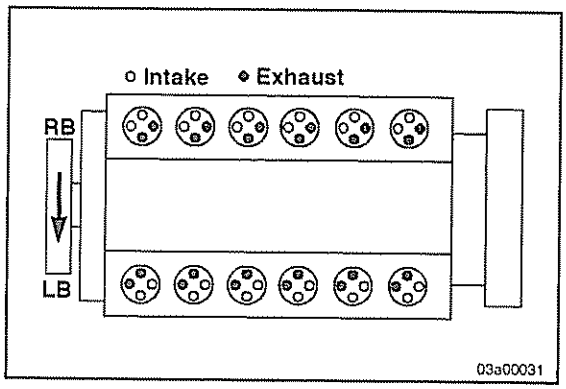
Cummins engines in most applications will **not** experience significant valve train wear after an initial adjustment is made at the 2,000 hours or 1 year interval. After this adjustment, Cummins recommends the valves **not** be adjusted again until the 6000 hour or 2 year injector calibration interval.

Engine firing order:
1R-1L-5R-5L-3R-3L-6R-6L-2R-2L-4R-4L

Cylinders are numbered from the front gear cover end of the engine. To determine the right and left banks on a QST30 engine, stand at the rear of the engine and face the front.

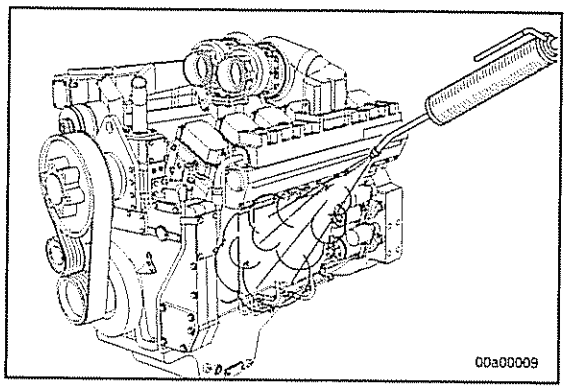
Two crankshaft revolutions are required to adjust all of the valves.





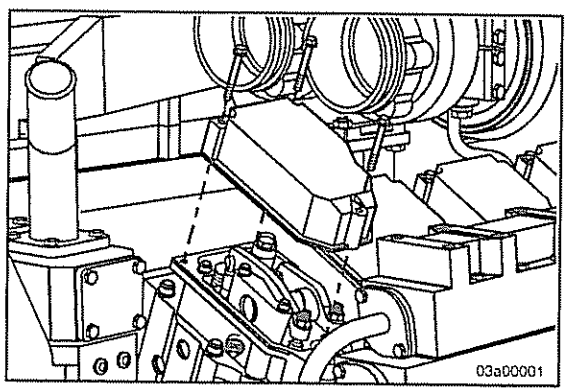
Each cylinder has two rocker levers. On the left bank, the lever nearest to the rear of the engine is the intake lever. On the right bank, the exhaust valve is nearest to the rear.

One pair of valves are adjusted at each index mark before rotating the engine to the next index mark.

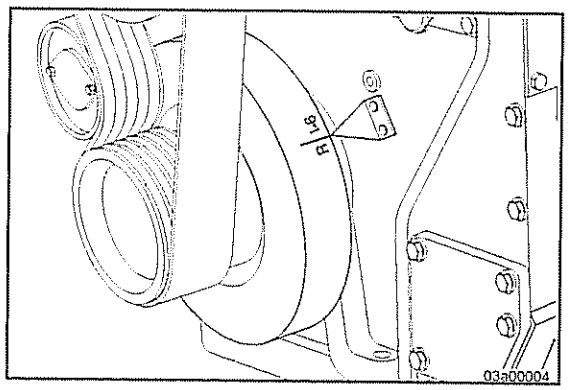


Preparatory

If you have **not** previously cleaned the engine, steam clean the engine now to prevent dirt from entering the engine when the valve covers are removed. Refer to Steam Engine Cleaning in this section of the manual.

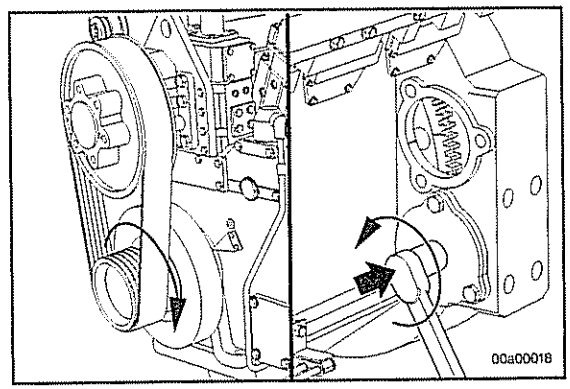


Remove the rocker lever covers and all related components.



Valve adjustment marks are on the vibration damper. The marks **must** be aligned with the pointer.

Rotate the engine **clockwise**, as the arrow on the pulley indicates, with a barring device.



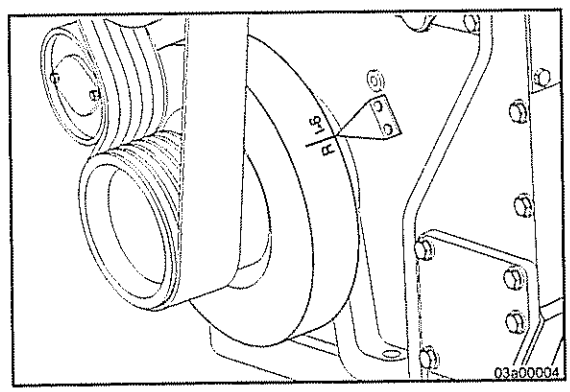
The firing order for QST30 engines is 1R - 1L - 5R - 5L - 3R - 3L - 6R - 6L - 2R - 2L - 4R - 4L.

Determine the Cylinder in Position for Valve Set

The direction of the normal rotation for QST30 engines is **clockwise** when viewing the **front** of the engine.

The crossheads and valves are ready to be adjusted on the cylinder that has all the valves closed.

Check the two cylinders shown on the mark.

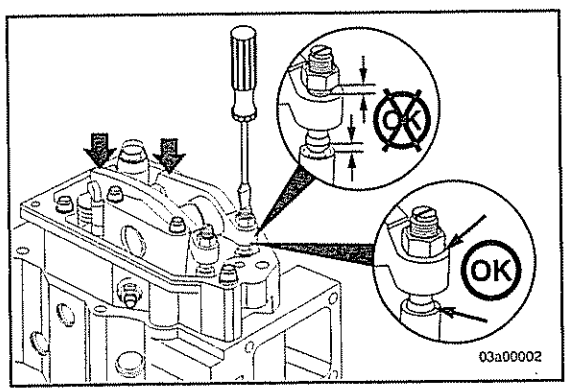


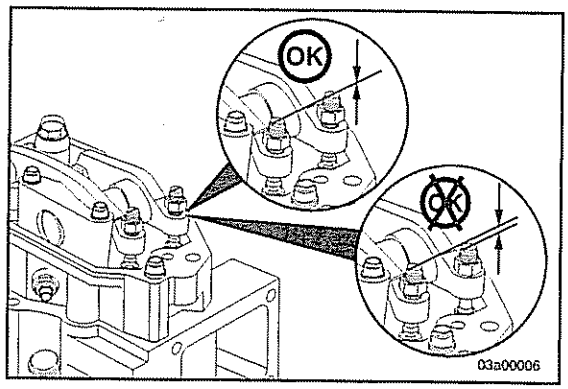
If the rocker lever assemblies have been removed, use this step to determine the cylinder to set.

All adjusting screws **must** be loose on all cylinders, and the push rod **must** remain in alignment.

NOTE: Perform this step on both cylinders to be checked.

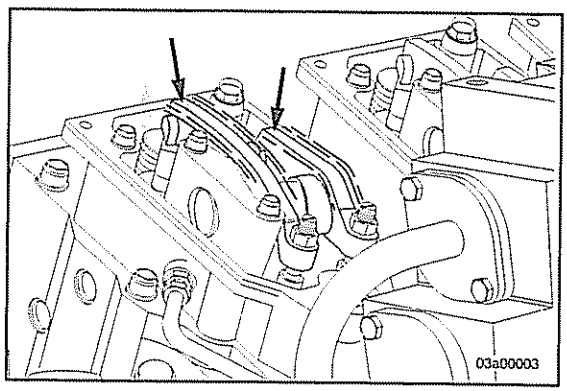
Hold both rocker levers against the crossheads. Turn the adjusting screws until they touch the push rods. Turn the locknuts until they touch the levers.



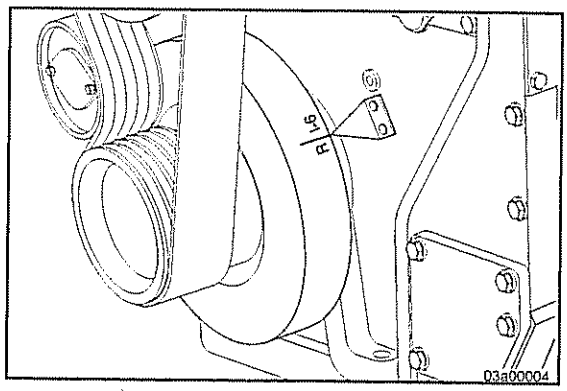


The cylinder with the adjusting screws that are nearly the same height is ready for valve adjustment. The second cylinder that is **not** ready for adjustment will have the adjusting screw for the intake valves more than five threads above the exhaust screw.

The push rods will be close to the same height above the top of the rocker lever housing on the cylinder ready for valve adjustment.



If the rocker levers have **not** been removed and installed again, wiggle the valve rocker levers on the two cylinders in question. The crossheads and valves on the cylinder where both levers feel loose are ready to adjust.



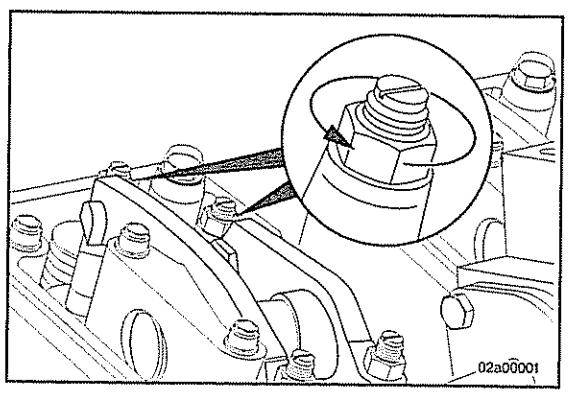
⚠ CAUTION ⚠

Use the correct firing order for the engine being serviced or the parts will be damaged.

NOTE: Adjustment can begin on any valve set mark. In the example, assume the **R1–6** mark is aligned and the adjusting screw height for the valve on cylinder No. 1 **right** bank is the same, indicating the valve is closed and ready to adjust.

After identifying which cylinder is ready to be adjusted, follow the QST30 firing order for subsequent adjustments.

The firing order for QST30 engines is 1R - 1L - 5R - 5L - 3R - 3L - 6R - 6L - 2R - 2L - 4R - 4L.



Adjust

Crosshead Adjustment

NOTE: Crosshead adjustment **must always** be made before attempting to adjust the valves.

Adjust the crossheads on the cylinder that has both valves closed.

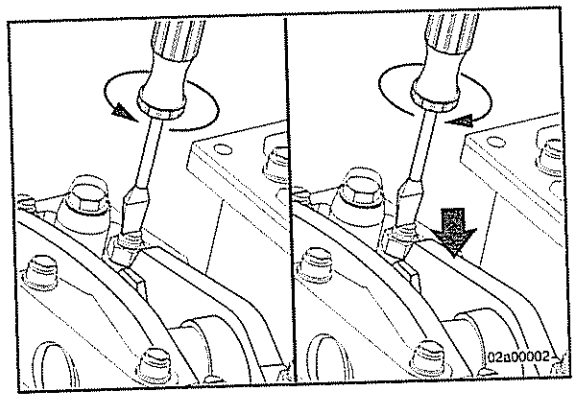
Loosen the crosshead adjusting screw locknuts on the intake and exhaust valve crossheads.

Use the following procedure to adjust both the intake and exhaust crossheads.

Turn the adjusting screw out at least one turn.

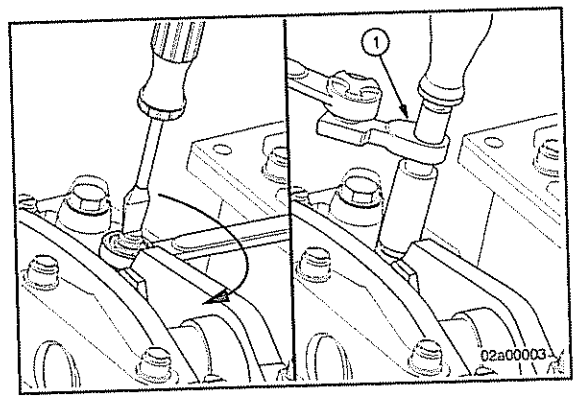
Hold the crosshead down against its guide.

Turn the adjusting screw in until it touches the top of the valve stem but does **not** raise the crosshead.



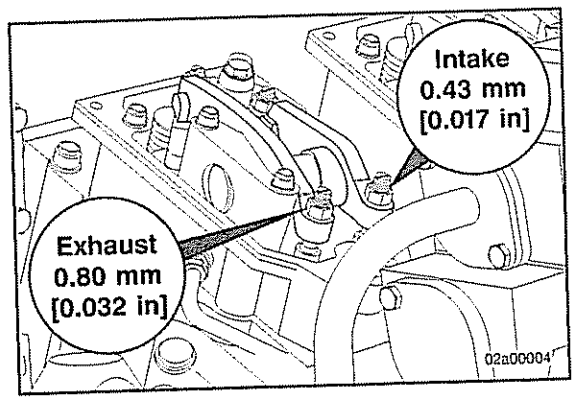
Hold the adjusting screw in this position. The adjusting screw **must not** turn when the lock nut is tightened to its torque value. Tighten the lock nut. The following torque values are given with and without Part No. ST669, Torque Wrench Adapter (1):

Torque Value:		
With Adapter	45 N•m	[35 ft-lb]
Without Adapter	60 N•m	[45 ft-lb]

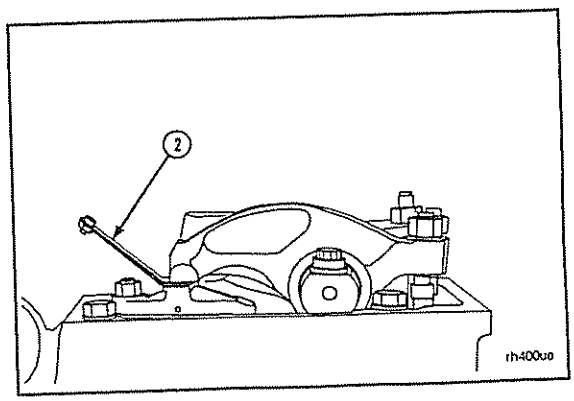


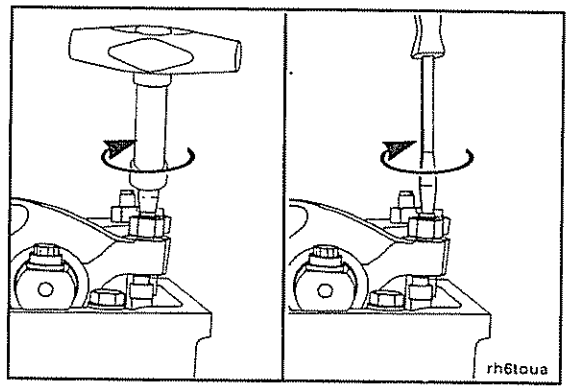
Valve Adjustment

Exhaust	0.80 mm	[0.032 in]
Intake	0.43 mm	[0.017 in]



Select a feeler gauge for the correct valve lash specification. Insert the gauge (2) between the rocker lever and the crosshead.



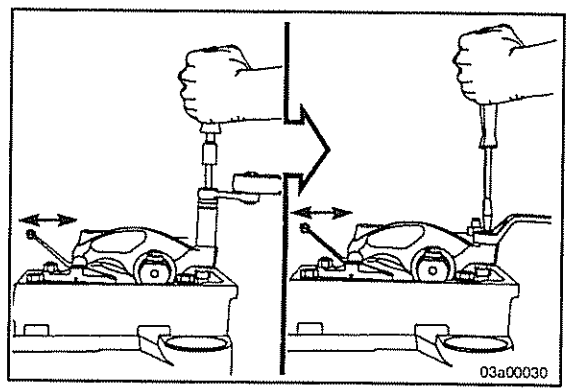


Two different methods for establishing valve lash clearance are described below. Either method, Torque Wrench Method or Feel Method, can be used; however, the torque wrench method has proven to be the most consistent.

Torque Wrench Method

Inch Pound Torque Wrench, Part No. 3376592	0.68 N•m	[6 in-lb]

Feel Method: Use a screwdriver and turn the adjusting screw ONLY until the lever touches the feeler gauge.

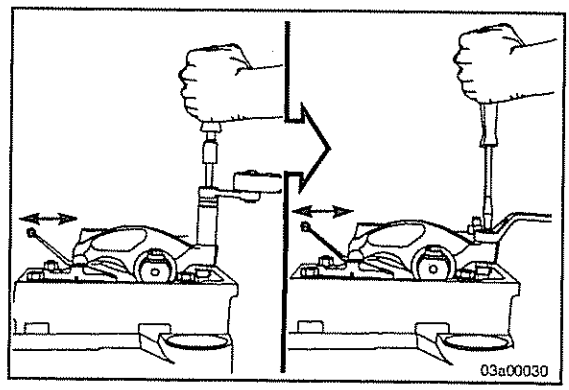


The adjusting screw **must not** turn when the locknut is tightened.

Tighten the locknut to the torque value indicated below.

Torque Value:

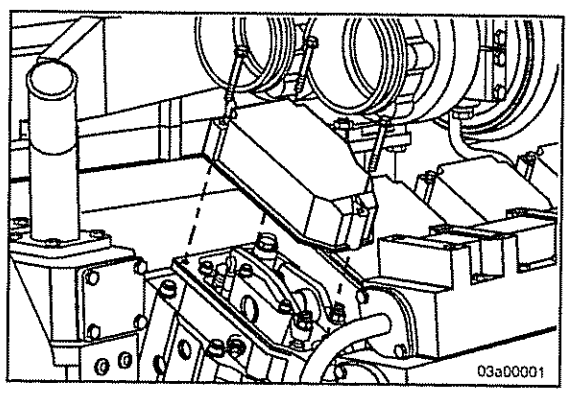
With Adapter, Part No. ST669	45 N•m	[35 ft-lb]
Without Adapter	60 N•m	[45 ft-lb]



The feeler gauge **must** slide backward and forward with only a slight drag.

Attempt to insert a feeler gauge that is 0.03 mm [0.001 inch] thicker. The valve lash is **not** correct when the thicker gauge will fit.

Repeat the adjustment process until the clearance is correct on both the intake and the exhaust valves on the cylinder being adjusted.



Install the rocker lever cover with a new gasket.

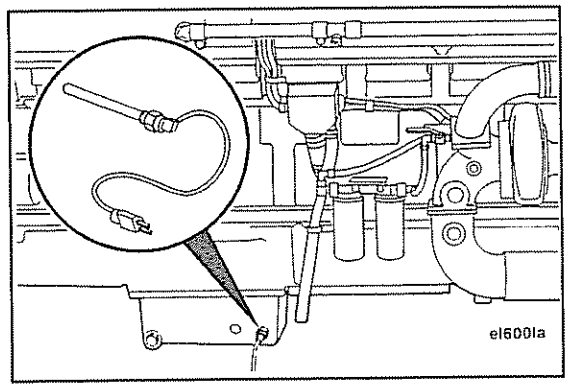
Tighten the capscrews.

Torque Value: 7 N•m [62 in-lb]

Engine Oil Heater

Maintenance Check

Check the engine oil heater (oil pan heater) for proper operation. If operating properly, the oil pan will be warm. Inspect for loose connections, frayed wires, and oil leaks. Repair or replace as needed.

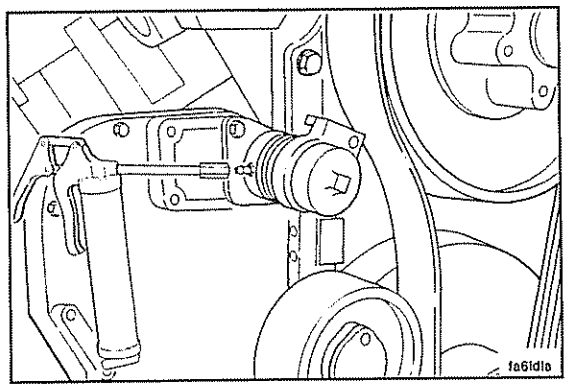


Fan Drive Idler Pivot Arm Assembly

Maintenance Check

Use water pump type grease listed below, or its equivalent, to lubricate the pivot arm assembly. Lubricate the pivot arm until grease appears from under the cap.

Supplier	Compound
Amoco Oil Company	Rykon Premium No. 2
	Rykon Premium No. 2 EP
Chevron U.S.A., Inc.	SRI
Exxon Company, U.S.A.	Unirex N2
Shell Oil Company	Dolium R
Texaco Inc.	Premium RB



Drive Belt, Cooling Fan

Adjust

There is no adjustment required for engines equipped with a shock absorber.

Back Side Idler System

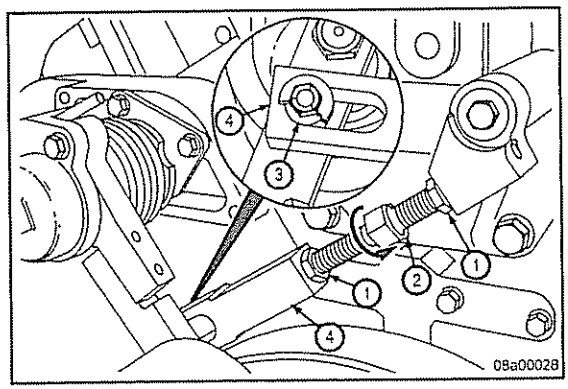
Control Rod

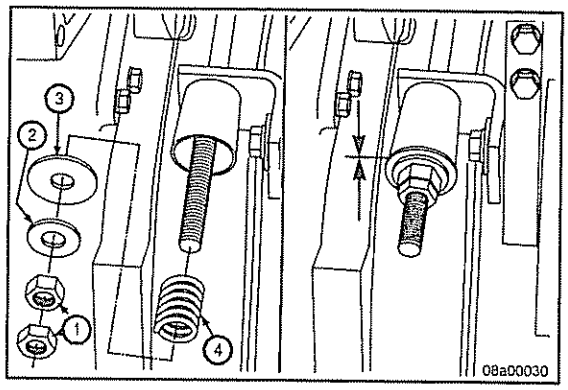
The fan belt **must** be installed and under the tension of the fan idler arm spring to adjust the control rod. The fan belt and a portion of the flat washer are **not** shown for clarity.

Turn the adjusting screw (2) until the end of the slot on the **lower** control rod end (4) is touching the spacer (3).

NOTE: One of the nuts has left-hand threads.

Hold the adjusting screw and tighten the two jam nuts (1).



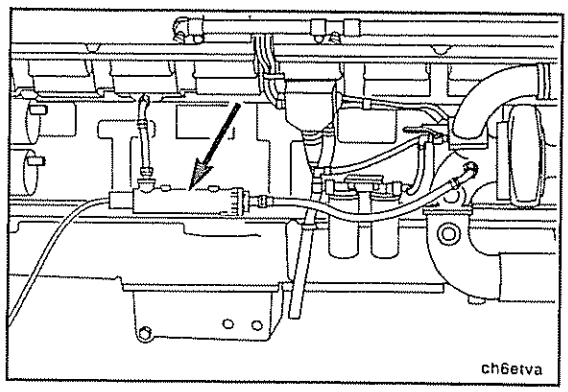


Control Rod with Spring

⚠ CAUTION ⚠

Do NOT tighten the inner jam nut excessively. If the jam nut is too tight, the spring retainer will bend, causing the control rod to fail.

Turn the **inner** jam nut until the spring (4) retainer washers (2,3) touch the cylinder on the lower control rod end. Hold the **inner** jam nut and tighten the **outer** jam nut (1).



Coolant Heater

Maintenance Check

Check the coolant heater (engine coolant preheater) for proper operation. Check for loose connections, frayed wires, and coolant leaks. Clean the alkali and sludge from the unit.

Check the lines which take coolant from the coolant heater to the engine block to determine that they are flexible. These lines normally consist of steel tubing connected with silicone hose.

Do **not** replace the silicone hose with normal radiator hose as it becomes too brittle and breaks.

NOTE: The outlet connection from the coolant heater will experience a large number of thermal cycles and thus **must** be of high quality with specific operating capabilities.

Replacement hose material for the coolant heater to the block hose connection **must** be a polyester reinforced silicone rubber material, capable of 120°C [250°F] temperatures and a minimum working pressure rating of 689 kPa [100 psi].

Replacement Temperature Capability	120 °C	[250 °F]
Minimum Working Pressure Rating	689 kPa	[100 psi]

Maintenance Procedures at 6,000 Hours or 2 Years

Section Contents

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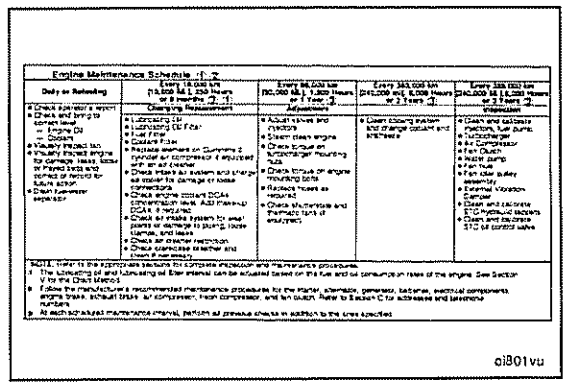
Maintenance Procedures - General Information

General Information

All checks or inspections listed under the previous maintenance intervals **must** also be performed at this time in addition to those listed under this maintenance interval.

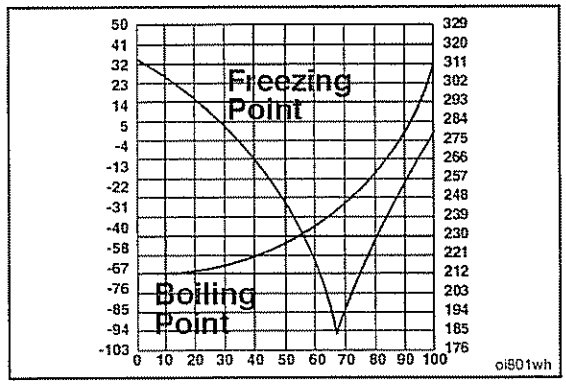


Cooling System

Maintenance Check

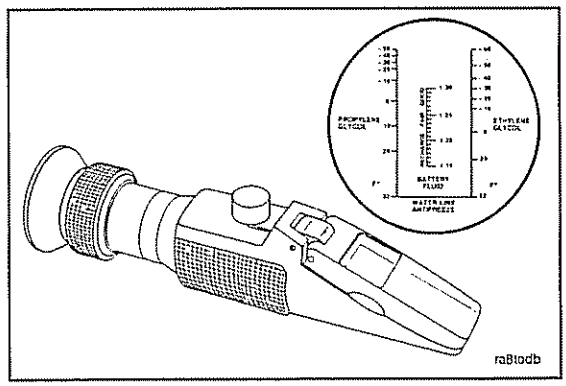
Fully formulated antifreeze **must** be mixed with quality water at a 50/50 ratio (40 to 60% working range). A 50/50 mixture of antifreeze and water gives a −36°C [−34°F] freeze point and a boiling point of 110C [228F], which is adequate for locations in North America. The actual lowest freeze point of ethylene glycol antifreeze is at 68%. Using higher concentrations of antifreeze will raise the freeze point of the solution and increase the possibility of a silicate gel problem.

Refer to Section V for water and antifreeze recommendations.



The Fleetguard® refractometer, Part No. C2800, provides a reliable, easy to read, and accurate measurement of freeze point protection and glycol (antifreeze) concentration.

The freeze point protection **must** be checked if coolant is added to the cooling system. Refer to the manufacturer's instructions for correct operation.



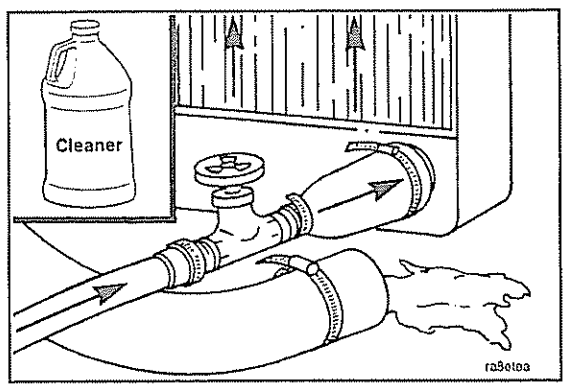
Clean

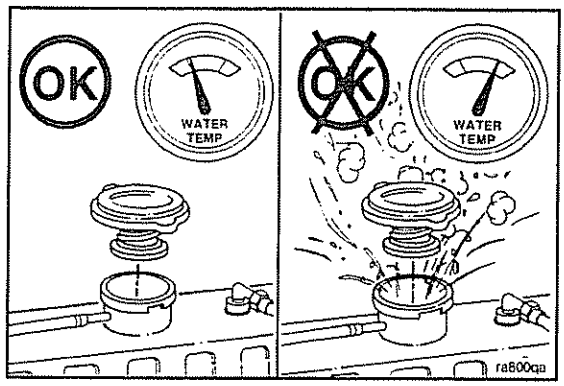
Every 6,000 hours or 2 years of operation, whichever comes first, change the coolant and antifreeze.

⚠ CAUTION ⚠

Do not use caustic cleaners in the cooling system. Aluminum components will be damaged.

The cooling system **must** be clean to work correctly and to eliminate buildup of harmful chemicals.

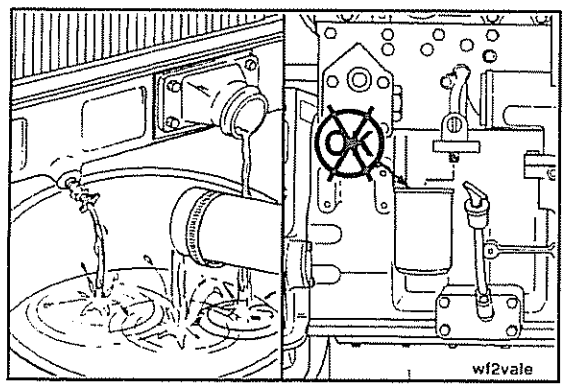




⚠ WARNING ⚠

Wait until the temperature is below 50°C [120°F] before removing the coolant system pressure cap. Failure to do so can cause personal injury from heated coolant spray.

RESTORE is a heavy duty cooling system cleaner which removes corrosion products, silicate gel and other deposits. The performance of RESTORE is dependent on time, temperature, and concentration levels. An extremely scaled or flow restricted system, for example, can require higher concentrations of cleaners, higher temperatures, or longer cleaning times or the use of RESTORE PLUS. Up to twice the recommended concentration levels of RESTORE can be used safely. RESTORE PLUS **must** be used only at its recommended concentration level. Extremely scaled or fouled systems can require more than one cleaning.

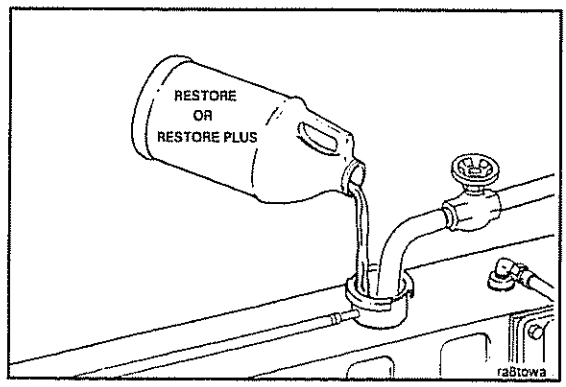


⚠ WARNING ⚠

Coolant may be toxic. Keep away from children and pets. Dispose of in accordance with local environmental regulations.

Drain the cooling system. Do **not** allow the cooling system to dry out.

Do **not** remove the coolant filter.



△ CAUTION △

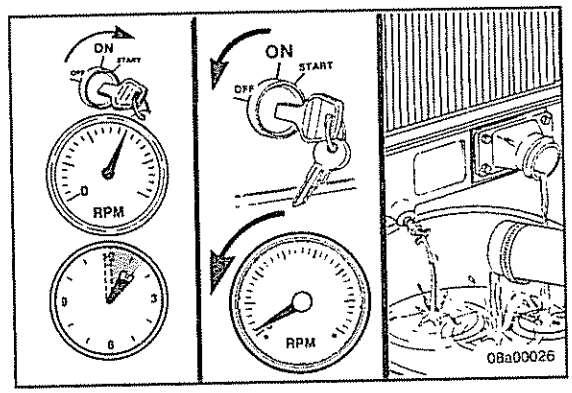
Fleetguard® RESTORE contains no antifreeze. Do not allow the cooling system to freeze during the cleaning operation.

Immediately add 3.8 liters [1 U.S. gal.] of Fleetguard® RESTORE, RESTORE PLUS, or equivalent, for each 38 to 57 liters [10 to 15 U.S. gal.] of cooling system capacity, and fill the system with plain water.

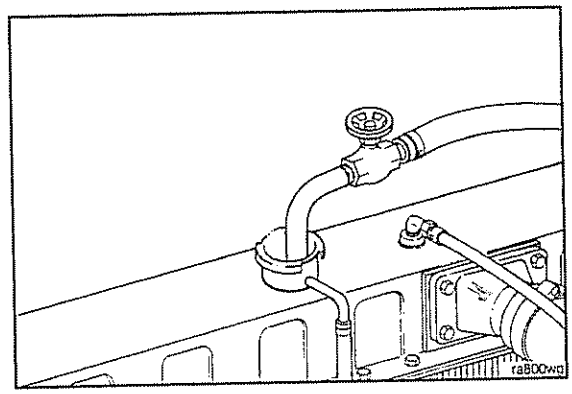
Turn the heater temperature switch to high to allow maximum coolant flow through the heater core. The blower does **not** have to be on.

Operate the engine at normal operating temperatures, at least 85°C [185°F], for 1 to 1–1/2 hours.

Shut off the engine and drain the cooling system.



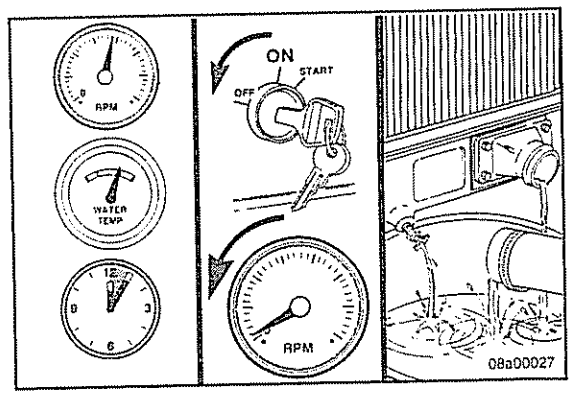
Fill the cooling system with clean water.



Operate the engine at high idle for five minutes with the coolant temperature above 85°C [185°F].

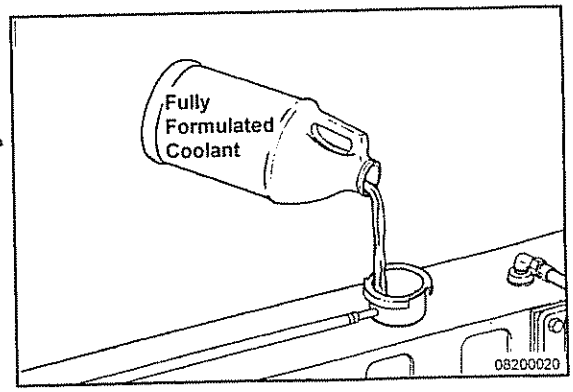
Shut off the engine and drain the cooling system.

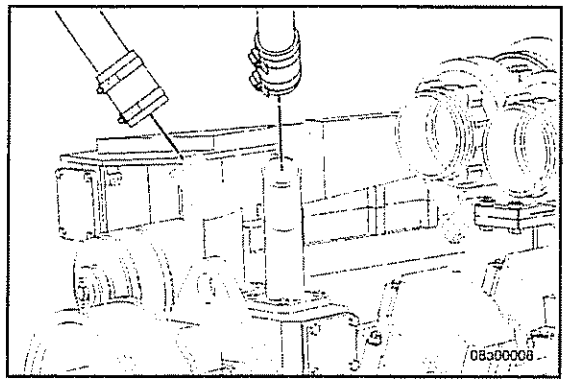
If the water being drained is still dirty, the system **must** be flushed again until the water is clean.



Fill the cooling system with **Fully Formulated Coolant** or a 50/50 mixture of **Fully Formulated Antifreeze** and good quality water. Use a service filter to bring the coolant to the correct SCA concentration level. Refer to the Coolant Specifications in Section V.

Install the pressure cap. Operate the engine until it reaches a temperature of 80°C [180°F], and check for coolant leaks.

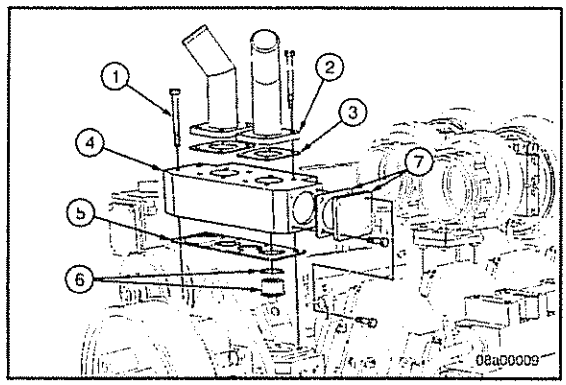




Coolant Thermostat Housing

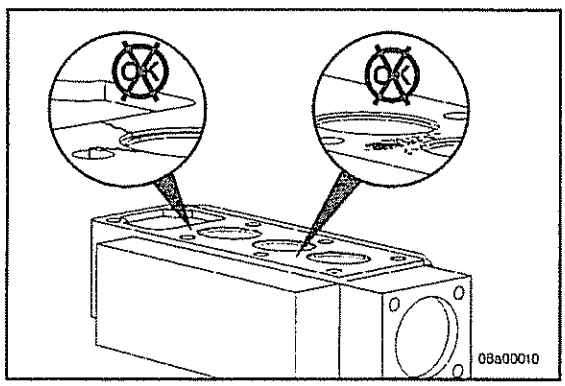
Remove

Remove both upper radiator hoses from the thermostat housing.

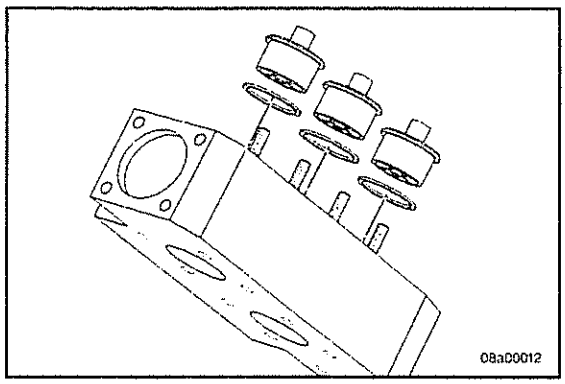


Remove the:

1. ten capscrews
2. connections
3. connection gaskets
4. thermostat housing
5. thermostat housing gasket
6. thermostats and seals
7. cover and vent connection



Clean and inspect the thermostat housing for cracks, pitting or other damage.



Install

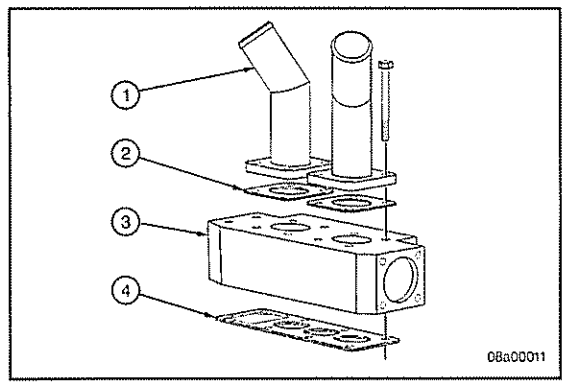
⚠ CAUTION ⚠

Tilt the housing to prevent the thermostats from falling out.

Install the thermostats and seals into the thermostat housing.

Install the following in the thermostat housing:

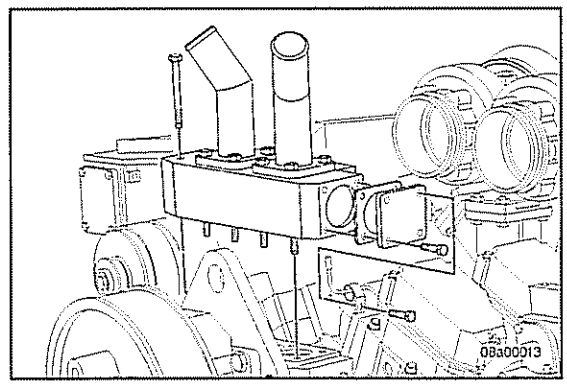
1. water outlet connections
2. connection gaskets
3. thermostat housing
4. thermostats housing gasket.



Install the thermostat housing, vent line support brackets, and the two remaining capscrews on the engine. Tighten all the capscrews.

Torque Value: 60 N•m [45 ft-lb]

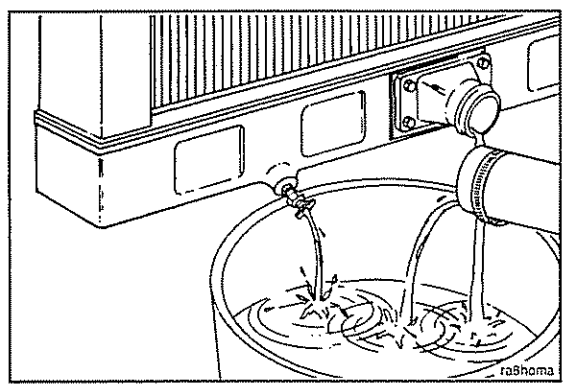
Install the cover and vent connection.



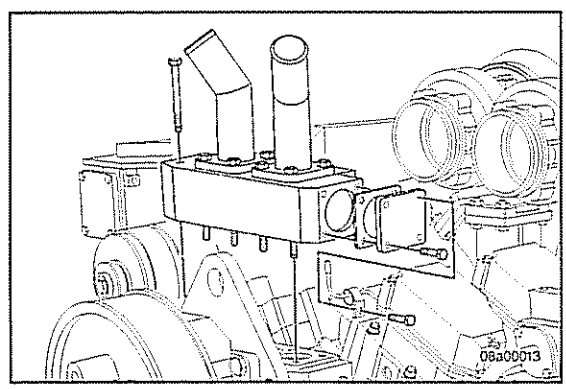
Coolant Thermostat

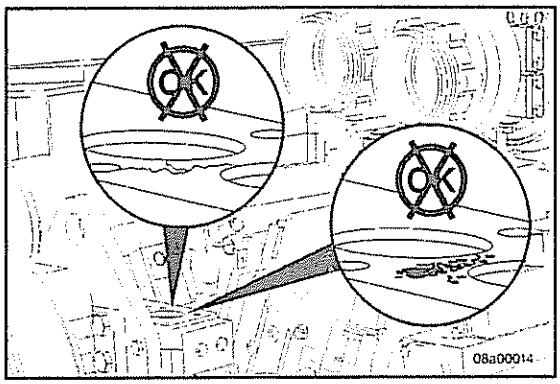
Remove

Drain the cooling system. Refer to Section V for further information.

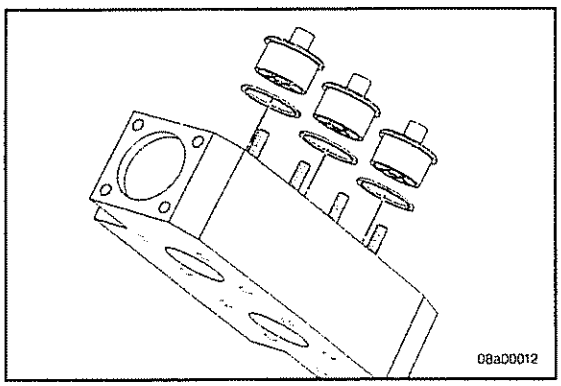


Remove the thermostat housing.



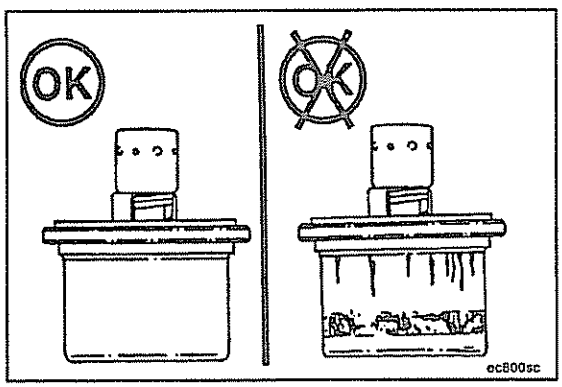


Check the housing support for damage.



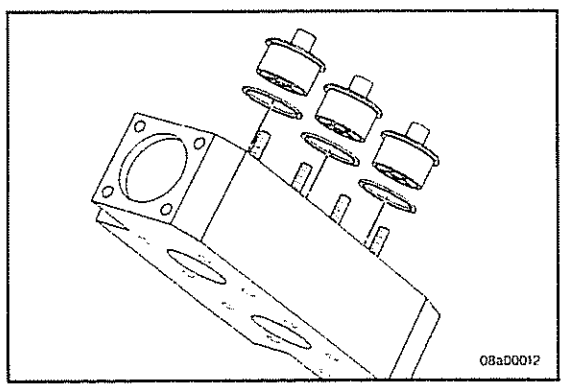
Remove the thermostats and seals.

Clean all gasket surfaces and bores.



Inspect for Reuse

Check the thermostat for wear or damage. If the barrel of the thermostat is worn or fretted, it **must** be discarded.

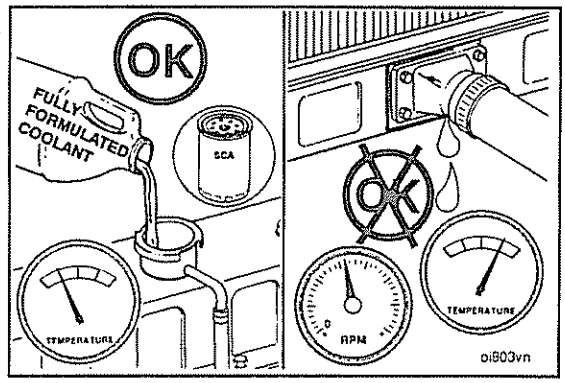


Install

Install the thermostat by pushing on the outer rim. Install the thermostats into the housing and the housing onto the engine.

Fill the cooling system.

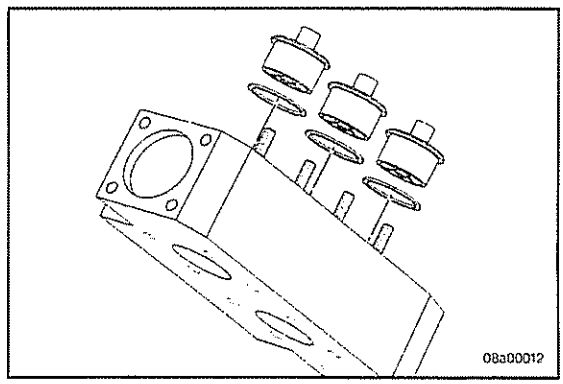
Operate the engine to 70°C [160°F] coolant temperature and check for leaks.



Coolant Thermostat Seal

Remove

Remove the thermostats from the housing. Remove the seals from the housing. Discard the seals.

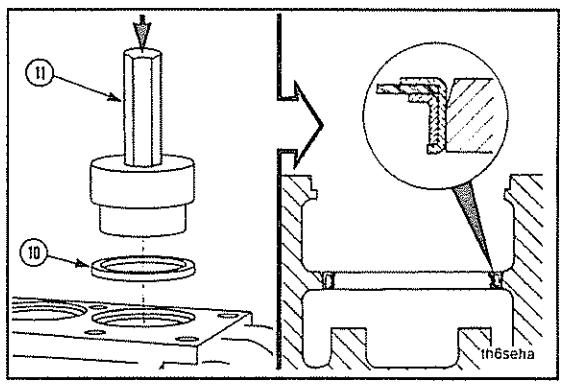


Install

The seal **must** be installed with the seal lip positioned up.

Use a mallet and Thermostat Seal Driver, Part No. ST1225, to install the thermostat seal. Install the seal.

NOTE: Install the seal no more than 0.51 mm [0.020 in] below the top of the cast edge.

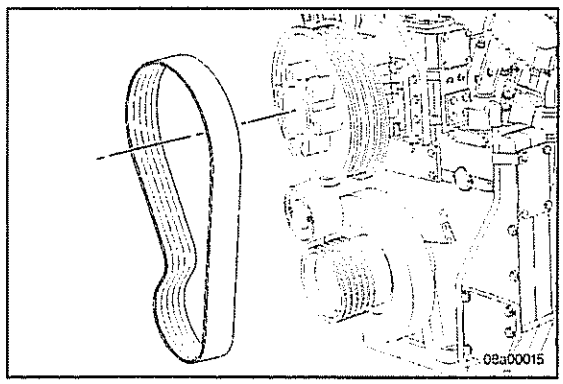


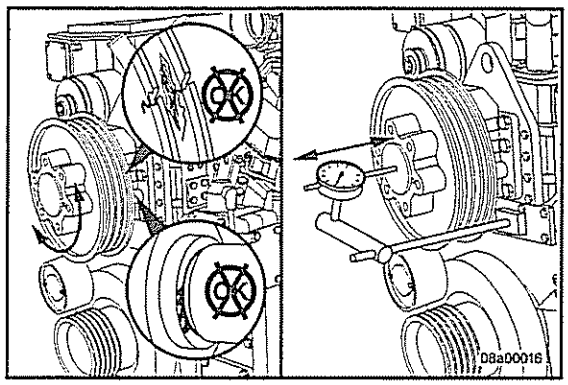
Fan Hub, Belt Driven

Maintenance Check

Every 6,000 hours or 2 years inspect the fan hub for proper end clearance and grease leakage.

Remove the fan belt. Refer to Section A for this procedure.

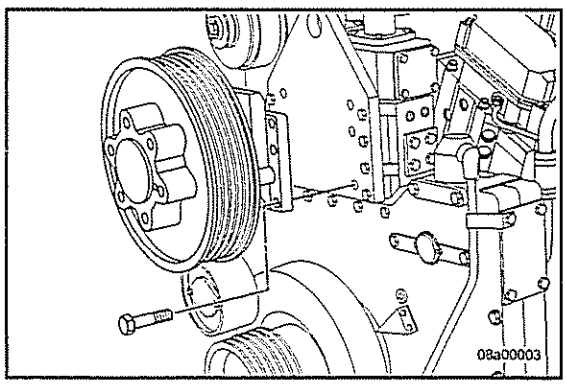




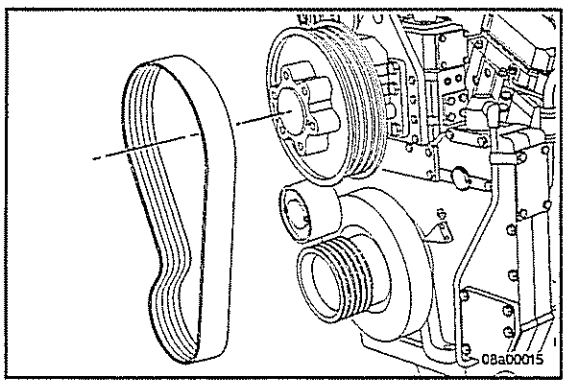
Inspect for Reuse

Rotate the fan hub pulley to check for rough or damaged bearings. Inspect the pulley grooves for excessive wear. Check for grease leakage. Use a dial indicator to check the bearing end clearance.

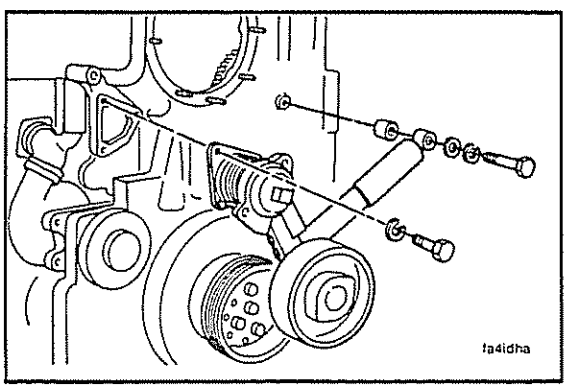
Fan Hub Bearing End Clearance		
mm		in
0.03	MIN	0.001
0.15	MAX	0.006



Replace the fan hub with a new or rebuilt unit when necessary.



Install the fan belt. Refer to Section A for the installation procedures.



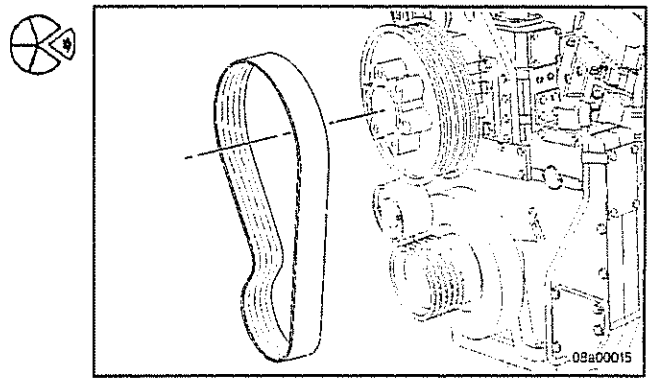
Fan Drive Idler Pulley Assembly

Maintenance Check

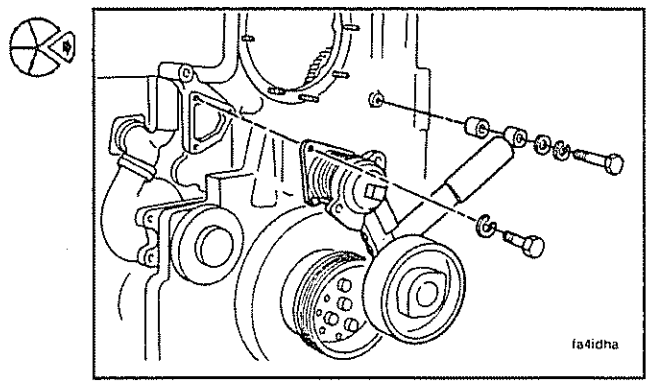
Every 6,000 hours or 2 years inspect the idler pulley assembly. Rebuild or replace the idler pulley as necessary. Refer to Section A for removal and installation procedures.

Remove

Remove the fan belt. Refer to Section A for removal procedures.



Remove the four capscrews, idler assembly and tensioner.



Install

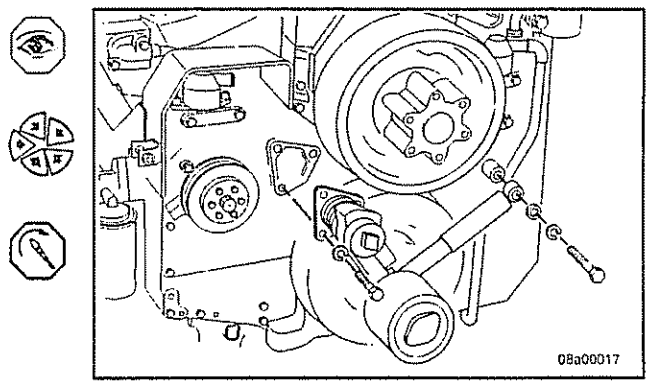
Check to make sure the spring on the idler arm is **not** under tension. This will aid the future installation of the fan hub.

Install the fan belt idler assembly, the three lock washers and capscrews.

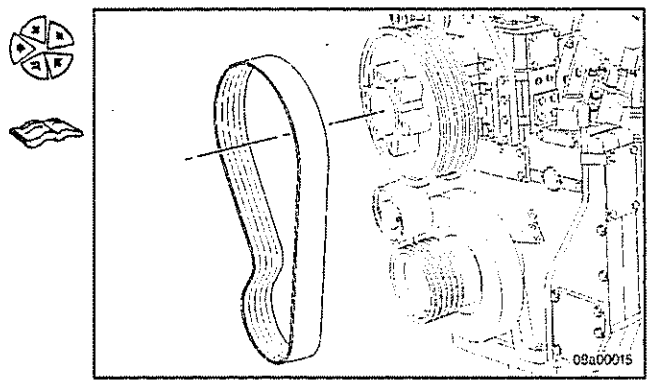
Torque Value: 60 N•m [45 ft-lb]

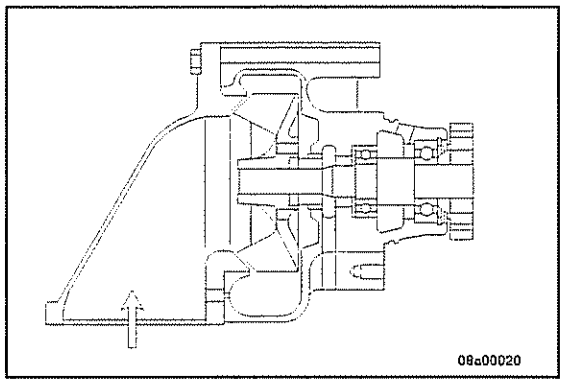
Install the tensioner and capscrews.

Torque Value: 60 N•m [45 ft-lb]



Install the fan belt. Refer to Section A.



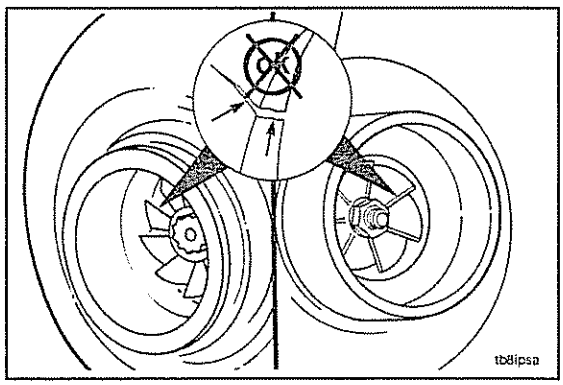


Water Pump

Maintenance Check

Every 6,000 hours or 2 years rebuild or replace the water pump.

NOTE: Prior to the 6,000 hours or 2 years, a minor chemical build up or streaking at the water pump weep hole is normal. Do **not** repair or replace the water pump unless an actual leak is confirmed.



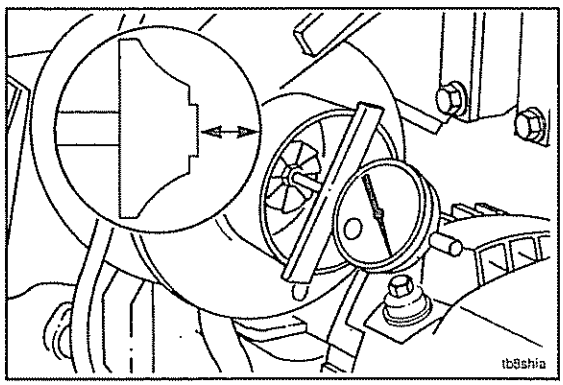
Turbocharger

Maintenance Check

Inspect the turbocharger every 6,000 hours or 2 years. Remove the air intake and the exhaust piping. Check the turbocharger as follows:

Look for damaged or cracked compressor or turbine blades. Check to see that the turbocharger shaft spins freely.

NOTE: If visual inspections or dimensional checks indicate a problem, contact a Cummins Authorized Repair Location for assistance. Refer to the model number on the turbocharger dataplate.



Turbocharger Axial Clearance

Measure

Holset™ Model HX60

Measure the turbocharger shaft end clearance with a Dial Depth Gauge, Part No. ST537.

Turbocharger (HX60) Shaft End Clearance		
mm		in
0.03	MIN	0.001
0.10	MAX	0.004

Turbocharger Radial Bearing Clearance

Measure

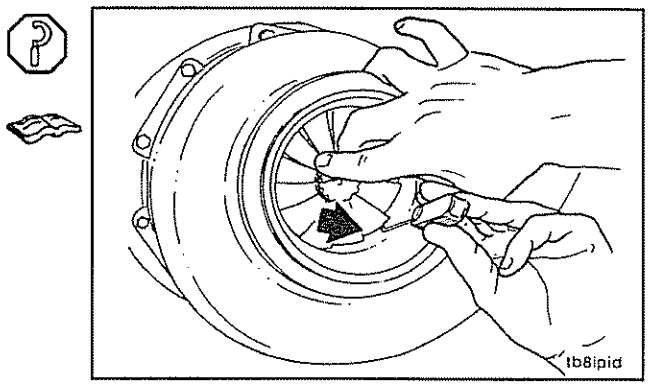
Compressor Impeller

Measure the radial clearance of the compressor impeller.

Hold the impeller TOWARD the housing. Install a wire feeler gauge or a flat feeler gauge with a maximum width of 6.35 mm [0.25 in] at the minimum clearance point between the impeller and the housing.

Compressor Impeller Radial Clearance (HX60)		
mm		in
0.15	MIN	0.006
0.46	MAX	0.018

If the compressor impeller to housing radial clearance does **not** meet the specifications listed, the turbocharger **must** be rebuilt. Refer to a Cummins Authorized Repair Location.



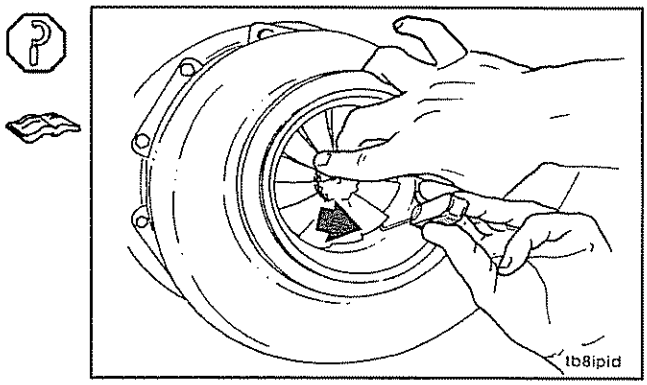
Turbine Wheel

Measure the radial clearance of the turbine wheel.

Hold the turbine wheel TOWARD the housing. Install a wire feeler gauge at the minimum clearance point between the turbine wheel and the housing.

Turbine Wheel Radial Clearance (HX60)		
mm		in
0.20	MIN	0.008
0.53	MAX	0.021

If the turbine wheel to housing radial clearance does **not** meet the specifications listed, the turbocharger **must** be rebuilt. Refer to a Cummins Authorized Repair Location.



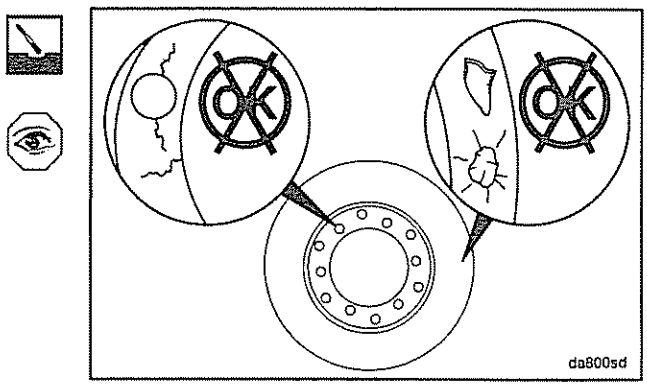
Vibration Damper

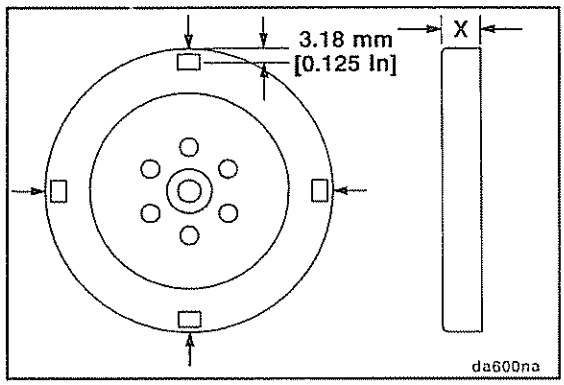
Maintenance Check

NOTE: Vibration dampers have a limited service life. The dampers **must** be inspected every 6,000 hours of service, and **must** be replaced after 24,000 hours in service.

NOTE: Do **not** repair or balance a viscous damper in the field.

- Use solvent. Clean the exterior of the damper.
- Inspect the mounting flange for cracks.
- Inspect the housing for dents, bulges, or leaks.
- Replace the damper if it is damaged.

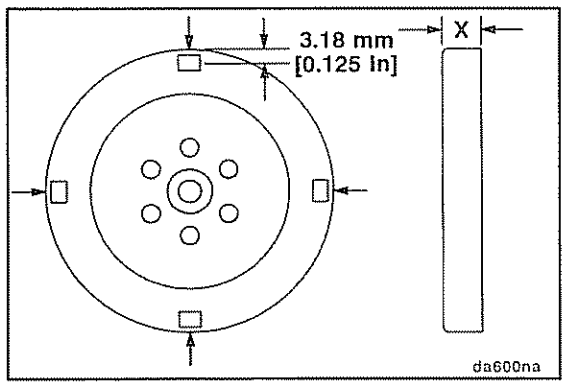




Measure

Use a paint solvent and a fine emery cloth. Remove paint from the front and back of the housing at the four areas as shown in the drawing.

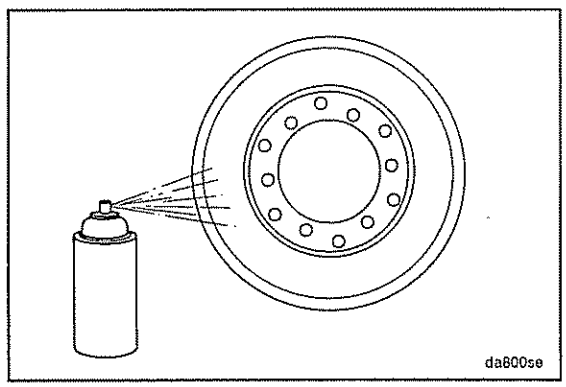
Measure the damper thickness no less than 3 mm [1/8 inch] from the outside circumference to make sure readings are taken on a flat surface.



Measure the thickness (x) at four locations around the damper, 90 degrees apart. The readings **must not** vary more than 0.25 mm [0.010 inch]. If the thickness exceeds these specifications, the damper **must** be replaced.

Thickness 80 mm [3.150 in]

NOTE: If the damper has been in service for 24,000 hours or more, it **must** be replaced, regardless of the thickness measurement.

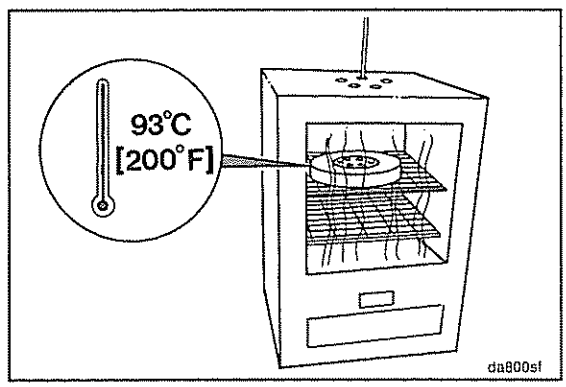


Leak Test

If visual inspection found signs of leaks, thorough leakage detection is required.

Use Crack Detection Developer, Part No. 3375434 or equivalent. Spray the rolled lip of the damper.

NOTE: The Crack Detection Kit, Part No. 3375432, contains the necessary cleaner, the penetrant and the developer to check for cracks using the dye penetrant method.



⚠ CAUTION ⚠

Wear protective clothing to prevent personal injury from burns.

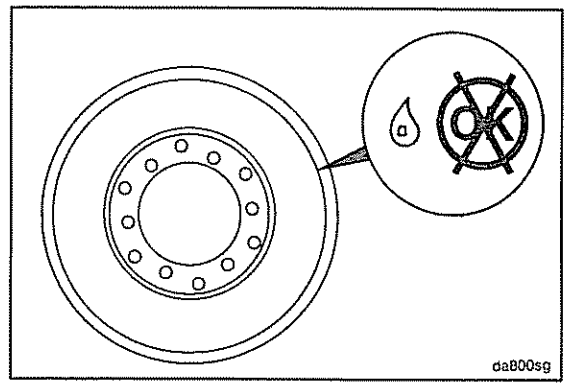
Place the damper in an oven with the rolled lip **toward** the bottom.

Adjust the temperature of the oven to 93° C [200° F] and allow the damper to remain in the oven for 2 hours.

⚠ CAUTION ⚠

Wear protective clothing to prevent personal injury from burns.

Remove the damper and look for fluid leakage around the rolled lip. The damper **must** be replaced if there is any fluid leakage.

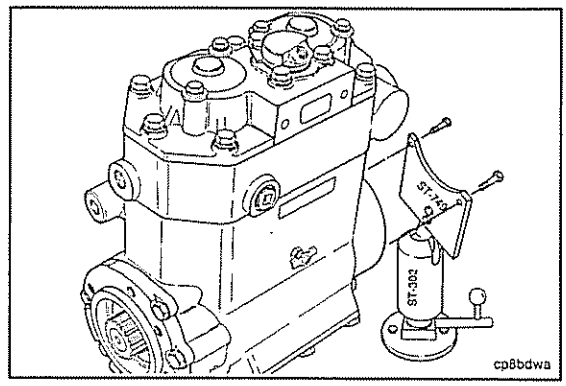


Air Compressor Carbon Buildup

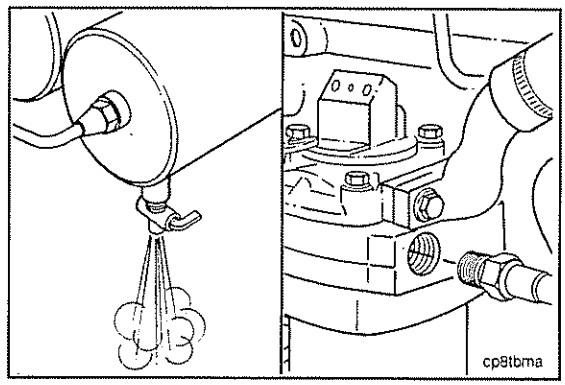
Maintenance Check

Complete air compressor inspection is required every 6,000 hours or 2 years.

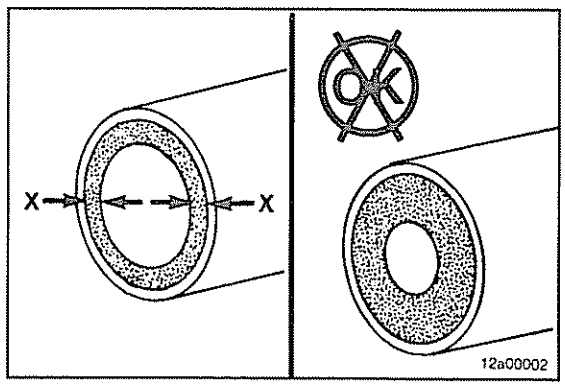
NOTE: All air compressors have a small amount of oil carryover which lubricates the piston rings and moving parts. When this oil is exposed to normal air compressor operating temperatures over a period of time, it will form varnish or carbon deposits. If the following inspections are **not** done, the air compressor piston rings will be effected by high operating temperatures and pressures, and will **not** seal correctly.

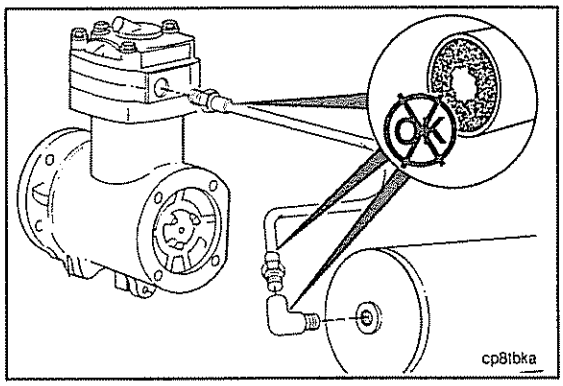


Drain the air system wet tank to release the system air pressure. Remove the air discharge line from the air compressor.

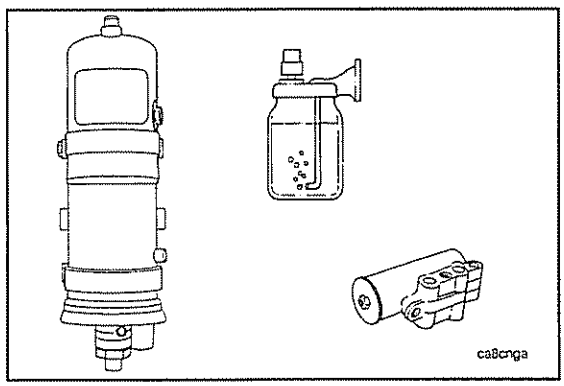


Measure the total carbon deposit thickness inside the air discharge line, as shown. If the total carbon deposit (X + X) exceeds 2 mm [1/16 in], clean and inspect the cylinder head, the valve assembly and the discharge line. Replace if necessary. Contact your Cummins Authorized Repair Location.

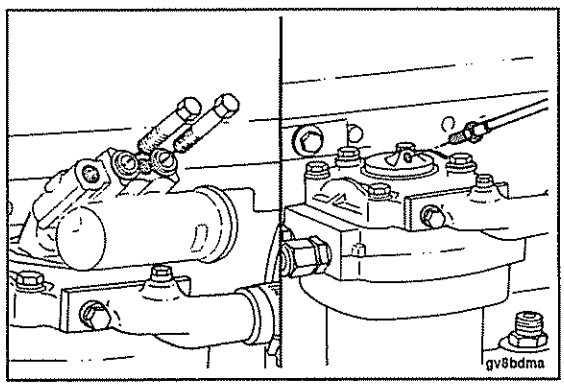




If the total carbon deposit exceeds specifications, continue checking the air discharge line connections up to the first tank, until total carbon deposit is less than 2 mm [1/16 in]. Clean or replace any lines that exceed this specification.



Inspect any air driers, spitter valves, pressure relief valves and alcohol injectors for carbon deposits or malfunctioning parts. Inspect for air leaks. Maintain and repair the parts according to the manufacturer's specifications.

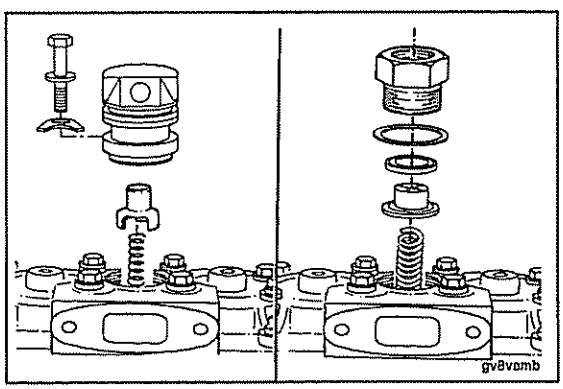


Air Compressor Unloader and Valve Assembly

Maintenance Check

NOTE: The illustrations shown will be of the single cylinder air compressor. Differences in procedure for one and two cylinder Cummins air compressors will be shown where necessary.

Remove the air governor or air governor signal line from the air compressor unloader body.

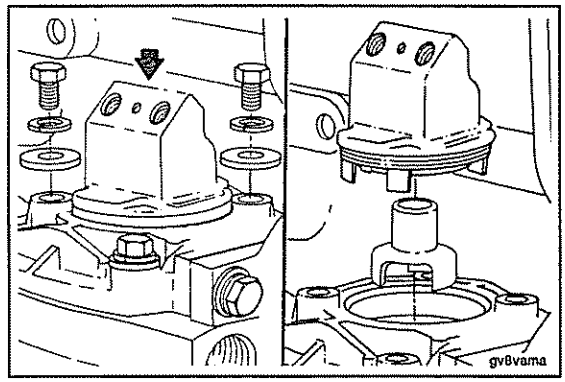


Remove the center unloader valve. Two types are shown; one that is secured by one capscrew and a retaining clamp, and one that is screwed in.

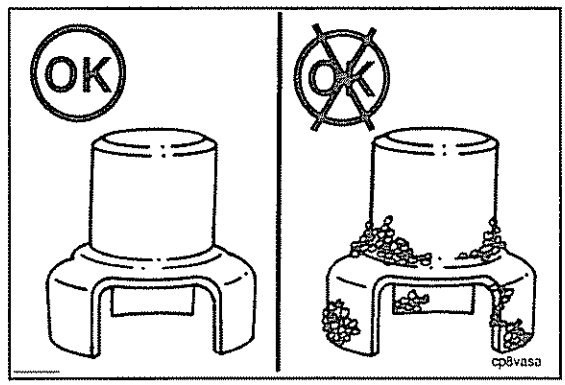
⚠ WARNING ⚠

The unloader valve body is installed with spring tension. To avoid personal injury, hold the unloader body down while removing the capscrews.

Remove the two unloader assemblies. Discard the o-rings and seals.

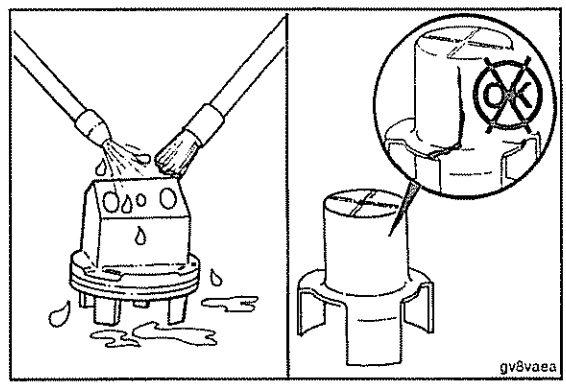


Visually inspect the unloader valve for carbon buildup. If carbon or heavy varnish is present, remove, clean and inspect the compressor head and the valve assembly. Replace the parts as necessary. Contact your nearest Cummins Authorized Repair Location.



Clean the unloader valve with solvent a non-metallic brush to remove carbon. Do **not** use a sharp object, as this may damage the sealing surfaces.

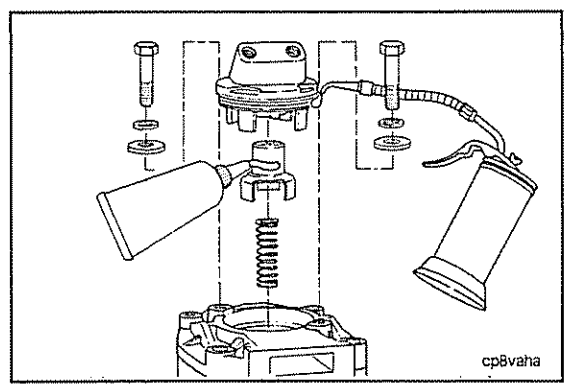
Inspect for reuse. The valve **must** be replaced if cracked.

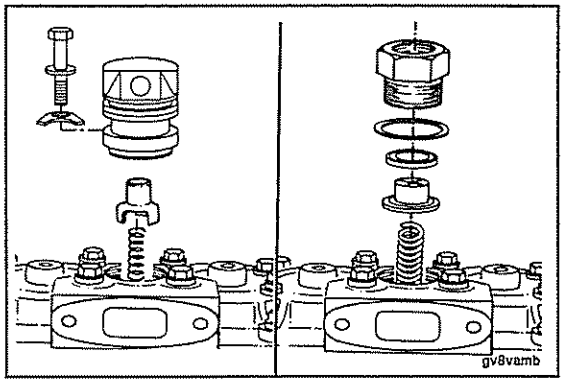


Lubricate the unloader cap with antiseize compound. Lubricate the unloader body o-ring with clean engine oil. Assemble the unloader assembly to the cylinder head cover. Tighten the capscrews.

Torque Value: 14 N•m [10 ft-lb]

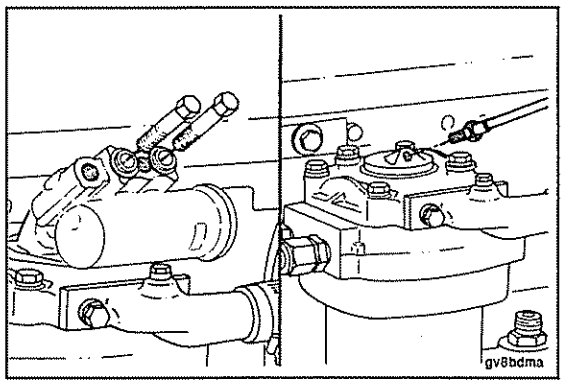
NOTE: If the compressor has the three prong unloader valve, as shown, make sure that the prongs are aligned with the slots in the intake valve retainer.





Install the center unloader. Lubricate the o-ring with clean engine oil. Tighten the capscrew.

Torque Value: 40 N•m [30 ft-lb]



Install the air governor or air governor signal line to the unloader body.

Other Maintenance

Section Contents

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For the following components, follow the manufacturer's recommended maintenance procedures.

- Alternator
- Generator
- Starter
- Air Compressor (non-Cummins)
- Electric Connections
- Batteries
- Freon Compressor
- Hydraulic Governor
- Fan Shaft Bearings
- Clutch or Marine Gear
- Fuel Pump
- Injectors

NOTES

Section A - Adjustment, Repair and Replacement

Section Contents

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Engine Storage - Short Term

Preparatory

This procedure describes the proper method for the short term storage (one month to six months) of an engine.

Operate the engine at HIGH IDLE until the coolant temperature is 70°C [160°F].

Turn the engine OFF.

Disconnect the fuel lines to the engine fuel filter and the injector return line.

Use a preservative oil. Use Daubert Chemical NoxRust No. 518, or equivalent. The oil must be Military Specification MIL-L-644, Type P-9.

Fill one container with diesel fuel, and the second container with preservative oil. Put both fuel lines in the container of diesel fuel.

START the engine.

After the engine is operating smoothly, transfer the fuel supply line to the container of preservative oil. Operate the engine until the preservative oil flows out of the injector return line.

Turn the engine OFF. Connect the fuel lines to the fuel filter and the injector return line.

Drain the oil pan sump, oil filters, and fuel filters.

Install the drain plugs in the oil pan. The pan can remain empty until the engine is ready to put in a service application.

Disconnect the electrical wiring from the fuel pump solenoid.

Turn the fuel pump manual shutoff valve counterclockwise until it stops.

Crank the engine slowly. Spray lubricating oil into the intake manifold and the inlet of the air compressor.

Drain the coolant.

NOTE: It is **not** necessary to drain the coolant if it is a permanent type antifreeze with a rust inhibitor.

Put a warning tag on the engine. The tag must read:

The engine does NOT contain oil. Do NOT operate the engine.

Store the engine in an area that is dry and has a uniform temperature.

Bar the crankshaft two or three revolutions every 3 to 4 weeks.

Remove

This procedure describes the proper method for the removal of an engine from short term storage (one month to six months).

Prime the lubricating system:

- Fill the oil pan sump, oil filters, and fuel filters.
- Fill the coolant system if necessary.
- Disconnect the electrical cable from the fuel pumps.
- Rotate the crankshaft by the starting motor until oil pressure appears on the gauge or the warning light goes out.
- Connect the electrical cable to the fuel pumps.
- Start the engine. (Refer to Normal Starting Procedures).

Engine Storage - Long Term

Preparatory

⚠ CAUTION ⚠

After 24 months in storage, the engine cooling system MUST be flushed with a suitable solvent or a hot, lightweight mineral oil. This procedure MUST then be repeated.

This procedure describes the proper method for the long term storage (six month to 24 months) of an engine.

Operate the engine at HIGH IDLE until the coolant temperature is 70°C [160°F]. Turn the engine OFF. Drain the oil.

Install the drain plugs. Use Shell 66202 or equivalent, preservative oil. The oil **must** meet Military Specification MIL-L-21260, Type P-10, Grade 2, SAE 30. Fill the engine to the HIGH mark.

Disconnect the fuel lines to the engine fuel filter and the injector return line. Use Daubert Chemical NoxRust No. 518, or an equivalent preservative oil. The oil **must** meet Military Specification MIL-L-644 Type P9.

Fill one container with diesel fuel, and the second container with preservative oil. Insert both fuel lines in the container of diesel fuel.

START the engine.

After the engine is operating smoothly, transfer the fuel supply line to the container of preservative oil. Operate the engine until the preservative oil flows out of the injector return line.

Turn the engine OFF. Connect the fuel lines to the fuel filter and the injector return line.

Drain the preservative oil from the engine oil pan sump, the air compressor and the oil filters.

Remove the intake and exhaust manifolds. Spray preservative oil into the intake and exhaust ports in the cylinder heads and in the manifolds.

Spray preservative oil in the intake port on the air compressor.

Use a rust preventative compound that meets Military Specification MIL-C-16173C, Type P-2, Grade 1 or 2. Brush or spray the compound on all of the exposed surfaces that are **not** painted.

Remove the rocker lever covers. Spray the rocker levers, the valve stems, the springs, the valve guides, the crossheads, and the push rods with preservative oil. Install the covers.

Cover all of the openings with heavy paper and tape to prevent dirt and moisture from entering the engine.

Put a warning tag on the engine. The tag **must** indicate:

The engine has been treated with preservatives.

Do NOT bar the crankshaft.

The coolant has been removed.

The date of treatment.

Do NOT operate the engine.

Store the engine in an area that is dry and has a uniform temperature.

Remove

Remove the plug from the main oil rifle. Use a hot, lightweight mineral oil. Flush all of the preservative oil from the engine. Bar the engine crankshaft three to four revolutions during the flushing procedure.

Fill the oil pan sump, oil filters, and fuel filters. Drain the rust preventative compound from the cooling system. Fill the cooling system with coolant.

Prime the lubricating system:

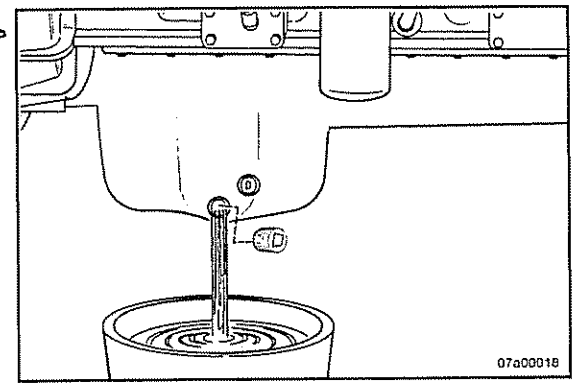
- Disconnect the electrical cable from the fuel pumps.
- Rotate the crankshaft by the starting motor until oil pressure appears on the gauge or the warning light goes out.
- Connect the electrical cable to the fuel pumps.
- Start the engine. (Refer to Normal Starting Procedures).

Use clean diesel fuel. Flush the fuel system by operating the engine at low idle until the preservative oil is removed.

Lubricating Oil Dipstick

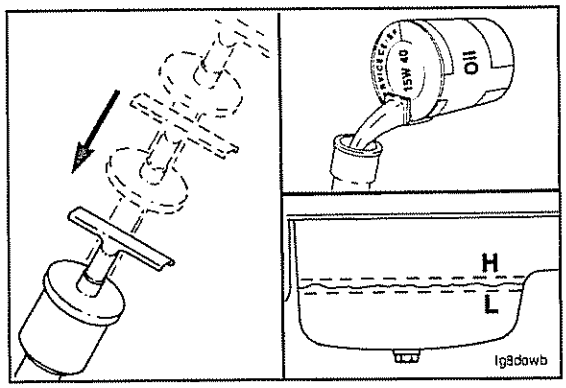
Calibrate

Drain the oil from the pan. Refer to Lubricating Oil and Filters within this section for draining information.



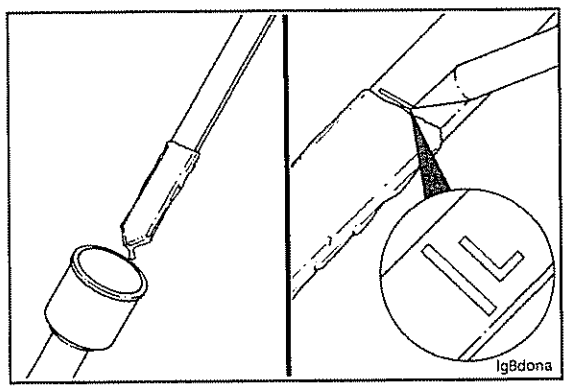
Install the dipstick in the dipstick tube.

Measure clean 15W-40 oil to fill the oil pan to the specified **low** level. Refer to the lubricating oil system specifications in Section V.



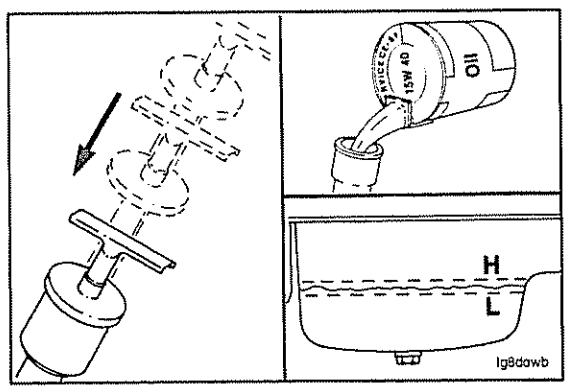
NOTE: The dipstick will break if the scribe mark is too deep.

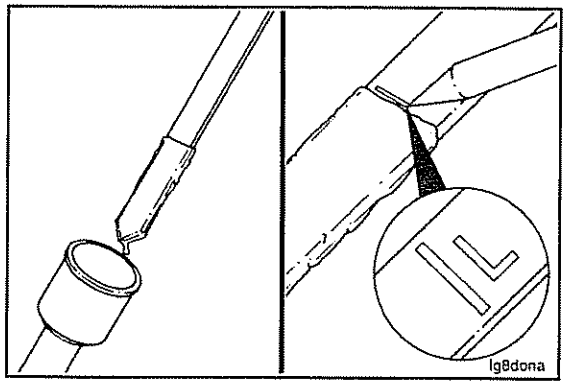
Remove the dipstick and scribe a mark across the dipstick at the oil level. Mark the **low** level with an 'L'.



Install the dipstick.

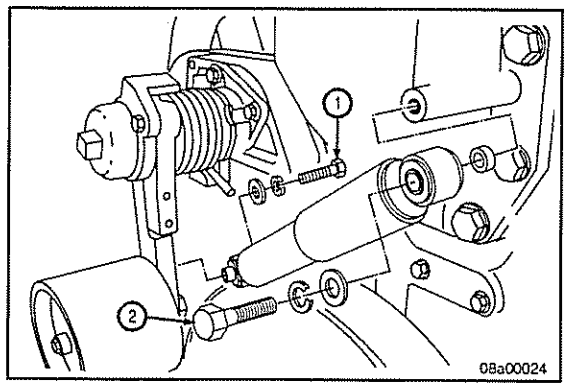
Measure and add additional oil to the oil pan to specified **full** level. Refer to the lubricating oil system specifications in Section V.





NOTE: The dipstick will break if the scribe mark is too deep.

Remove the dipstick and scribe a mark across the dipstick at the oil level. Mark the **high** oil level with an 'H'.



Drive Belt, Cooling Fan

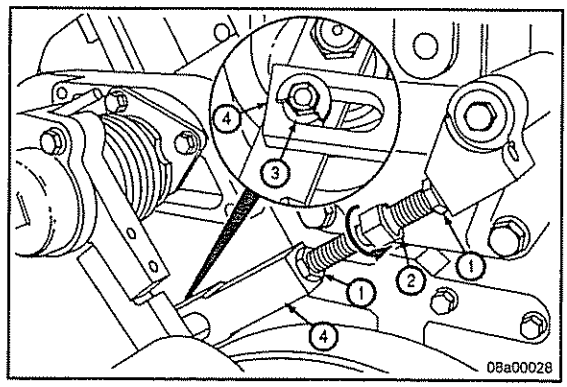
Remove

Back Side Idler System

Remove the back side idler pulley end of the shock absorber, control rod (turnbuckle), or control rod with spring assembly.

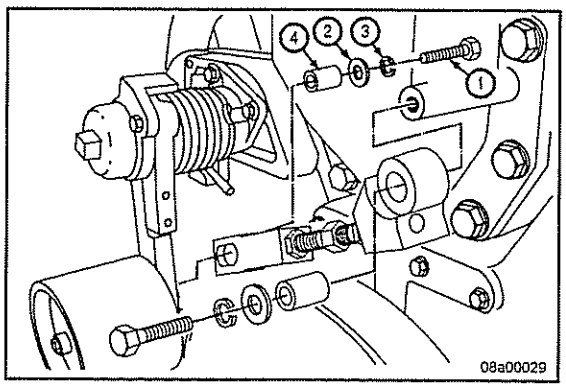
NOTE: The back side idler system uses one of two types of control rods (turnbuckles) or a shock absorber. Refer to the instructions that apply to the engine being serviced.

Loosen the upper capscrew (1). Remove the lower capscrew (2).



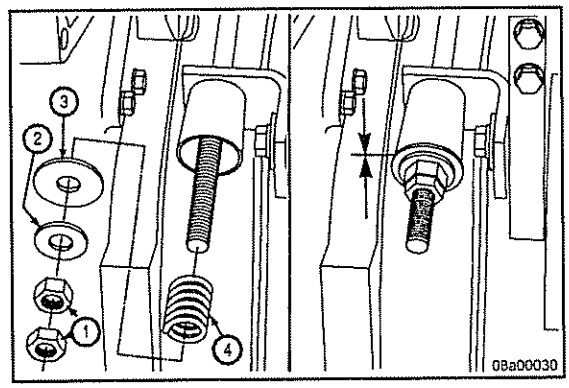
NOTE: One of the jam nuts on the solid control rod (turnbuckle) has left hand threads.

Loosen the solid control rod (turnbuckle) jam nuts (1). Turn the adjusting screw (2) until the spacer (3) is not touching the end of the slot in the control rod (4).



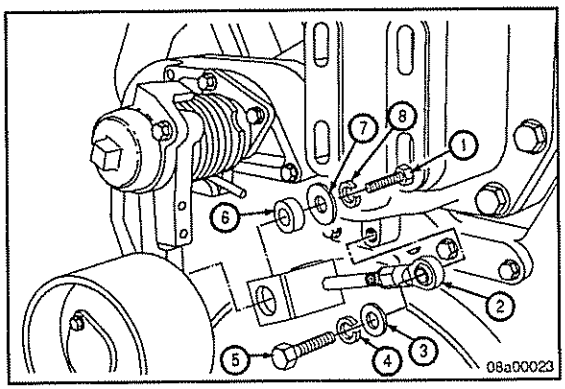
Remove the capscrew (1), washers (2, 3) and spacers (4). Remove the control rod assembly from the idler assembly.

To remove the control rod with spring, remove the two jam nuts (1), washers (2, 3), and spring (4).



Remove the parts.

(1) Capscrew
(2) Control Rod
(3) Washer
(4) Lock Washer
(5) Capscrew
(6) Spacer
(7) Washer
(8) Lock Washer



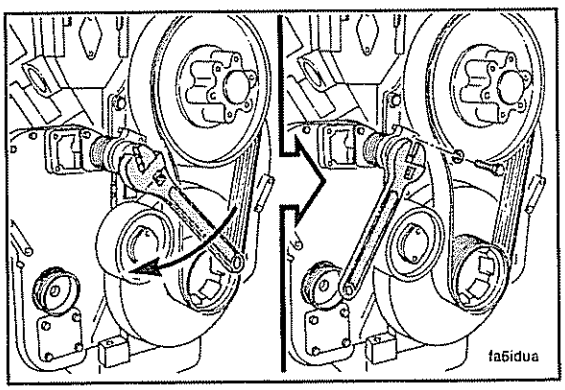
⚠ CAUTION ⚠

The fan belt idler is under tension. Do NOT allow your hands to get between the idler and the belt, or the fan hub. Personal injury can result.

Use a socket and breaker bar or large wrench to hold the idler in position against the spring tension. Remove the capscrews from the spring cap.

Slowly turn the wrench until the spring tension is relieved.

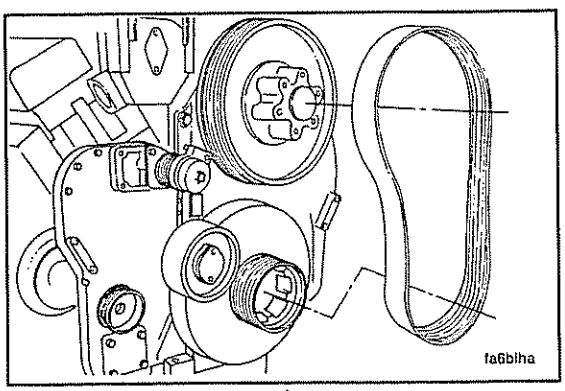
Remove the fan belt.

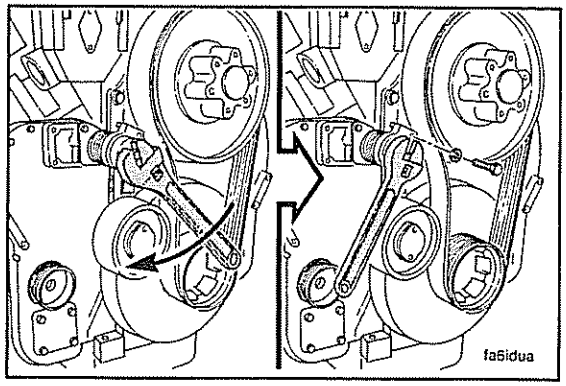


Install

Back Side Idler System

Install the belt on the crankshaft and fan hub pulley. Align the grooves on the belt on the ribs of the pulley.





After installing the fan belt, install the fan idler system.

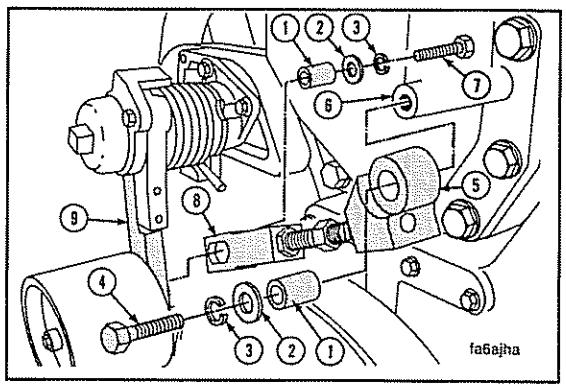
⚠ CAUTION ⚠

The fan belt idler is under tension. Do NOT allow your hands to get between the idler and the belt or the fan hub. Personal injury can result.

Rotate the idler against the spring tension until the capscrew holes are aligned. Install the lock washer and capscrew.

Torque Value: 45 N•m [35 ft-lb]

Slowly turn the wrench until the idler is against the belt.



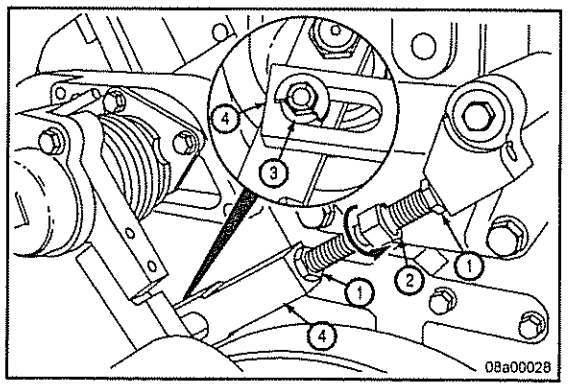
NOTE: The fan hub pulley and the fan belt are shown removed for clarity.

NOTE: Capscrews (4 and 7) are 57 mm [2 1/4 in] in length. It is recommended that SAE Grade 8 capscrews that are 57 mm [2 1/4 in] be installed or the capscrews can break.

Install a spacer (1), a heavy flat washer (2), and a lock washer (3). Install a capscrew (4) in the **upper** control rod end (5). Hand tighten the capscrew. Install the **upper** control rod end in the fan hub support (6).

Install a spacer (1), a lock washer (3), and a heavy flat washer (2). Install a capscrew (7) in the lower control rod end (8). Install the lower control rod end on the idler arm (9). Tighten the capscrews (4 and 7).

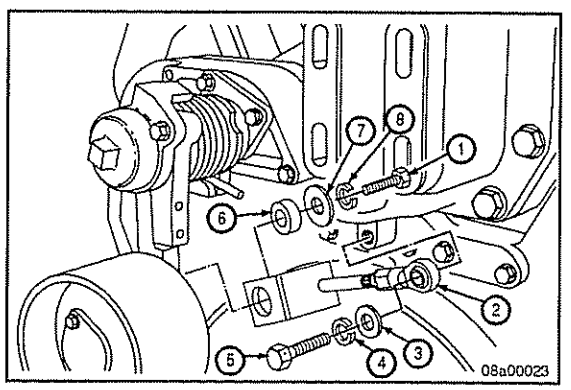
Torque Value: 90 N•m [65 ft-lb]



NOTE: The fan belt **must** be installed and under the tension of the fan idler arm spring to adjust the control rod. The fan belt and a portion of the flat washer are **not** shown for clarity.

Turn the adjusting screw (1) until the end of the slot on the **lower** control rod end (2) is touching the spacer (3). One of the nuts has left hand threads.

Hold the adjusting screw and tighten the two jam nuts (4).



To install the control rod with spring, install the flat washer (3), lock washer (4), and capscrews (5) in the upper end of the control rod (2). Install the control rod in the fan support. Tighten the capscrew.

Torque Value: 60 N•m [45 ft-lb]

Install the spacer bushing (6), flat washer (7), lock washer (8), and capscrew (1) in the lower end of the control rod (2). Install the **lower** end of the control rod on the fan idler arm. Tighten the capscrew.

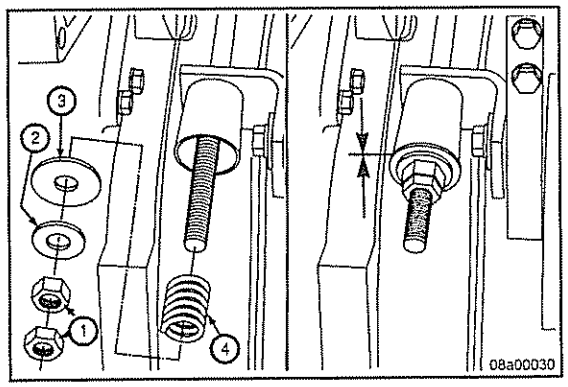
Torque Value: 60 N•m [45 ft-lb]

Install the control rod with spring.

- (1) Jam nuts (two)
- (2) Flat washer
- (3) Spring retainer washer
- (4) Spring

NOTE: Do **not** tighten the inner fan nut excessively. If the jam nut is too tight, the spring retainer will bend and the control rod will fail.

Turn the **inner** jam nut until the spring retainer washer (3) touches the cylinder on the **lower** control rod end. Hold the **inner** jam nut and tighten the **outer** jam nut.



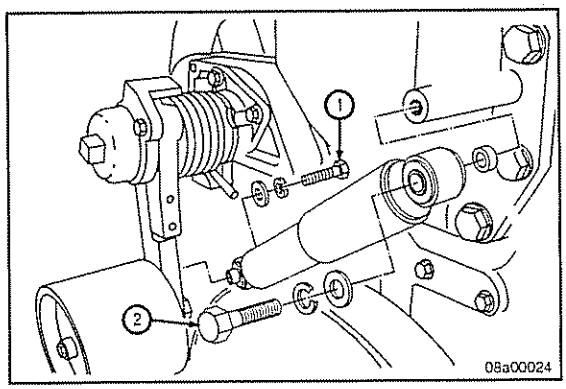
NOTE: The shock absorber **must** be installed with the larger outer tube of the absorber attached to the fan hub support. If the absorber is installed wrong, dirt can enter the tube and cause the part to fail.

Install the shock absorber with spacer in the fan support. Install the capscrew (1) with washer and lock washer.

Install the capscrew (2) with washer and lock washer, in the lower end of the shock absorber.

Install the shock absorber on the fan idler arm. Tighten the two capscrews.

Torque Value: 60 N•m [45 ft-lb]



Adjust

There is no adjustment required for engines equipped with a shock absorber.

Back Side Idler System

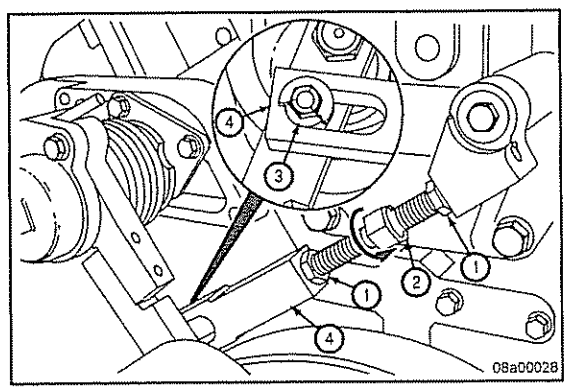
Control Rod

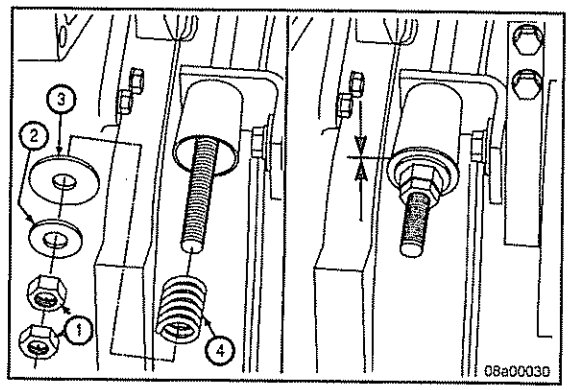
The fan belt **must** be installed and under the tension of the fan idler arm spring to adjust the control rod. The fan belt and a portion of the flat washer are **not** shown for clarity.

Turn the adjusting screw (2) until the end of the slot on the **lower** control rod end (4) is touching the spacer (3).

NOTE: One of the nuts has left-hand threads.

Hold the adjusting screw and tighten the two jam nuts (1).





Control Rod with Spring

⚠ CAUTION ⚠

Do NOT tighten the inner jam nut excessively. If the jam nut is too tight, the spring retainer will bend, causing the control rod to fail.

Turn the **inner** jam nut until the spring (4) retainer washers (2,3) touch the cylinder on the lower control rod end. Hold the **inner** jam nut and tighten the **outer** jam nut (1).

Air Starting Motor

General Information

The air starting motor system (tanks, line sizes, and valves) is designed and installed by the original equipment manufacturers and the starting motor suppliers. Refer any questions about the air starting systems to the manufacturer.

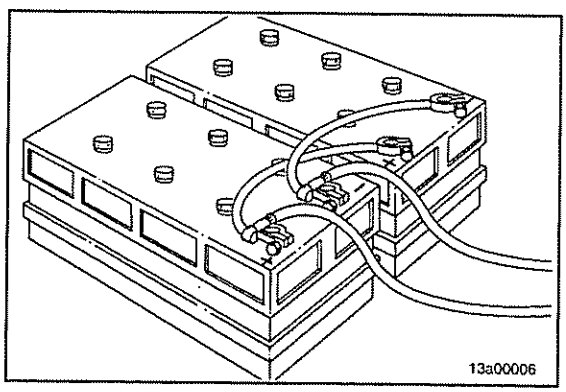
Do **not** operate the air starting motor with air pressure **below** specifications.

Minimum	480 kPa	[70 psi]

Maintain the air compressor according to the recommendations outlined in the manual.

For maximum efficiency, the hoses, tubes, and lines **must not** leak.

Refer to the original equipment manufacturers' and starting motor manufacturers' manuals for specific information regarding the starting motors, valves, and systems.



Battery Cables and Connections

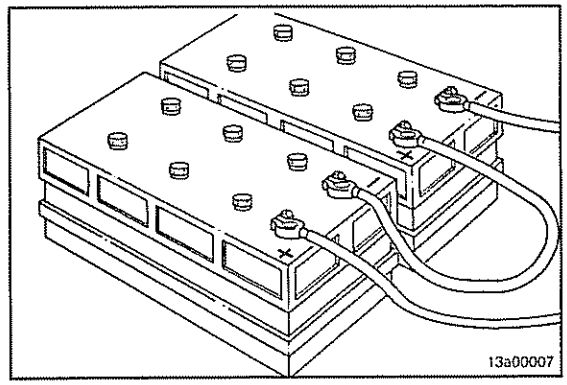
Maintenance Check

⚠ CAUTION ⚠

When using jumper cables to start the engine, make sure to connect the cables in parallel: positive (+) to positive (+) and negative (-) to negative (-). When using an external electrical source to start the engine, turn the disconnect switch to the OFF position and remove the key before attaching the jumper cables.

The accompanying illustration shows a typical **parallel** battery connection. This arrangement doubles the cranking amperage.

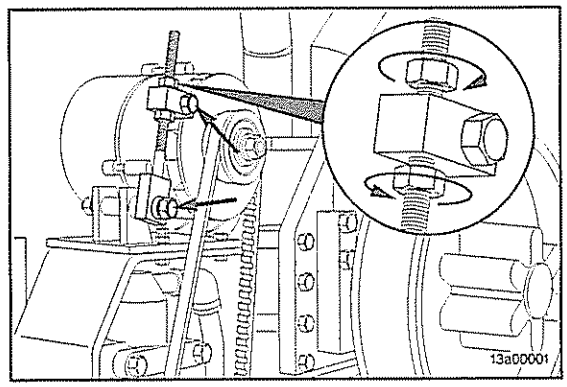
This illustration shows a typical **series** battery connection. This arrangement, positive to negative, doubles the voltage.



Drive Belt, Alternator

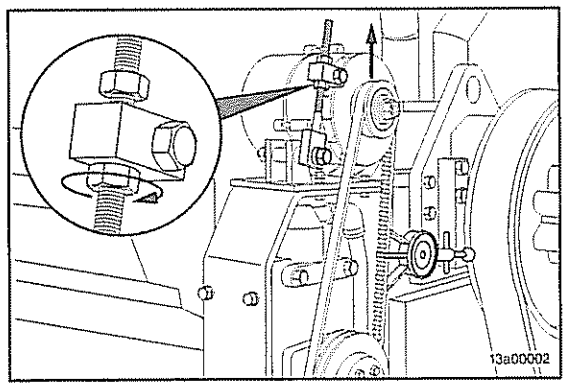
Adjust

Loosen the alternator and adjusting link mounting capscrews.



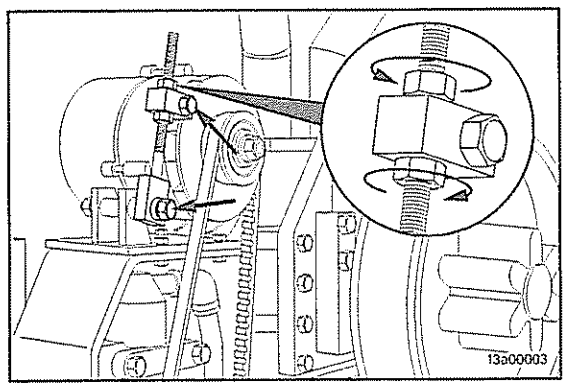
Install the alternator drive belt. Do **not** roll the belt over the pulley or pry it on with a tool.

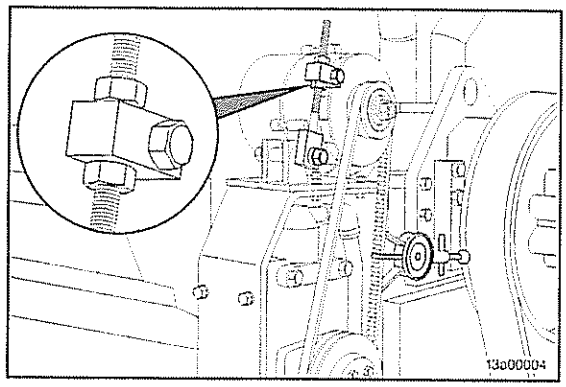
Adjust the belt tension. Refer to the Belt Tension Chart in Section V to select the correct gauge and tension value for the belt width.



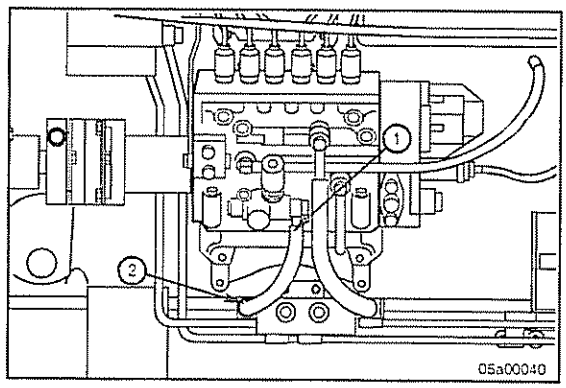
Tighten the adjusting link and alternator mounting capscrews.

Torque Value: 55 N•m [40 ft-lb]





Check the belt tension again to make sure the tension is correct.



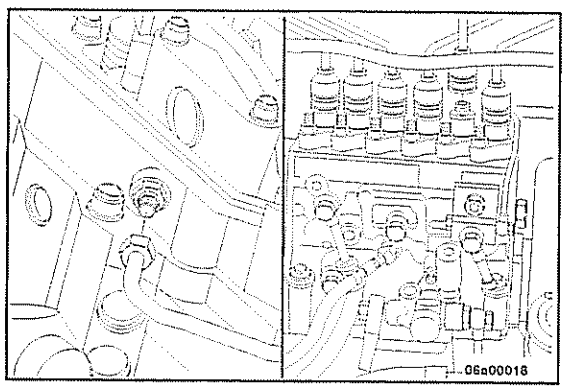
Fuel Supply Lines

Remove

Clean the debris from the fittings.

Disconnect the fuel line (1) from the fuel lift pump and the fuel block (2).

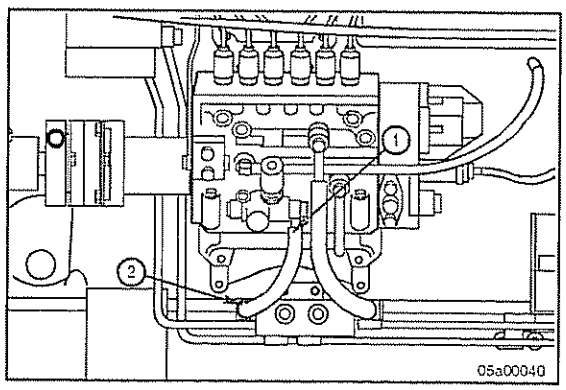
NOTE: Before removing the fuel supply line, place a pan to catch fuel remaining in the fuel line.



Clean the debris from the fittings.

NOTE: If individual high pressure fuel lines are to be replaced, remove the support clamp from the set of lines containing the line to be replaced.

Disconnect the high pressure fuel line(s) from the injectors. Be sure to protect the injector inlet from debris.



Install

Install the fuel line (1) to the fuel lift pump and fuel block (2).

Torque Value: 27 N•m [20 ft-lb]

High Pressure Fuel Line(s)

Disconnect the high pressure fuel line(s) from the fuel injection pump. Make sure to protect the delivery valves from debris.

NOTE: Install the support clamp in the original position and make sure the high pressure fuel lines do **not** contact each other or another component. Do **not** bend the fuel lines.

Use your hand to install the high pressure fuel lines and support clamps in the reverse order of removal. Tighten the high pressure fuel line capscrews and the high pressure fuel line support clamps.

Torque Value:

Fuel Line	24 N•m	[17 ft-lb]

Torque Value:

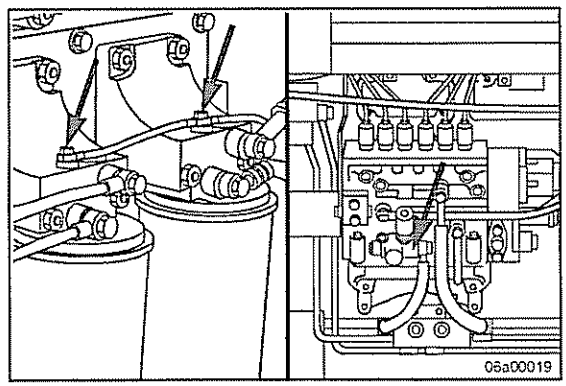
Support Clamps	10 N•m	[7 ft-lb]

Vent

Controlled venting is provided at the injection pump through the fuel drain manifold. Small amounts of air introduced by changing the fuel filters or fuel injection pump supply line will be vented automatically, if the fuel filter is changed in accordance with the instructions.

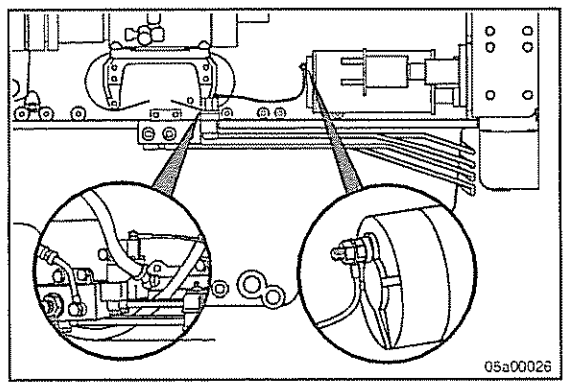
NOTE: Manual venting is required if:

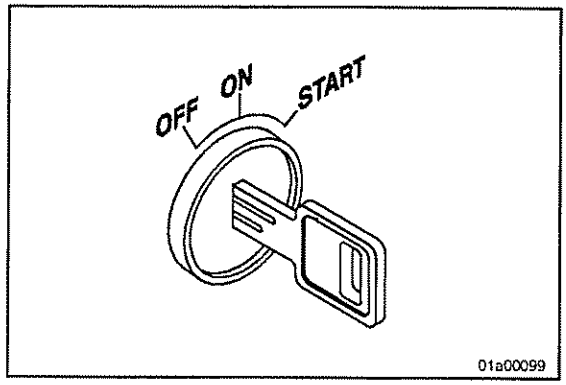
- The fuel filter is **not** filled prior to installation.
- Fuel injection pump is replaced.
- High pressure fuel line connections are loosened or fuel lines replaced.
- Initial engine start up or start up after an extended period of no engine operation.
- Vehicle fuel tank has been run until empty.



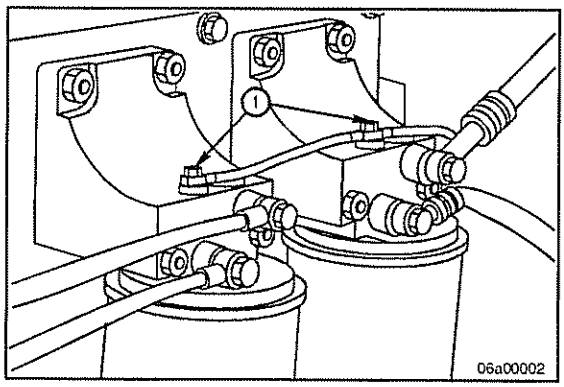
Prior to venting the G-Drive engine, connect a 24 VDC wire from the positive terminal of the starter to the fuel shutoff solenoid post.

NOTE: Remove this wire before starting the engine.



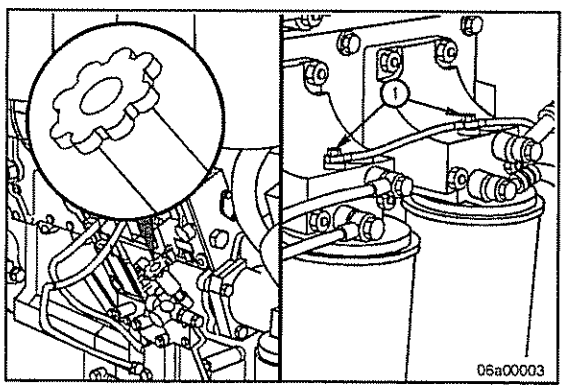


Prior to venting the industrial engine, place the key in the ON position, but do not crank the engine.



Loosen the relief valve (1) on the fuel filter head.

NOTE: On industrial engines, loosen the plug in the outlet port on the front of the fuel filter head.



Operate the plunger on the fuel lift pump until the fuel flowing from the relief valve (1) (outlet fitting) is free of air.

Tighten the relief valve (1) (outlet fitting) on the fuel filters.

Torque Value: 11 N•m [95 in-lb]

NOTE: For the G-Drive models, the overflow valve is mounted on the face of the P8500 fuel pump. For the industrial models, the overflow line is on the EHAB. (This fitting will have a check ball.)

Loosen the overflow fitting.

Operate the plunger on the fuel lift pump until the fuel flowing from the overflow valve is free of air.

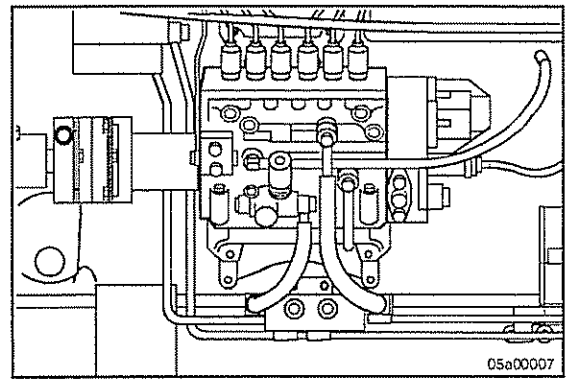
Tighten the overflow valve.

Torque Value:

G-Drive Fuel Overflow Valve	27 N•m	[20 ft-lb]

Torque Value:

Industrial Fuel Overflow Connection	27 N•m	[20 ft-lb]

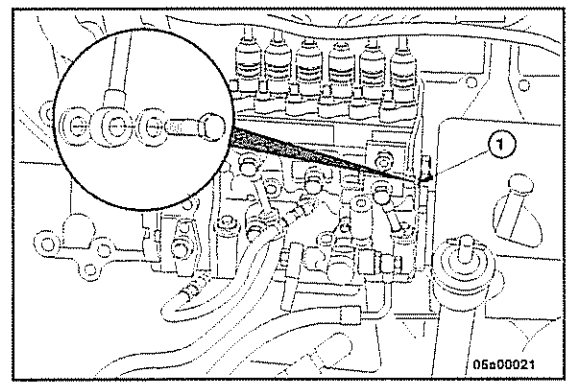


Fuel Manifold (Drain)

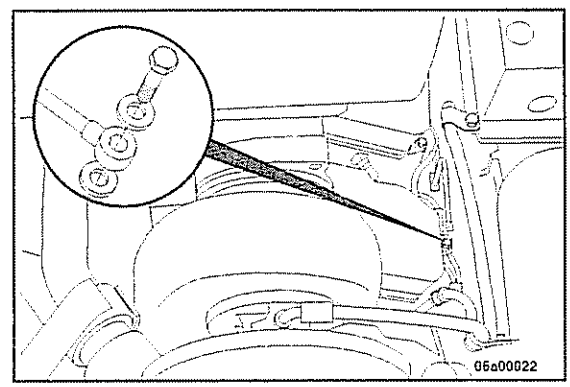
Remove

Clean the debris from the fuel drain manifold area.

Remove the banjo fitting capscrew (1) from the return line spill tube.



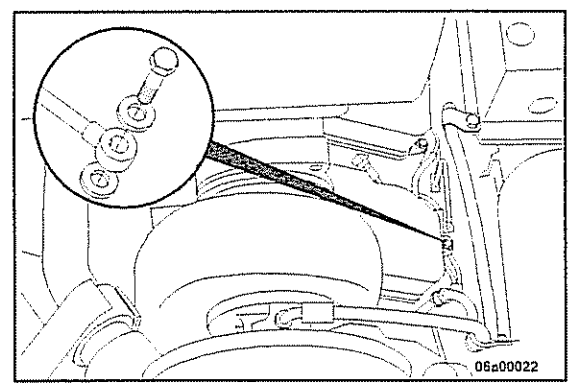
Remove the fuel drain line manifold banjo capscrews from the rocker boxes.

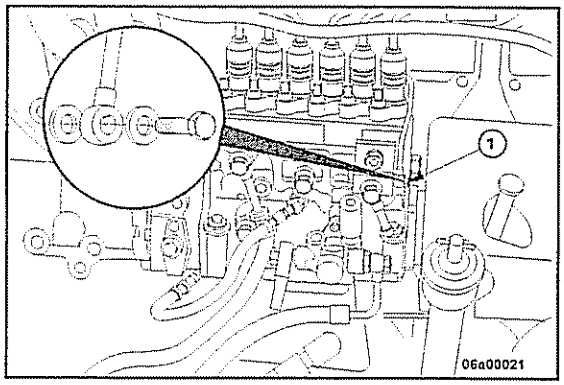


Install

Install the fuel drain line manifold banjo capscrew to the rocker boxes.

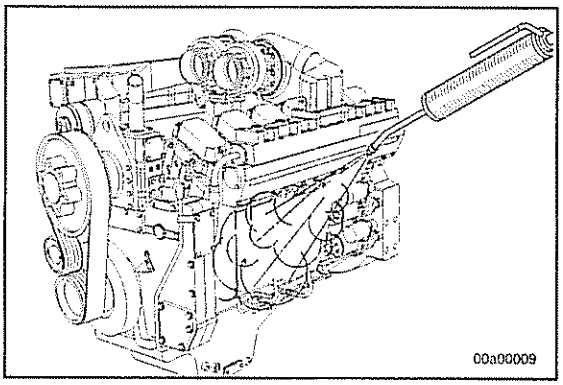
Torque Value: 9 N•m [80 in-lb]





Install the banjo fitting capscrew (1) to the return line spill tube.

Torque Value: 9 N•m [80 in-lb]



Injector

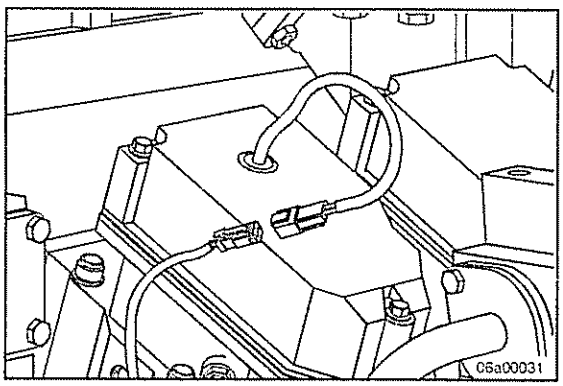
Remove

⚠ WARNING ⚠

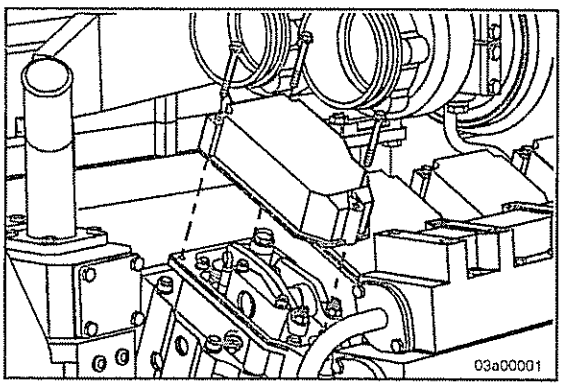
Wear protective clothing and eyewear when steam cleaning to prevent personal injury.

Steam clean the engine. Refer to Section 6. Steam is the best method of cleaning a dirty engine or a piece of equipment. If steam is **not** available, use a solvent to wash the engine.

Protect all electrical components, openings, and wiring from the full force of the cleaner spray nozzle.



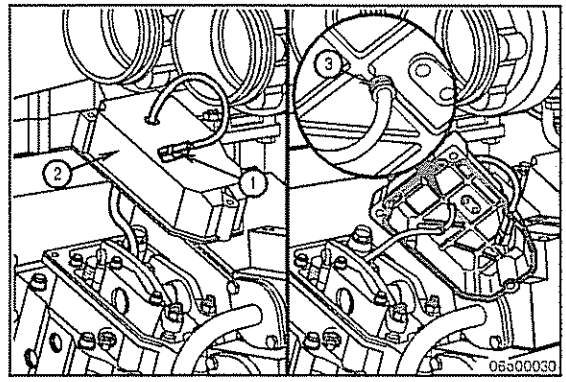
Disconnect the NBF lead connector from the ECM connector.



Remove the rocker lever covers.

Remove the grommet from the rocker lever cover.

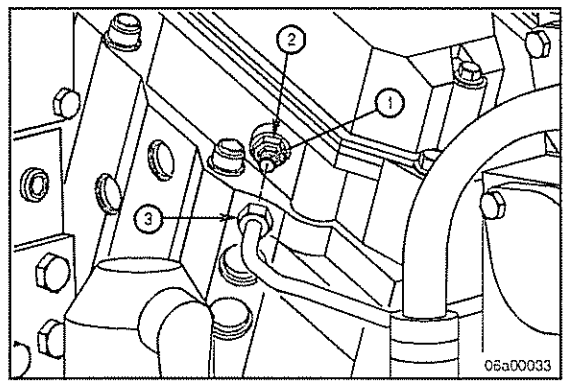
Pass the NBF lead connector through the hole in the rocker lever cover.



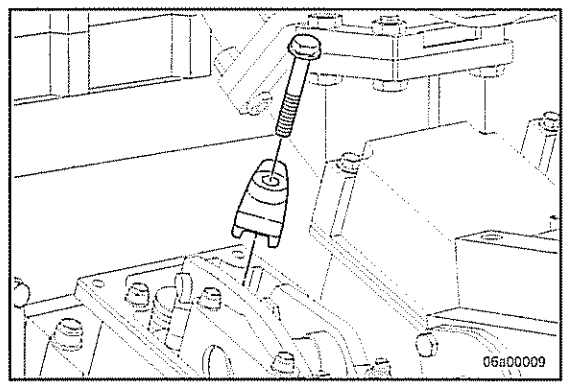
Thoroughly clean around the injectors.

Disconnect the high pressure fuel lines (3).

Loosen the lock nut (2) and remove the connector (1).



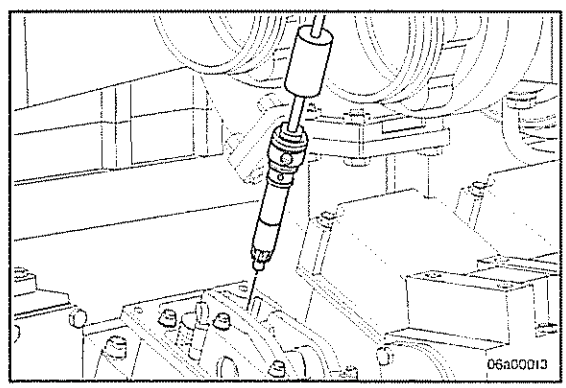
Remove the injector hold down clamps.

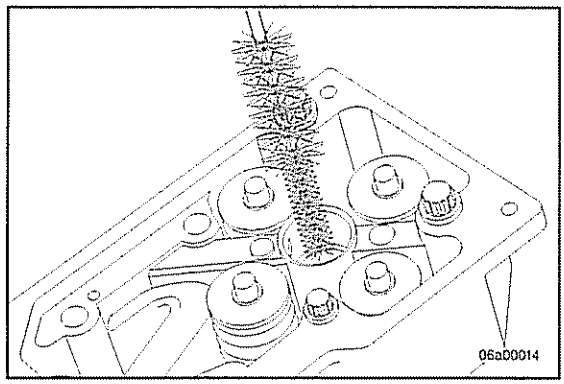


Remove the injectors. Mark each injector with the cylinder number. Store the injectors in a safe place and make sure **not** to damage the tip of the injector.

Make sure the seal ring is fitted to the tip of the injector.

NOTE: Use the inverted hold down clamp or puller, Part No. 3825142.

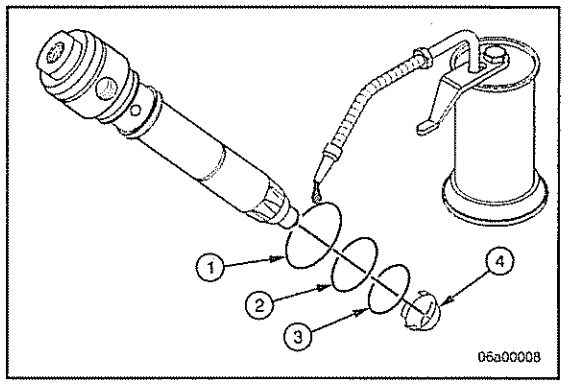




Install

Use an injector bore brush and clean the injector nozzle bore.

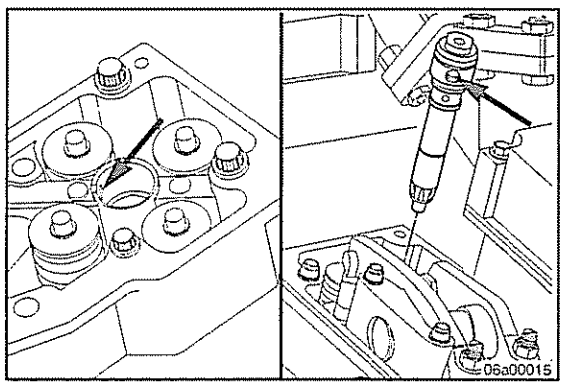
Check the inside of the nozzle holder sleeve for dirt or debris. Clean if necessary.



Install new o-rings into the grooves on the injector.

Check to make sure the o-rings (1,2,3) are **not** twisted or damaged. Lubricate the o-rings with clean engine oil.

Check to make sure that the seal ring (4) is fitted to the tip of the injector.

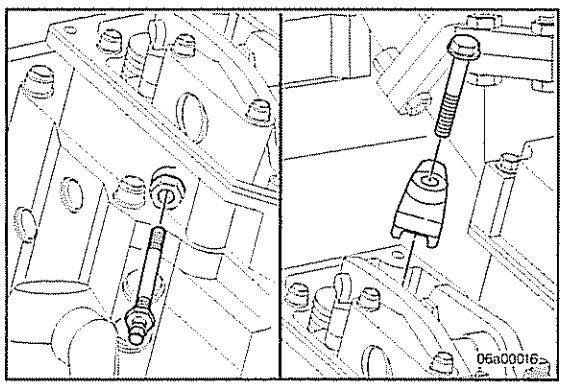


NOTE: Align the match mark, and make sure the nozzle holder and the rocker housing do **not** move out of position.

Inspect the bore in the cylinder head for debris.

Align the fuel inlet connection hole to the opening in the rocker housing.

Install the injector.



Install the connector tube and hand tighten.

Install the hold down clamp with the spherical washer on the mounting capscrew.

Torque Value: 65 N•m [48 ft-lb]

Tighten the connector tube (1).

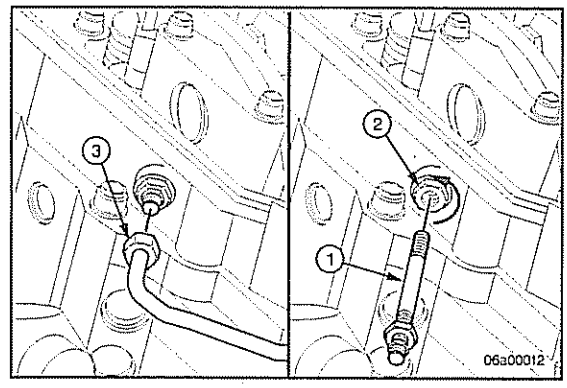
Torque Value: 32 N•m [23 ft-lb]

Tighten the locknut (2).

Torque Value: 32 N•m [23 ft-lb]

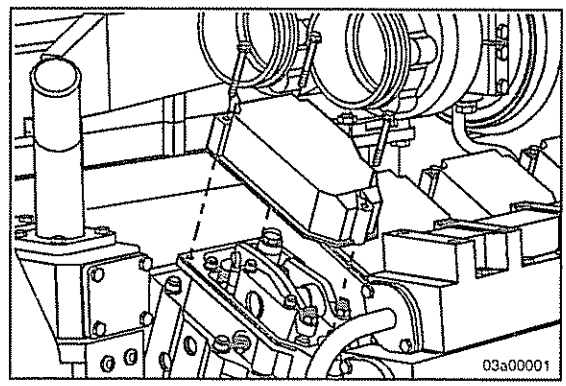
Connect the high pressure fuel supply line (3).

Torque Value: 24 N•m [17 ft-lb]



Install the rocker cover and the new gasket.

Torque Value: 7 N•m [62 in-lb]



NBF Injector

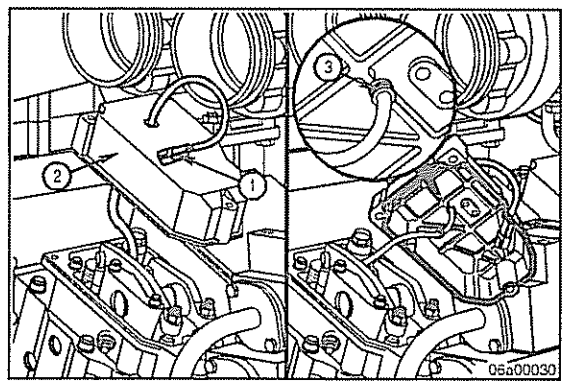
Pass the NBF connector through the hole in the rocker lever cover.

Install the grommet on the NBF lead.

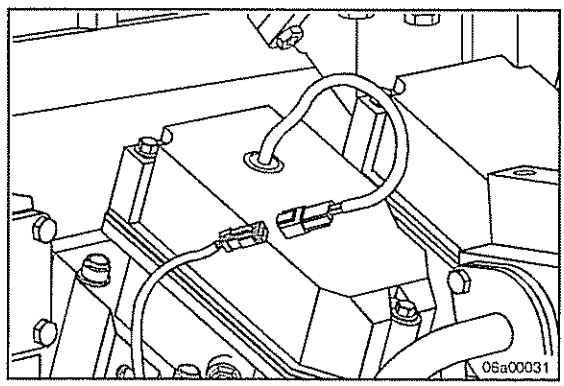
Press fit the grommet into the rocker lever cover.

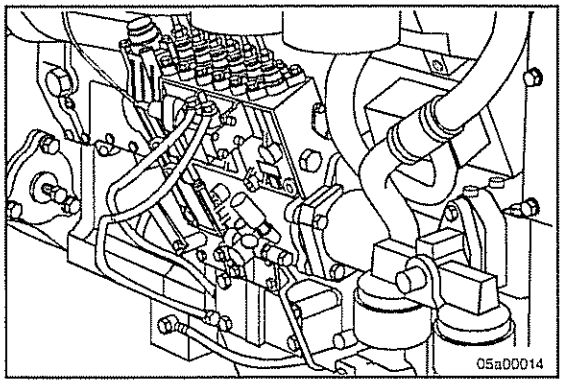
Install the valve cover and gasket.

Torque Value: 7 N•m [62 in-lb]



Connect the NBF lead connector to the ECM connector.

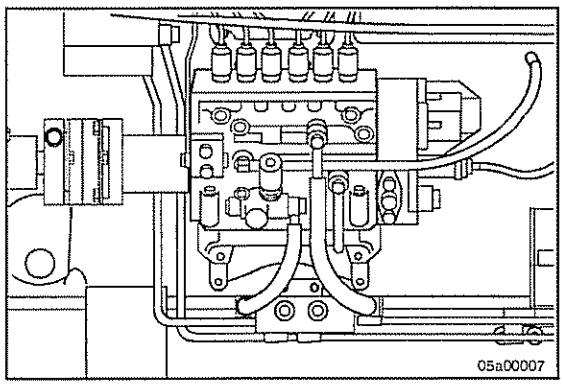




Fuel Injection Pump, Inline

General Information

The QST30 engines, regardless of application, use Bosch fuel injection pumps. The industrial model uses the RP39 model, shown here.



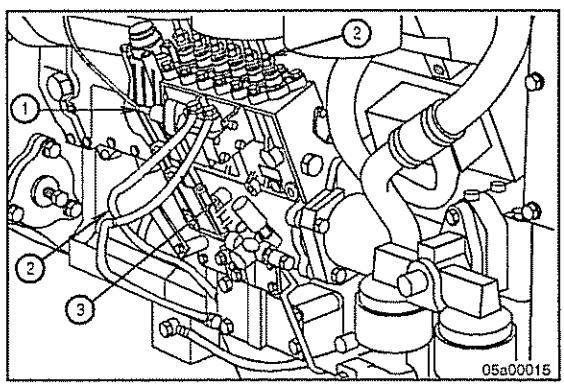
The G-Drive models use the P8500 model, equipped with either a flange mount drive or an open drive.

The inline fuel injection pump performs the three basic functions of:

- Producing the high fuel pressure required for injection.
- Metering the exact amount of fuel pressure required for injection.
- Distributing the high pressure, metered fuel to each cylinder at the precise time.

Individual plungers are used in the inline fuel injection pumps to develop and distribute the high pressure required for injection.

A worn or damaged plunger in the inline fuel injection pump affects only one cylinder.



Remove

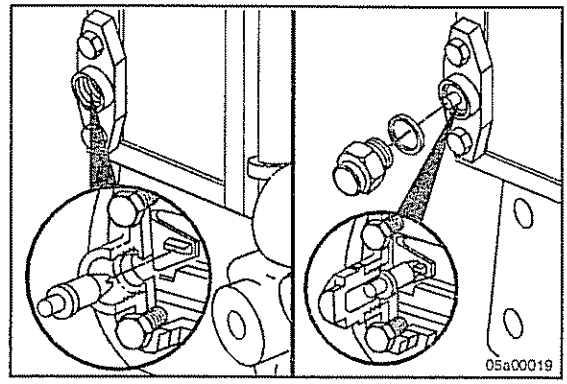
Flange Mount Fuel Pump

NOTE: Rotate the crankshaft to the engine timing specification before removing the right bank fuel pump.

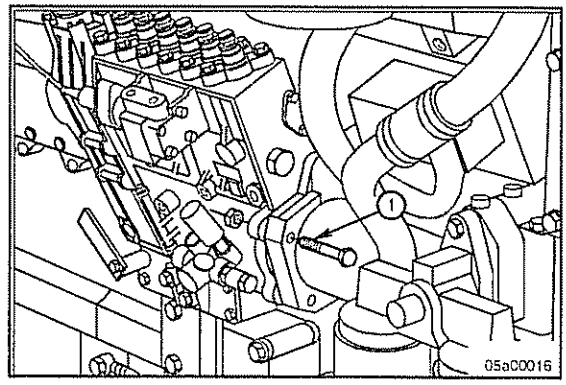
Install a protective cover to prevent any dirt or dust from getting into the discharge port of the injection pump or the inlet port of the nozzle connector. Clean the debris from around the inline fuel injection pump.

Remove electrical connections (1) and fuel lines (2). Remove all of the oil lines (3).

NOTE: If the fuel pump is to be reused, remove the timing lock pin and install in the locked position, as shown, to preserve the pump timing.

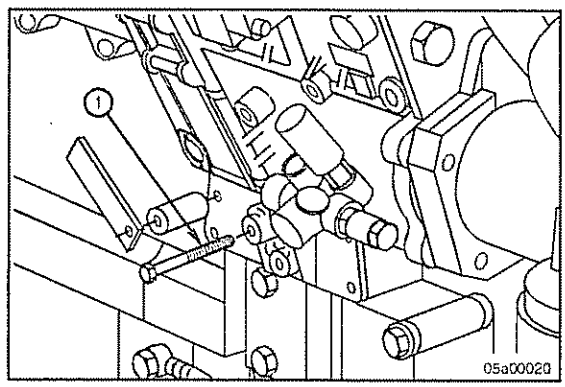


Remove the four capscrews (1), washers and nuts holding the pump to the drive housing.



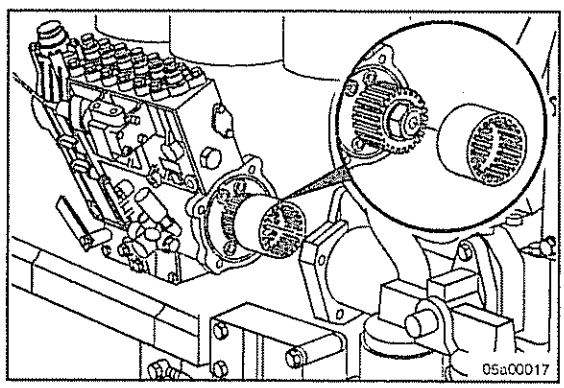
Remove the injection pump bracket mounting bolts (1).

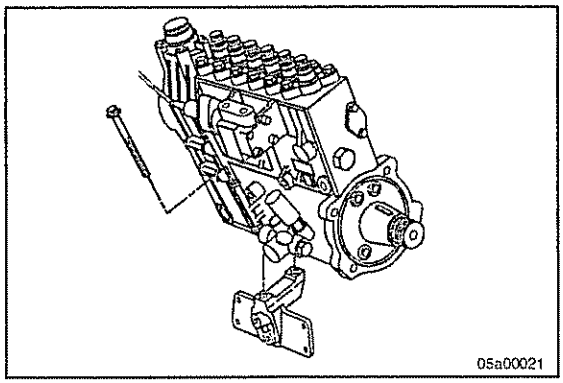
NOTE: The right bank fuel pump bracket has six mounting bolts. The left bank fuel pump bracket has three mounting bolts.



Disengage the pump driveshaft gear from the spline coupling.

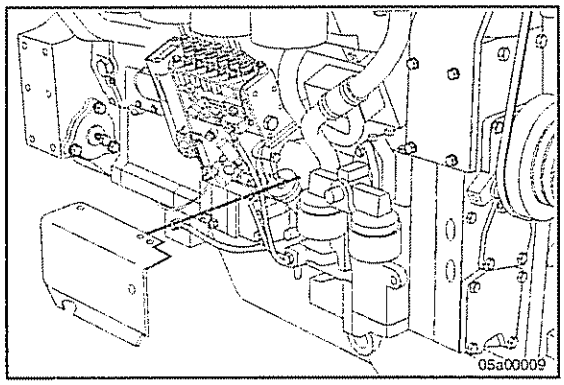
Remove the pump from the drive housing.





Remove the mounting bolts and the fuel pump bracket.

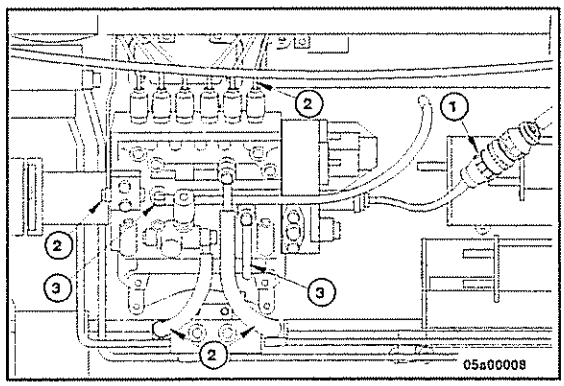
Remove the drive coupling spline prior to delivery to the repair location. Use a standard 3 jaw puller kit.



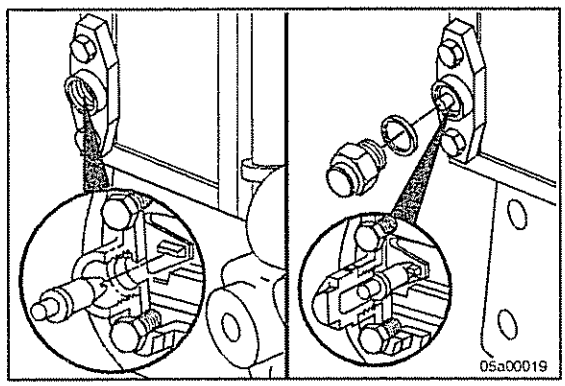
Open Drive Fuel Pumps

Install a protective cover to prevent any dirt or dust from getting into the discharge port of the injection pump or the inlet port of the nozzle connector. Clean the debris from around the inline fuel injection pump.

Remove the cover.



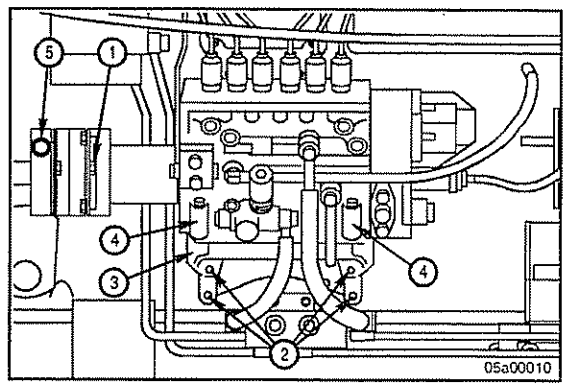
Remove electrical connections (1) and all fuel lines (2). Remove all of the oil lines (3).



NOTE: If the fuel pump is to be reused, remove the timing lock pin and install in the locked position, as shown, to preserve the pump timing.

To remove the injection pump assembly:

- Disconnect the coupling bolts (1).
- Loosen the four injection pump bracket mounting bolts (2).
- Remove the injection pump and bracket (3) at an angle as one unit.
- Remove the mounting bolts (4).



⚠ CAUTION ⚠

Do not hammer on the fuel pump while removing the coupling. Hammering will cause damage to the fuel pump and possible engine failure.

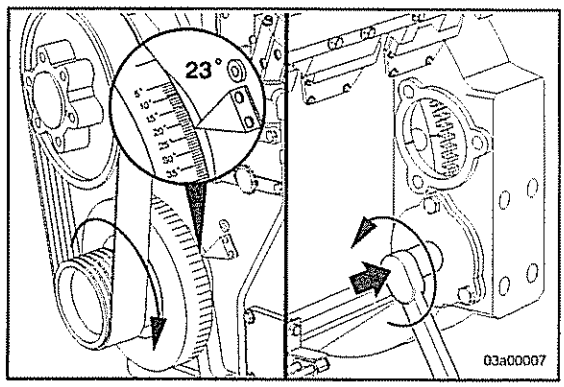
Use a T-bolt puller and remove the drive coupling from the pump prior to delivery to a repair facility.

Install

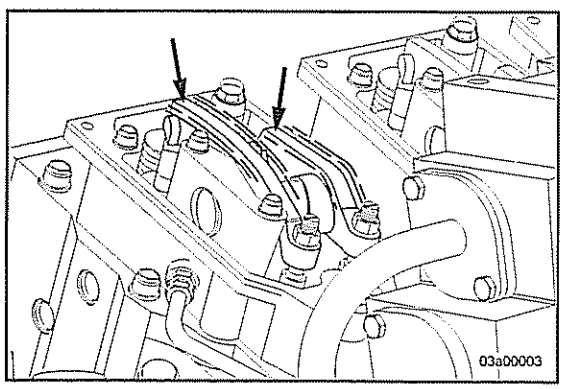
Open Drive Fuel Pump

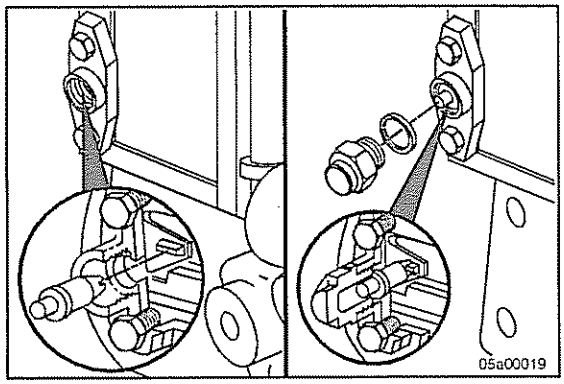
Rotate the engine slowly clockwise until the crankshaft damper pointer aligns with the 23 degree mark or specified engine timing before TDC for the right bank No. 1 cylinder on the compression stroke.

NOTE: Both the right bank and left bank fuel pumps are installed with the engine in this position.



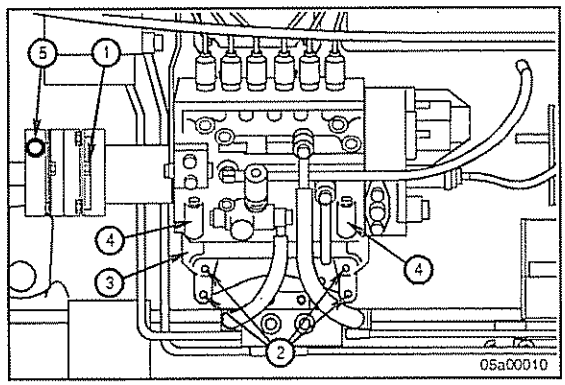
Remove the No. 1 cylinder rocker cover and verify that the No. 1 cylinder is on compression stroke. Refer to Section 6, Overhead Set.





Remove the fuel injection pump timing pin plug and check the position of the timing pin (fuel pump should be locked).

Install the cap and sealing washer.



Install the mounting bracket to the fuel pump. Tighten the four pump bracket mounting capscrews (4).

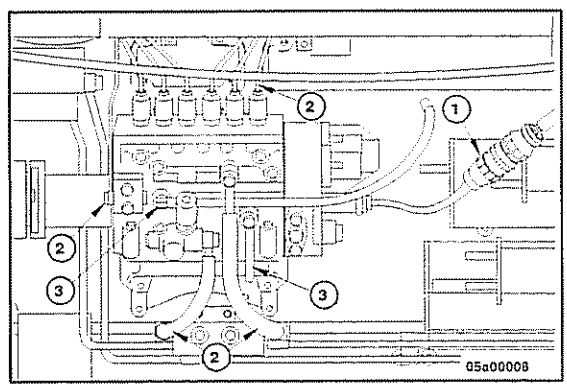
Set the fuel pump assembly in position.

With the bracket installed on the pump, set the fuel pump assembly at an angle and install the assembly (3) on the engine.

Tighten the bracket capscrews (2). Tighten the coupling capscrew (1).

If a timing adjustment is required, loosen the pinch bolt (5), rotate the engine to the timing mark and tighten the pinch bolt.

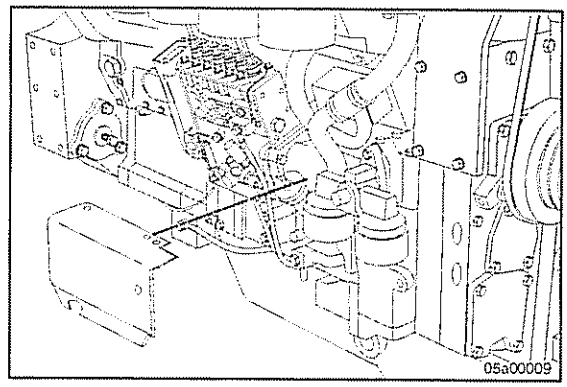
Torque Value: Bracket mounting capscrews	66 N•m	[49 ft-lb]
Torque Value: Coupling capscrews	108 N•m	[80 ft-lb]
Torque Value: Bracket capscrews	66 N•m	[49 ft-lb]
Torque Value: Pinchbolt	160 N•m	[120 ft-lb]



Install the electrical connections (1) and fuel lines (2). Install all the oil lines (3).

Torque Value: High pressure and supply lines	24 N•m	[17 ft-lb]
Torque Value:	27 N•m	[20 ft-lb]
Torque Value: Fuel Pump Drain Line	9 N•m	[80 in-lb]

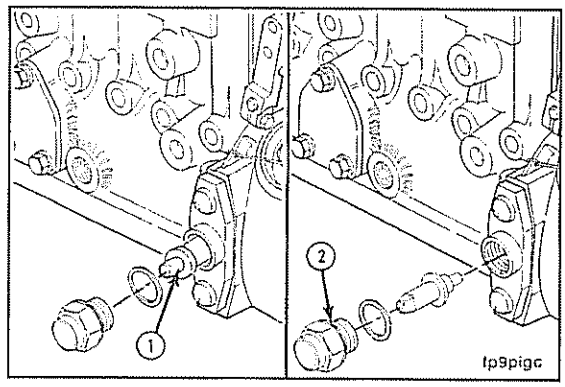
Install the cover (1).



⚠ CAUTION ⚠

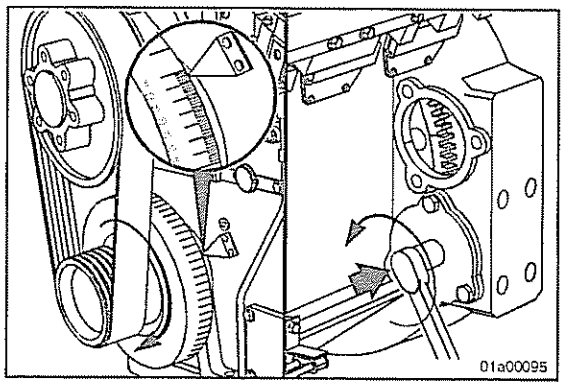
Severe damage to the fuel pump WILL occur unless the fuel pump is unlocked prior to operation.

Remove the fuel injection pump timing pin cap (2). Reverse the position of the timing pin (1) to unlock the pump, and install the pin, cap, and sealing washer.

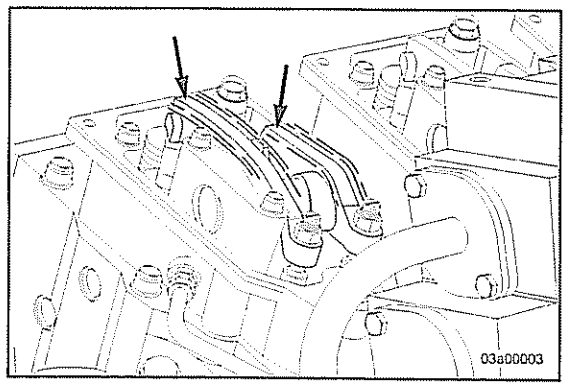


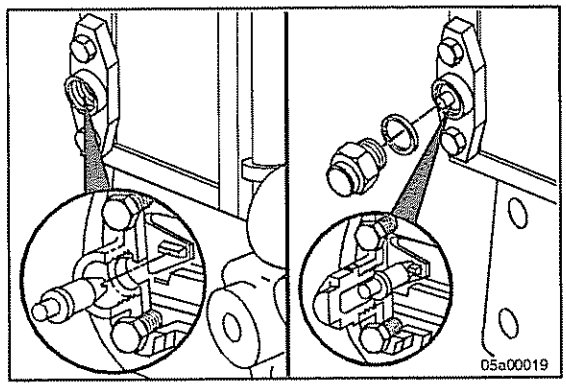
Flange Mount Fuel Pump

Rotate the engine clockwise until the crankshaft damper pointer aligns with the 6.5 degree mark or the specified engine timing before TDC for the right bank No. 1 cylinder on the compression stroke.



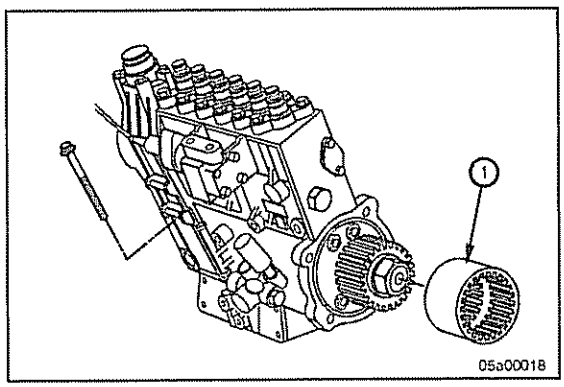
Remove the No. 1 cylinder rocker cover and verify that the No. 1 cylinder is at TDC. Refer to Section 6, Overhead Set.





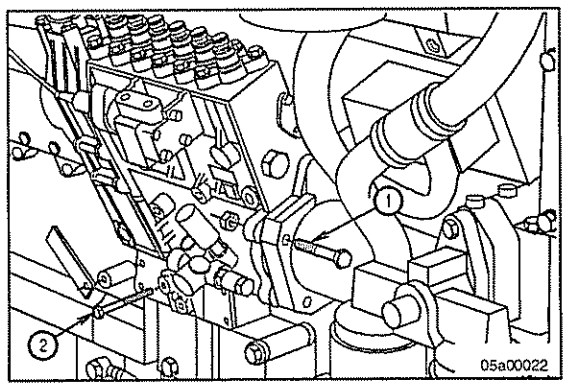
Remove the fuel injection pump timing pin cap and verify that the pump is locked.

Install the timing pin, plug, and sealing washer.



Install the mounting bracket onto the fuel pump. Do **not** tighten the capscrews.

Install the spline coupling onto the pump driveshaft gear (1).

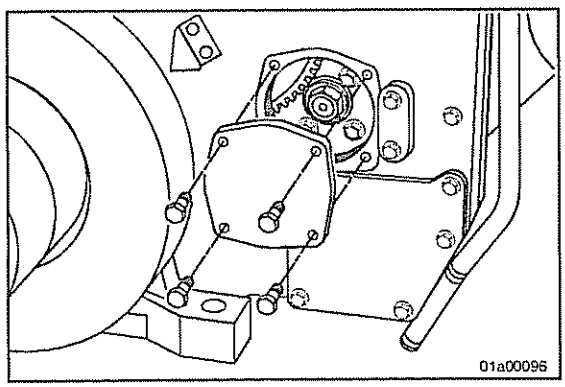


⚠ CAUTION ⚠

If the pump does not align, do NOT force the pump and drive into alignment. Forcing will result in fuel pump damage.

Engage the spline coupling and install the pump driveshaft gear into the drive housing.

NOTE: The injection pump assembly **must** be at an angle to the engine block.

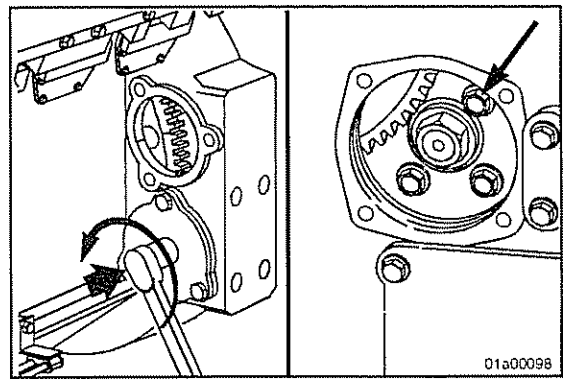


If the pump does not align, remove the cover plate on the front gear cover to gain access to the fuel pump drive gear.

NOTE: The fuel pump drive gear is a two piece gear, secured by four capscrews. One of the four capscrews will be hidden from view by the large idler gear.

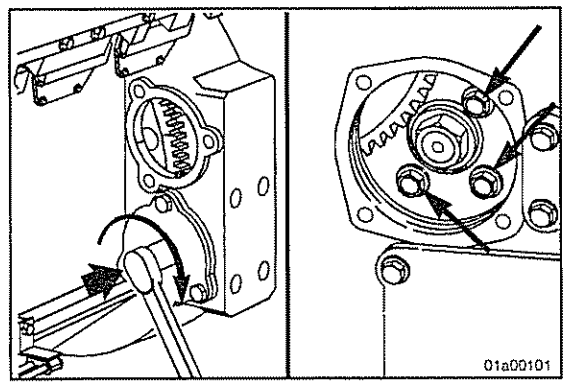
Before loosening **any** of the capscrews, rotate the crankshaft in the opposite direction of rotation until the fourth capscrew appears.

Loosen this capscrew **only** and tighten finger tight **only**.



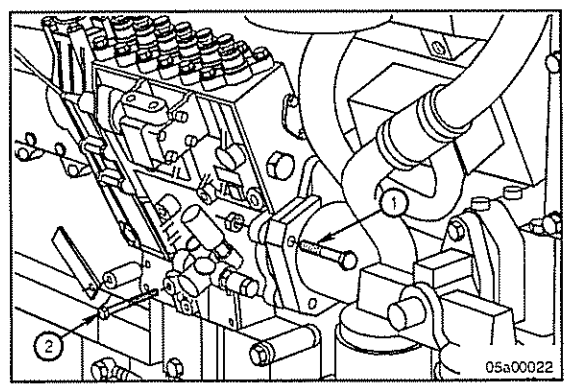
Rotate the engine clockwise until the crankshaft damper pointer aligns with the 6.5 degree mark or the specified engine timing.

NOTE: Loosen the remaining three capscrews, then tighten finger tight **only**.



Engage the spline coupling and install the pump driveshaft gear into the drive housing.

NOTE: The injection pump assembly **must** be at an angle to the engine block.



Tighten the four flange mounting capscrews (1).

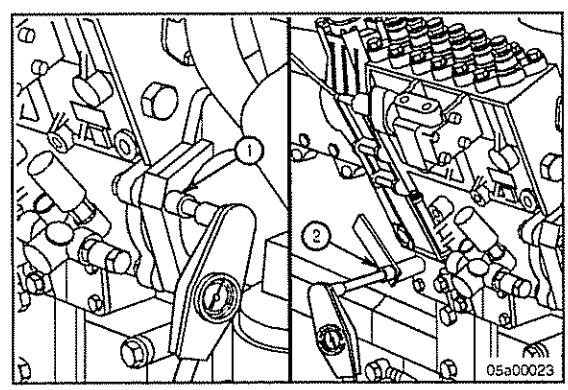
Tighten the fuel pump mounting capscrews (2).

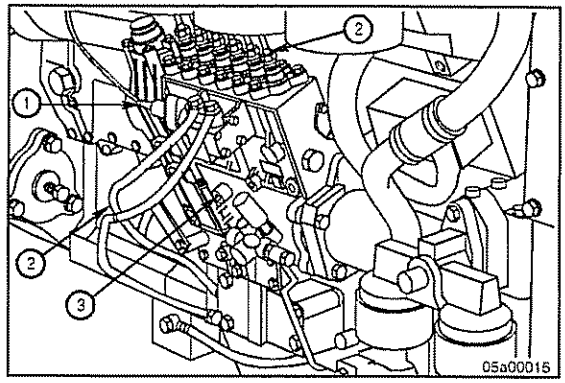
Torque Value:

Mounting bracket capscrews	65 N•m	[48 ft-lb]

Torque Value:

Flange mounting capscrews	65 N•m	[48 ft-lb]





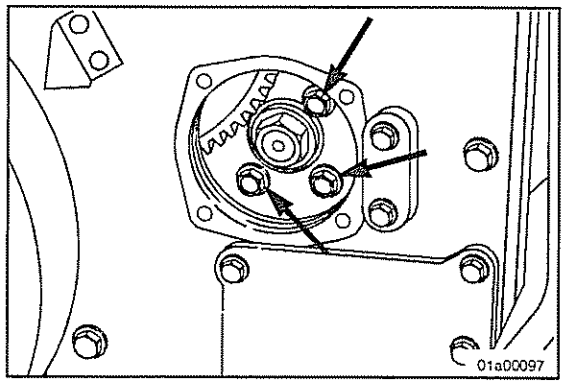
Install the electrical connections (1) and fuel lines (2) and all the oil lines (3).

Torque Value:

Low Pressure Fuel Lines	27 N•m	[20 ft-lb]

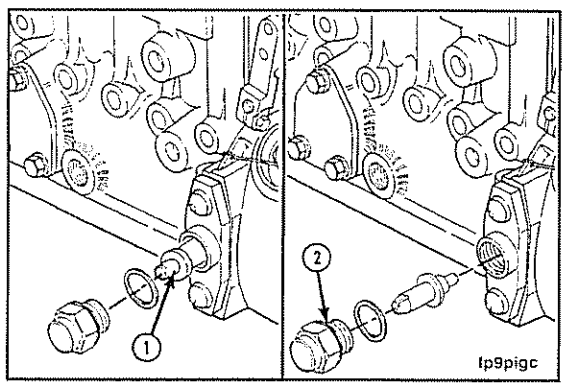
Torque Value:

High Pressure Fuel Lines	24 N•m	[17 ft-lb]



Tighten the three visible capscrews in the fuel pump drive gear.

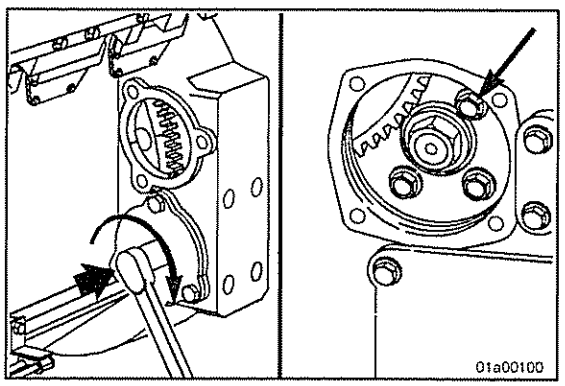
Torque Value: 115 N•m [84 ft-lb]



Remove the fuel injection pump timing pin cap.

Reverse the position of the timing pin and install the pin, cap and sealing washer in the unlocked position.

Torque Value: 30 N•m [22 ft-lb]



Rotate the engine one full revolution.

Tighten the fourth capscrew.

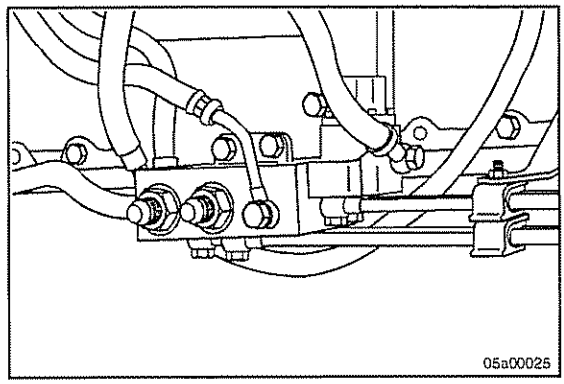
Torque Value: 115 N•m [84 ft-lb]

Fuel Shutoff Valve (FSOV)

General Information

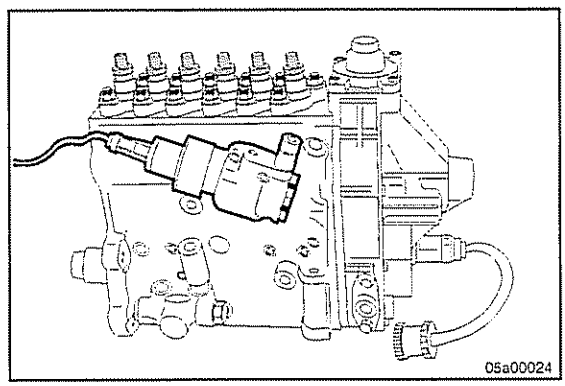
G-Drive and Generator Sets

The fuel shutoff valve (FSOV) for G-drive and generator set engines is located on the left bank fuel manifold. The FSOV is activated when the ECM detects a Common Alarm signal. Fuel shutoff accomplishes emergency engine shutdown in order to prevent engine damage.



Industrial Applications

For industrial applications, the fuel shutoff valve and solenoid is replaced with the EHAB, a component of the RP39 injection fuel pump. The only user service possible is to check fuel line and wiring harness connections. The EHAB not only enables engine protection shutdown, but also enhances operation safety by evacuating all fuel from the injection pump and lines during normal shutoff procedures.



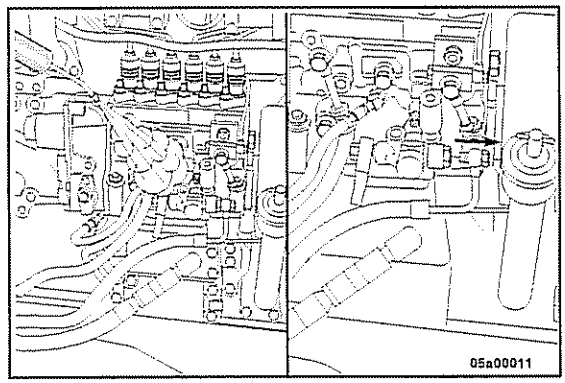
Fuel Lift Pump

Remove

Clean the debris from the fuel lift pump.

Disconnect the fuel lines.

Remove the fuel lift pump.



Install

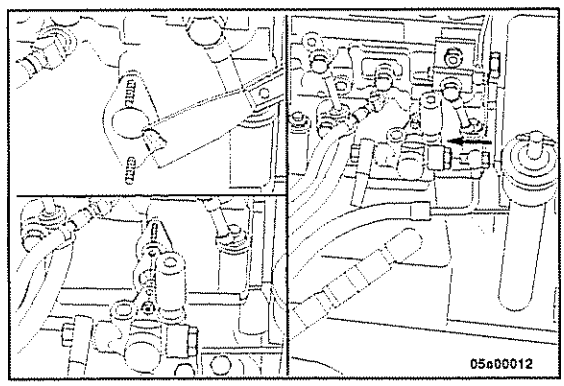
Clean the fuel lift pump mounting surface on the fuel injection pump.

Install a new gasket and the fuel lift pump. Tighten the capscrews.

Torque Value: 24 N•m [17 ft-lb]

Connect and tighten the fuel lines.

Torque Value: 24 N•m [17 ft-lb]



NOTES

Section D - System Diagrams

Section Contents

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System Diagrams - General Information

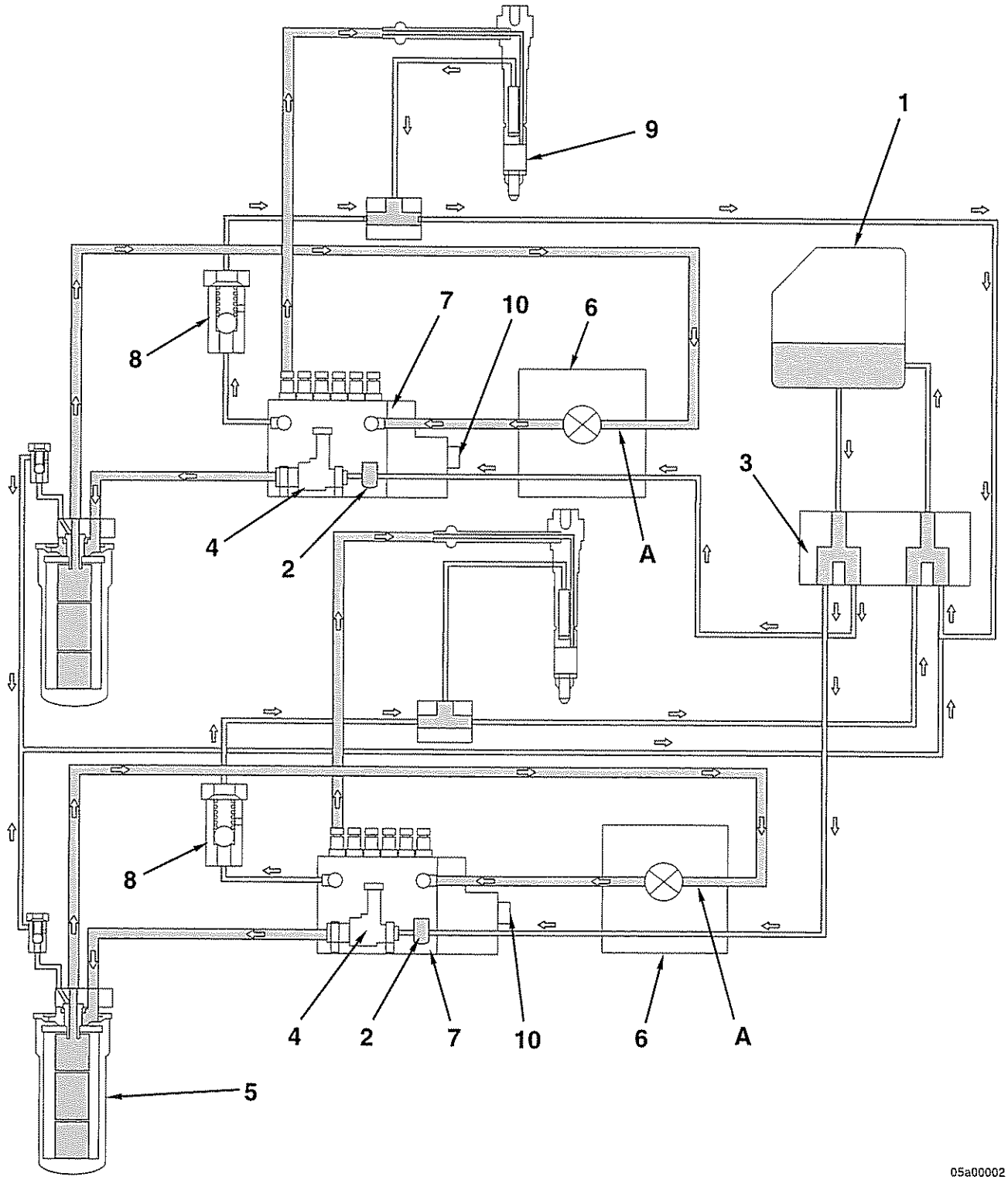
The following drawings show the flow through the engine systems. Although parts can change between different applications and installations, the flow remains the same. The systems shown are:

- Fuel System
- Lubricating Oil System
- Coolant System
- Intake Air System
- Exhaust System
- Compressed Air System

Knowledge of the engine systems can help you in troubleshooting, service, and general maintenance of your engine.

Flow Diagram, Fuel System

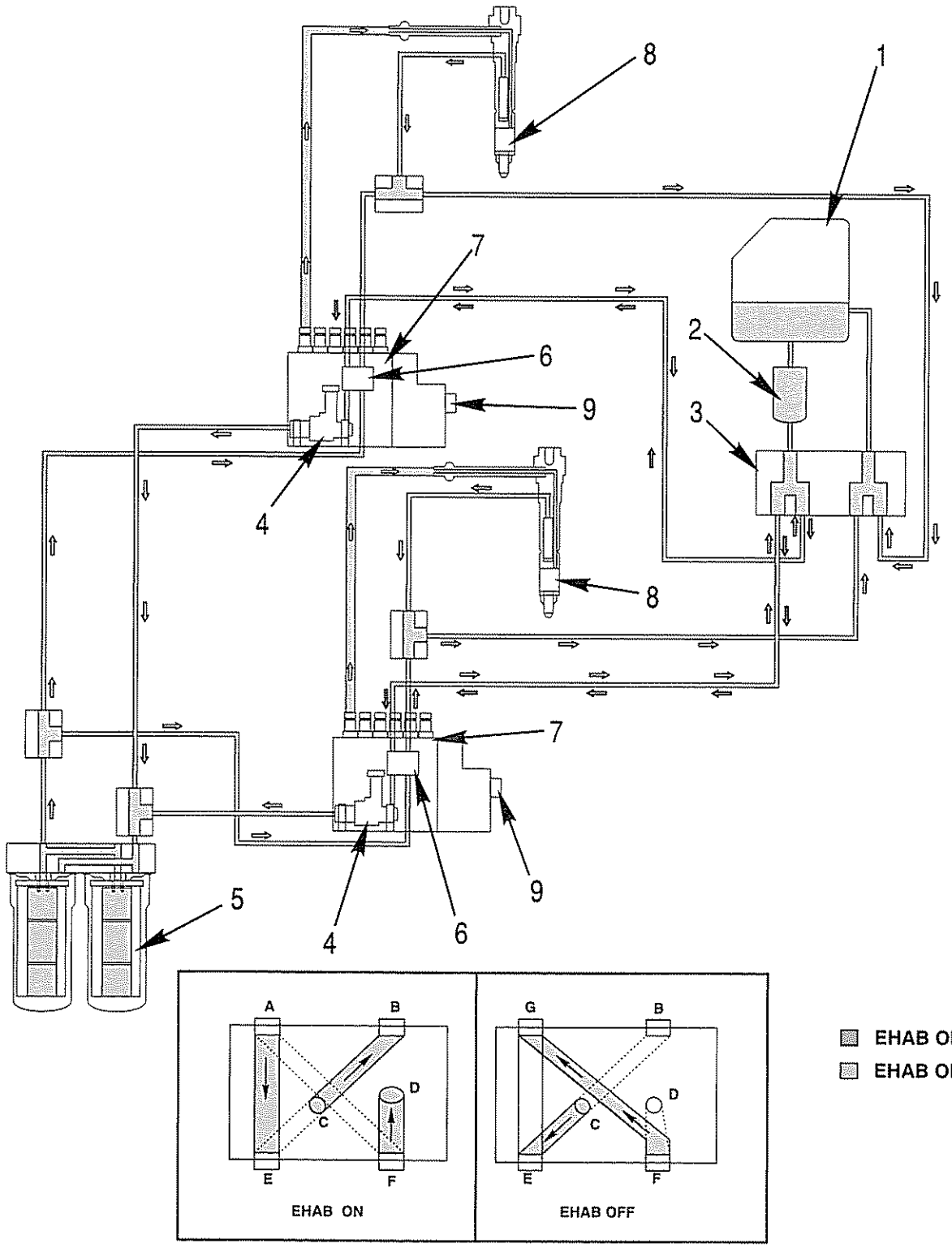
G-Drive Fuel System



1. Fuel Tank
2. Prefilter
3. Fuel Connection Block
4. Fuel Lift Pump
5. Fuel Filter
6. Fuel Shutoff Valve
7. Fuel Injection Pump
8. Overflow Valve
9. Fuel Injection Nozzle
10. Electronic Governor

A. Fuel Shutoff Valve Flow

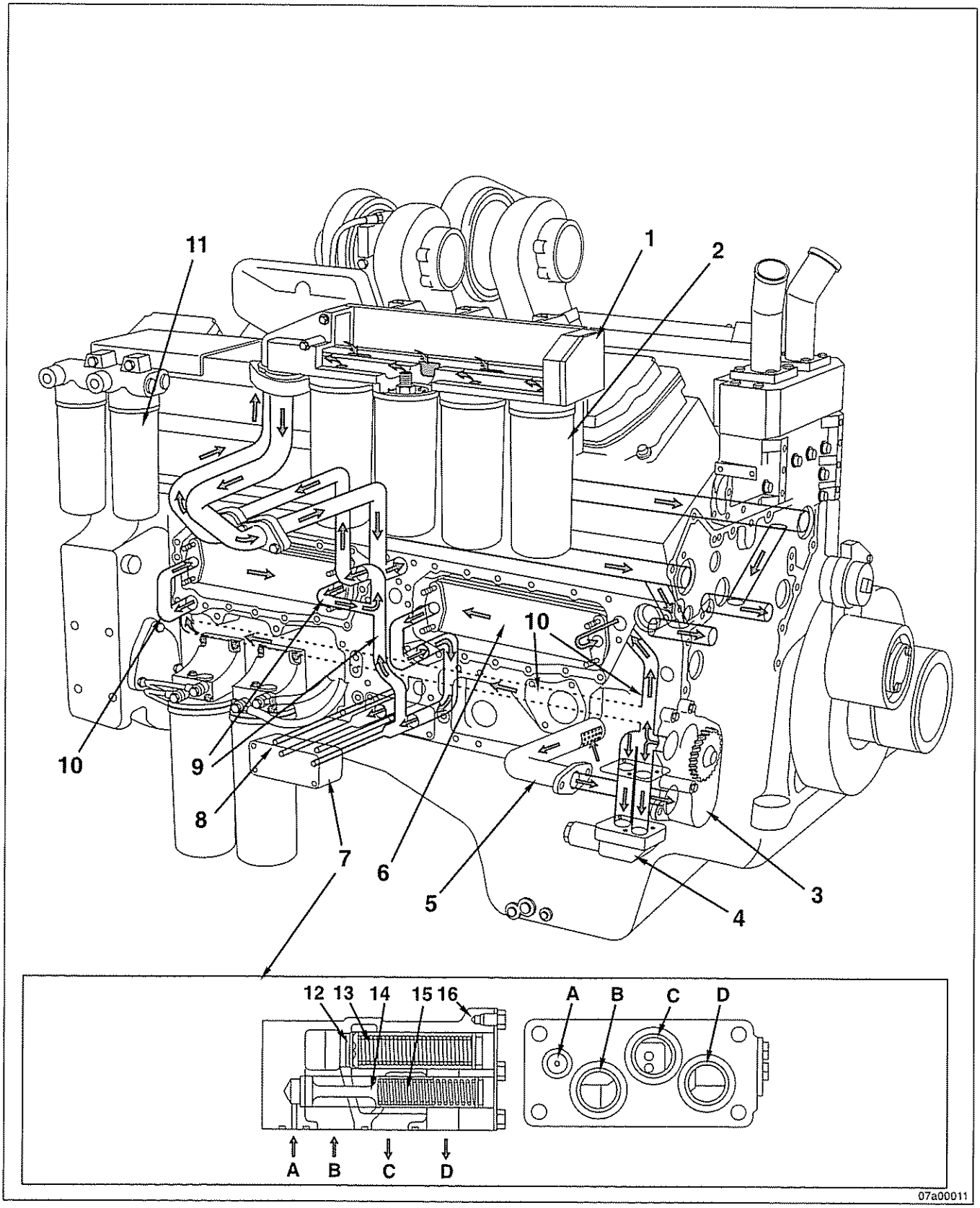
Industrial Fuel System with EHAB



1. Fuel Tank
2. Prefilter
3. Fuel Connection Block
4. Fuel Lift Pump
5. Fuel Filter
6. EHAB
7. Fuel Injection Pump
8. Fuel Injection Nozzle
9. Electronic Governor

A. Fuel Supply (From Tank)
B. Fuel Overflow Valve
C. Fuel Gallery Outlet
D. Fuel Gallery Inlet
E. Fuel out to Lift Pump
F. Fuel in from Fuel Filter
G. Fuel Drain (To Tank)

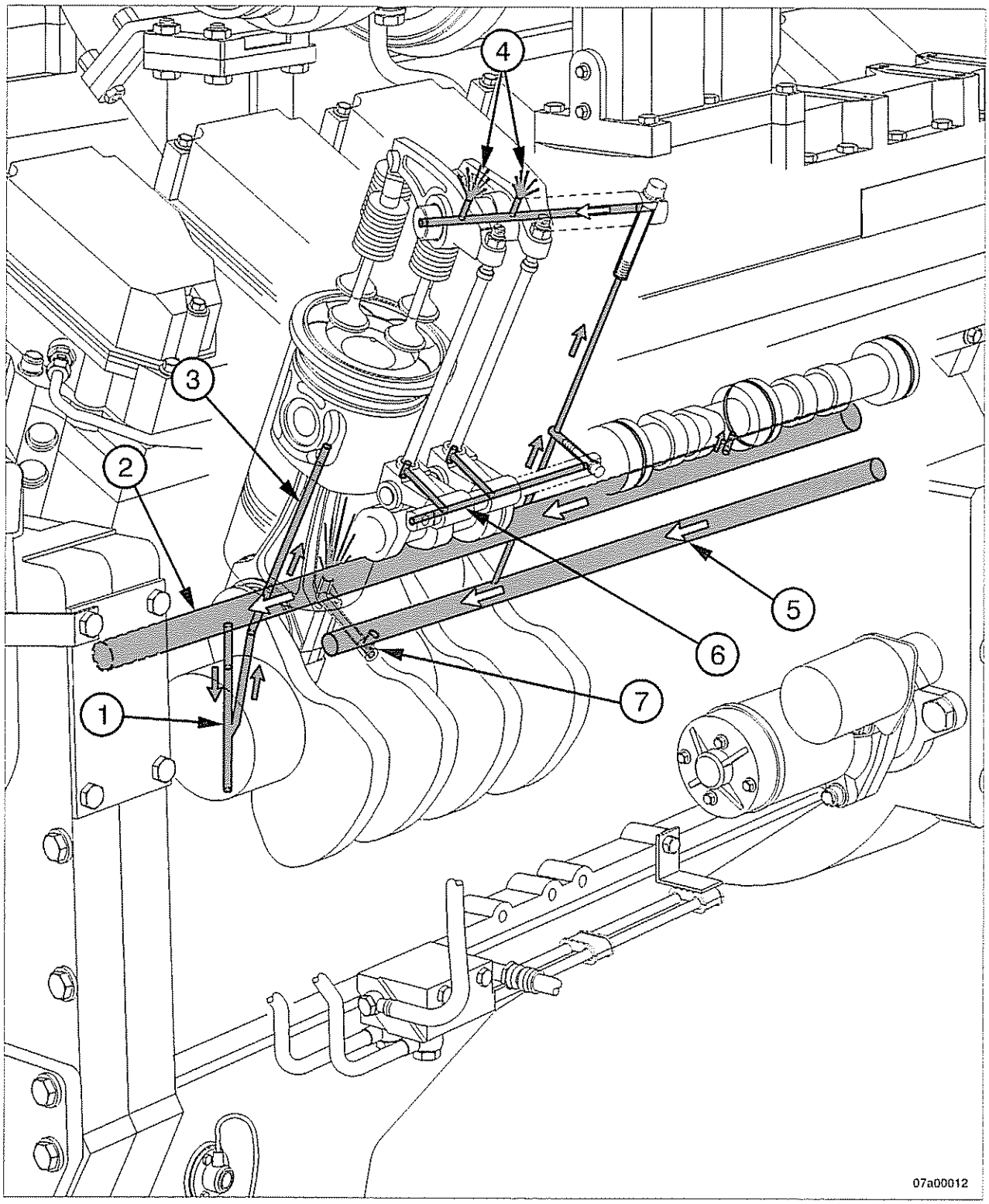
Flow Diagram, Lubricating Oil System



1. Full Flow Filter Head
2. Full Flow Filter(s)
3. Lubricating Oil Pump
4. High Pressure Regulator
5. Suction Tube
6. Lubricating Oil Cooler
7. Low Pressure and Lubricating Oil Cooler Bypass Regulator
8. Signal Line
9. Cold Oil Flow
10. Hot Oil Flow
11. Bypass Filters
12. Oil Cooler Bypass Valve
13. Bypass Valve Spring
14. Regulator Valve
15. Regulator Valve Spring
16. Valve Body

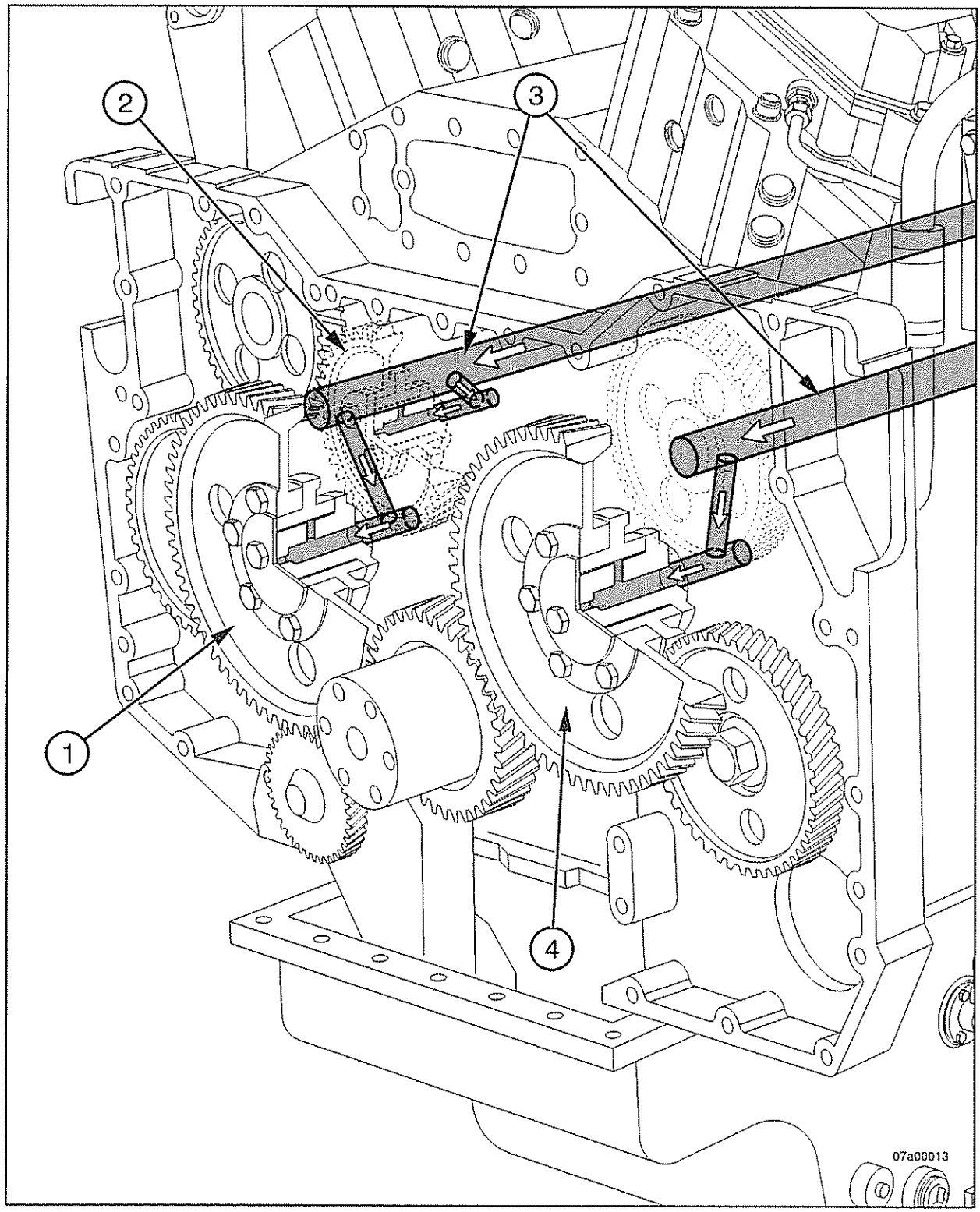
A. From Main Gallery (Signal Line)
B. From Oil Cooler
C. To Oil Pan
D. To Oil Filter

Piston Cooling, Connecting Rod, Overhead



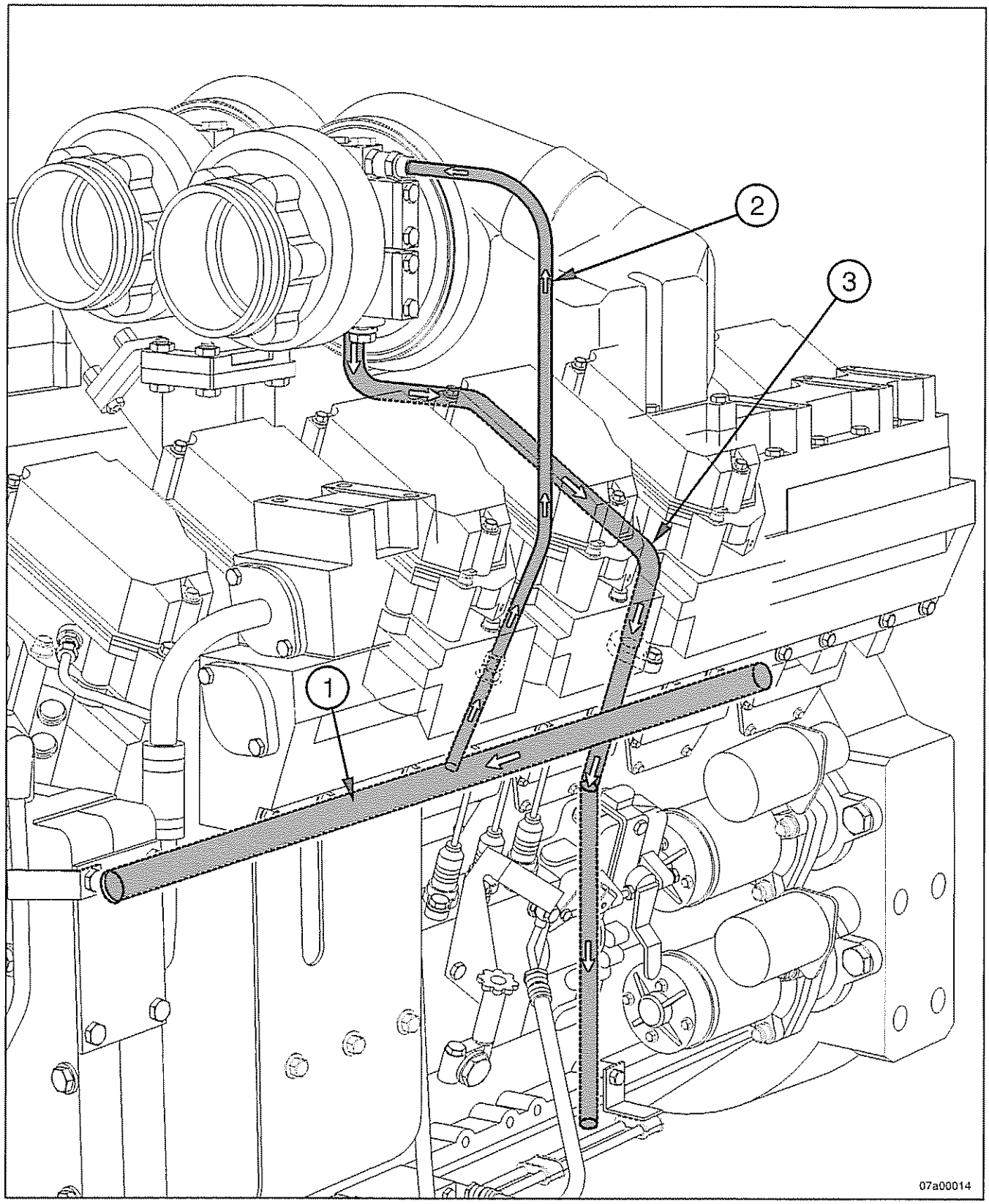
1. Crankshaft Oil Drillings
2. Main Oil Drillings
3. Connecting Rod Wrist Pin Oil Supply
4. Upper Rocker Lever Oil Supply
5. Piston Cooling Oil Drilling
6. Cam Follower Oil Drilling
7. Piston Cooling Nozzle

Front Gear Train



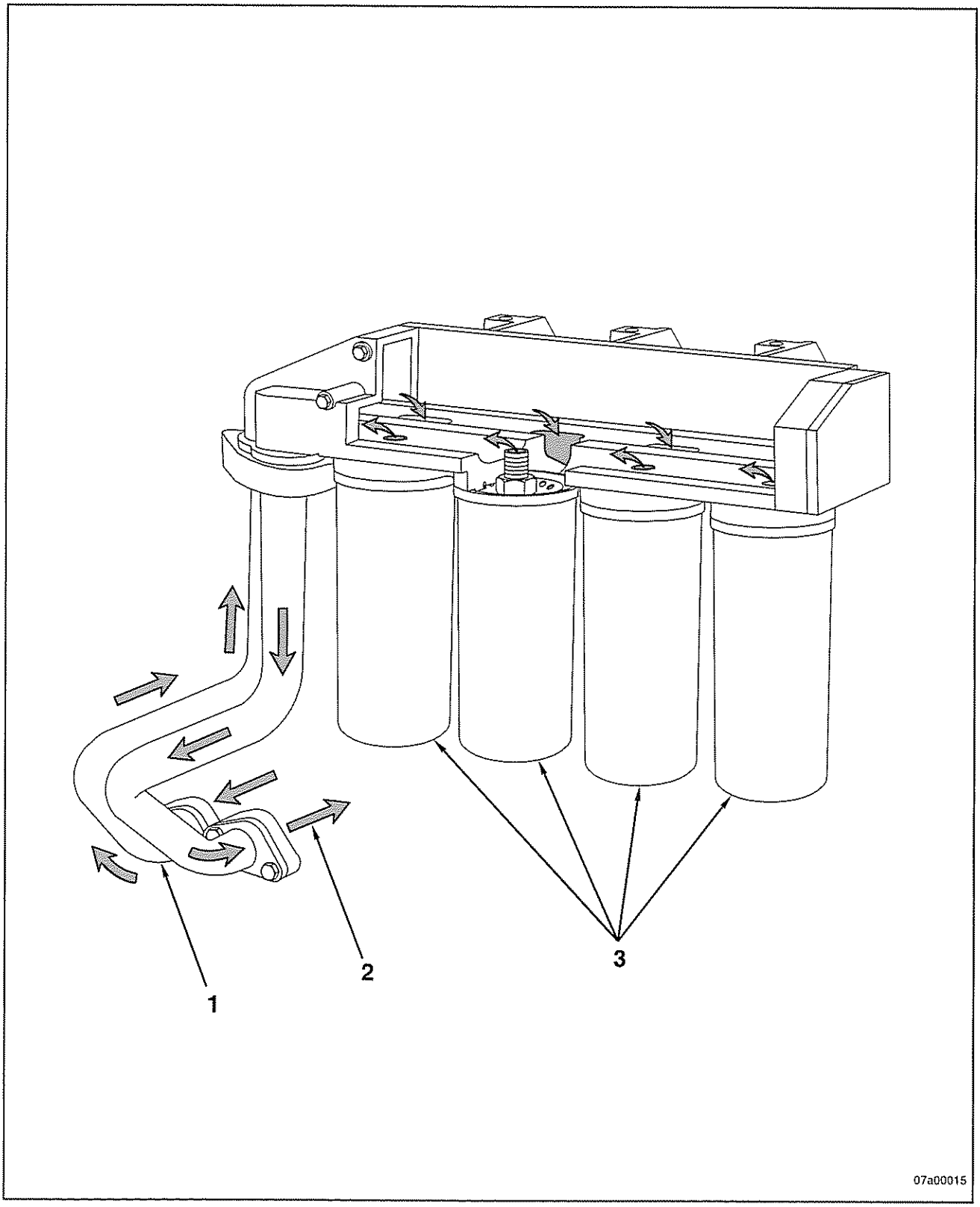
1. Right Bank (Large) Idler Gear
2. Right Bank (Small) Idler Gear
3. Piston Cooling Oil Supply Drillings
4. Left Bank (Large) Idler Gear

Turbocharger



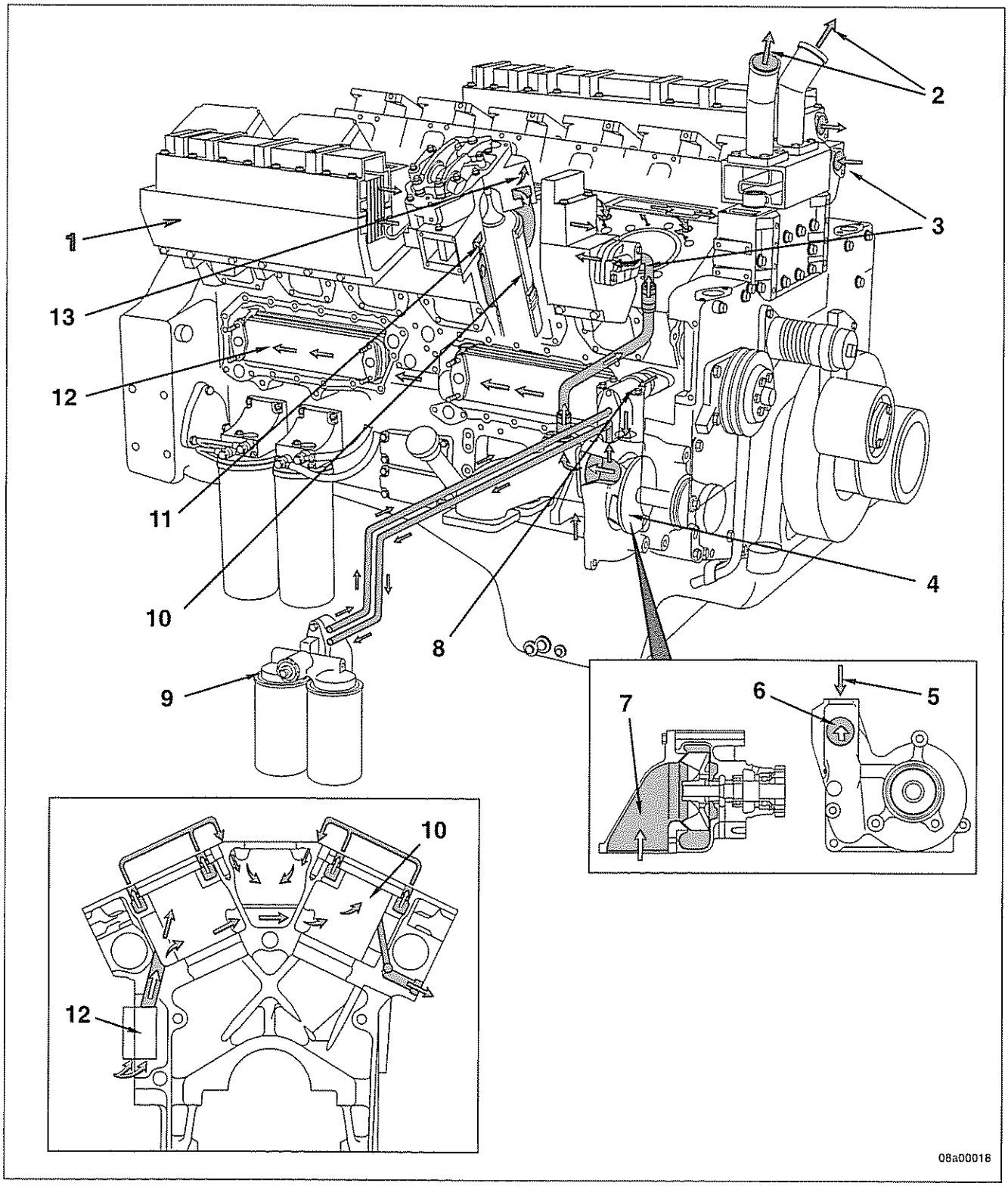
1. Piston Cooling Oil Supply Drilling
2. Turbocharger Oil Supply
3. Turbocharger Oil Drain

Full Flow Lubricating Oil Filter Head



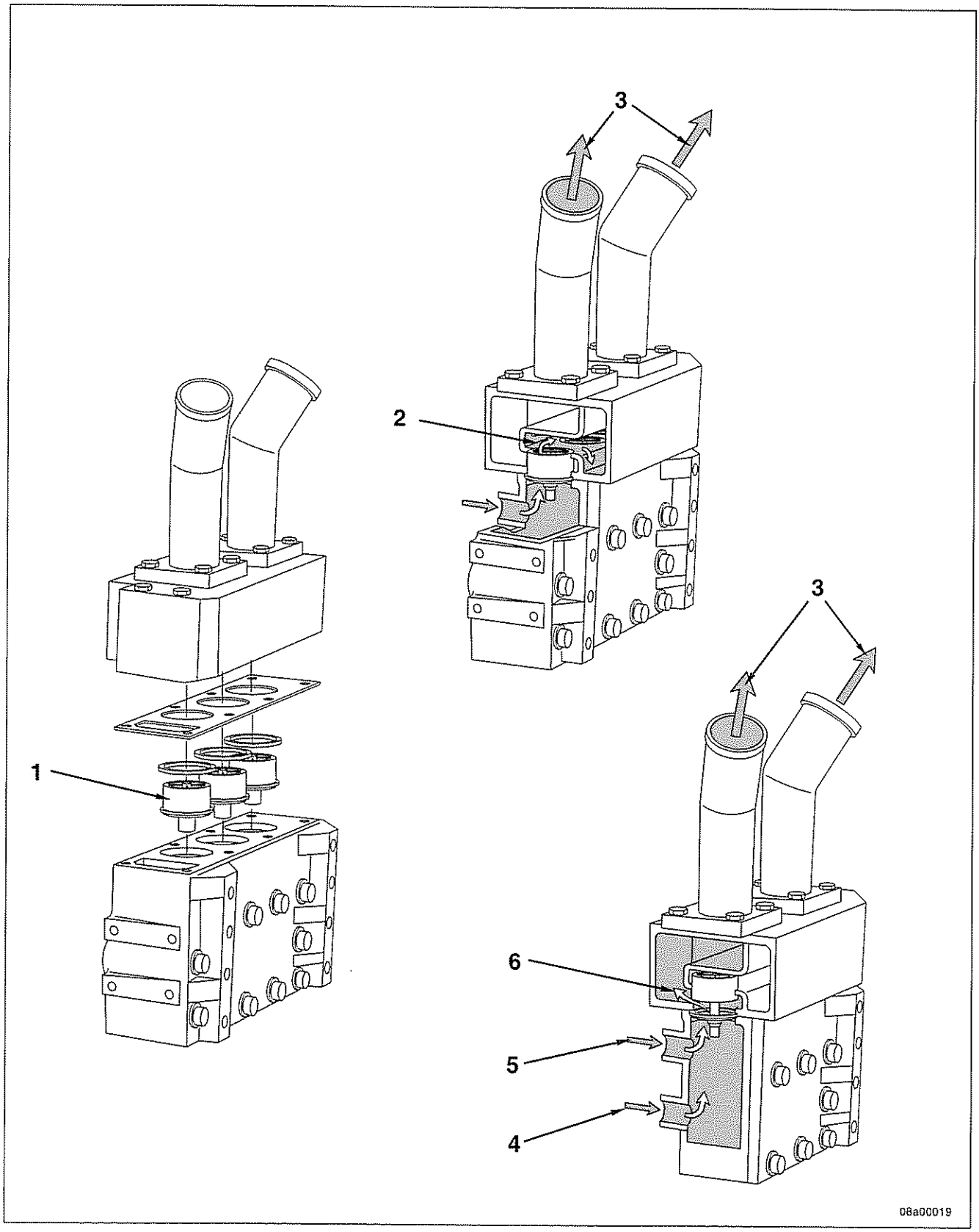
1. Oil Supply
2. Oil Drain
3. Full Flow Filters

Flow Diagram, Cooling System



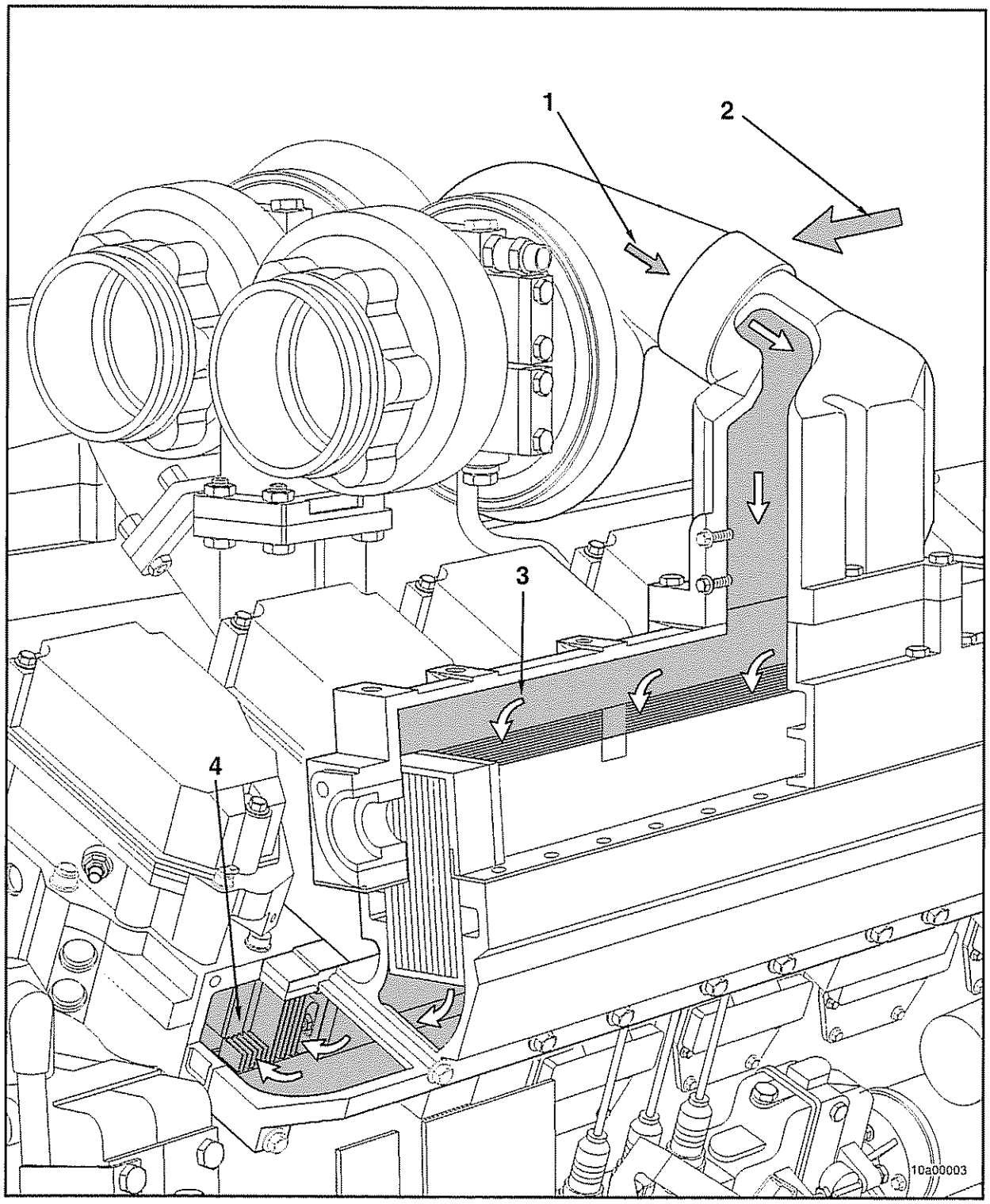
1. Aftercooler(s)
2. Water Outlet
3. Aftercooler Water Inlet
4. Water Pump Impeller
5. Bypass Flow
6. Water Outlet to Block
7. Water Inlet
8. Bypass Flow
9. Water Filters
10. Cylinder Liner Coolant Cavity
11. Cylinder Head Coolant Passage
12. Oil Coolers
13. Vent Line Flow

Thermostat Housing Flow



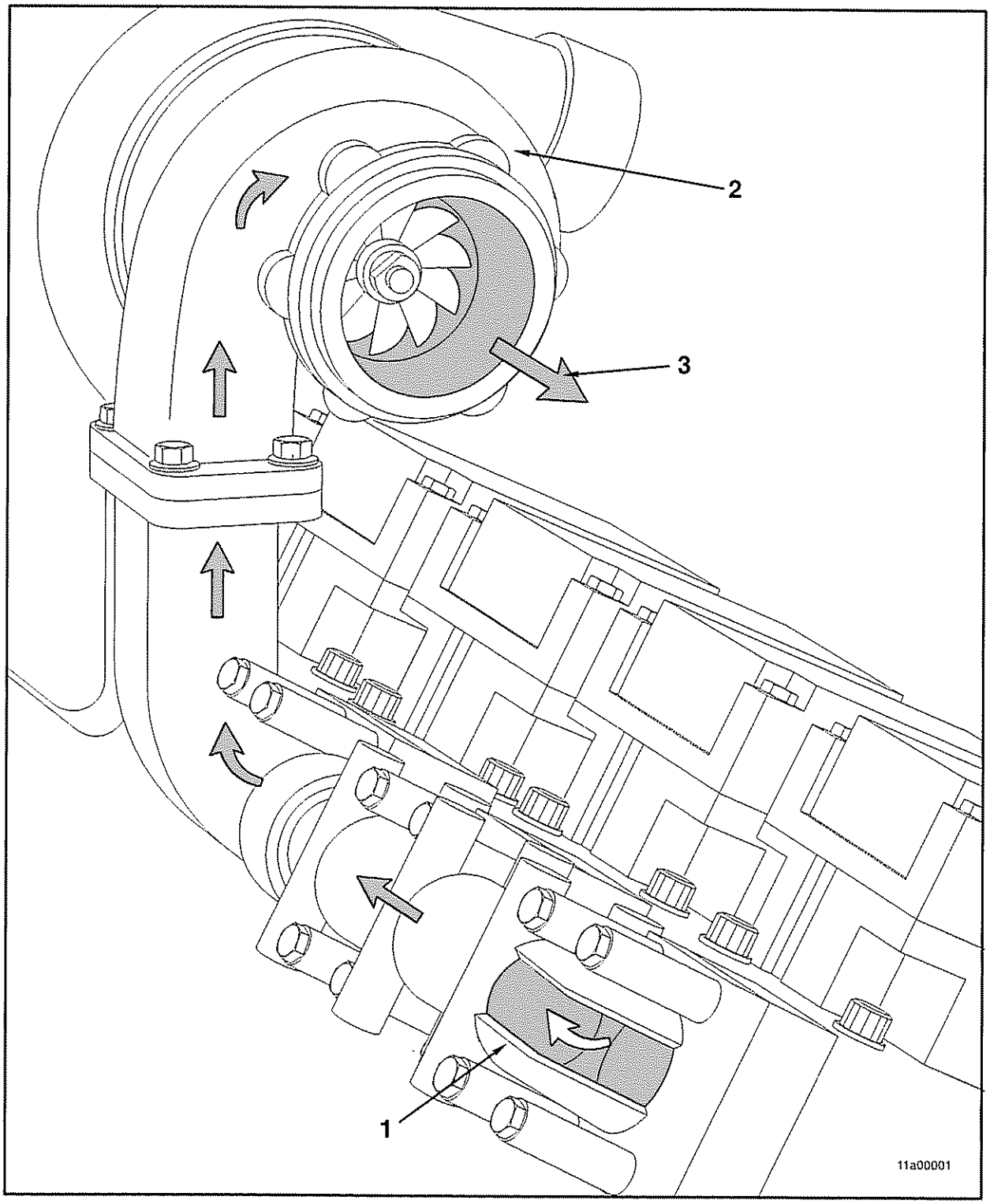
1. Thermostat
2. Closed Thermostat Bypass Flow to Water Pump Inlet
3. Water Outlet
4. Coolant from Block
5. Coolant from Aftercoolers
6. Open Thermostat Flow

Flow Diagram, Air Intake System



1. Turbocharger Outlet
2. Air Crossover
3. Aftercooler
4. Grid Heater (Option)

Flow Diagram, Exhaust System



1. Exhaust Manifold
2. Turbine Housing
3. Exhaust Outlet

NOTES

Section L - Service Literature

Section Contents

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Additional Service Literature

The following publications can be purchased by filling in and mailing the Literature Order Form:

Bulletin No.	Title of Publication
3810340	Cummins Engine Oil Recommendations
3379001	Fuel for Cummins Engines (QP-20)
3666184	Troubleshooting and Repair Manual, QST Fuel System, QST30 G-Drive Engine Series
3666185	QST30 G-Drive Wiring/Fault Code Diagram
3666190	QST30 Preliminary Shop Manual
3666196	INSITE™ G-Drive User's Manual (QST30)
3666214	Troubleshooting and Repair Manual, QST Fuel System, QST30 Industrial Engine Series
3672101	QST30 G1/G2/G3 Parts Manual
3884884	QST30 G-Drive Pocket Fault Card
3884888	QST30 G-Drive Governor Bulletin

Service Literature Ordering Location

Region	Ordering Location
United States and Canada	Cummins Distributors or Contact 1-800-DIESELS (1-800-343-7357)
U.K., Europe, Mid-East, Africa, and Eastern European Countries	Cummins Engine Co., Ltd. Royal Oak Way South Daventry Northants, NN11 5NU, England
South and Central America (excluding Brazil and Mexico)	Cummins Americas, Inc. 16085 N.W. 52nd Avenue Hialeah, FL 33104
Brazil and Mexico	Cummins Engine Co., Inc. International Parts Order Dept., MC 40931 Box 3005 Columbus, IN 47202-3005
Far East (excluding Australia and New Zealand)	Cummins Diesel Sales Corp. Literature Center 8 Tanjong Penjuru Jurong Industrial Estate Singapore
Australia and New Zealand	Cummins Diesel Australia Maroondah Highway, P.O.B. 139 Ringwood 3134 Victoria, Australia

Obtain current price information from your local Cummins Distributor.

Literature Order Form

Use this form for prompt handling of your literature order.

Item	Bulletin Number	Title of Publication	Quantity	U.S. Price Each	Amount
1				$	$
2					
3					
4					
5					
6					
				Order Total	$

Contact your Cummins distributor for prices and availability.

For problems with literature orders (for U.S.A. and Canada), contact 1-800-DIESELS (1-800-343-7357). All other locations contact your local Distributor.

Prices subject to change without notice.

Please cut on dotted line

Literature Order Form

Use this form for prompt handling of your literature order.

Item	Bulletin Number	Title of Publication	Quantity	U.S. Price Each	Amount
1				$	$
2					
3					
4					
5					
6					
				Order Total	$

Contact your Cummins distributor for prices and availability.

For problems with literature orders (for U.S.A. and Canada), contact 1-800-DIESELS (1-800-343-7357). All other locations contact your local Distributor.

Prices subject to change without notice.

Mail the Literature Order Form along with your ship-to address to your nearest Cummins distributor.

FROM:		
Name:		
Street Address:		
City:	State/Province:	Zip/Postal Code:
Country:		

SHIP TO: (Name and address where literature is to be shipped)		
Name:		
Street Address:		
City:	State/Province:	Zip/Postal Code:
Country:		

Please cut on dotted line

Mail the Literature Order Form along with your ship-to address to your nearest Cummins distributor.

FROM:		
Name:		
Street Address:		
City:	State/Province:	Zip/Postal Code:
Country:		

SHIP TO: (Name and address where literature is to be shipped)		
Name:		
Street Address:		
City:	State/Province:	Zip/Postal Code:
Country:		

Section M - Component Manufacturers

Section Contents

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Component Manufacturers' Addresses

NOTE: The following list contains addresses and telephone numbers of suppliers of accessories used on Cummins engines. Suppliers can be contacted directly for any specifications **not** covered in this manual.

Air Compressors

Bendix Heavy Vehicles Systems
Div. of Allied Automotive
901 Cleveland Street
Elyria, OH 44036
Telephone: (216) 329-9000

Holset Engineering Co., Inc.
1320 Kemper Meadow Drive
Suite 500
Cincinnati, OH 45240
Telephone: (513) 825-9600

Midland-Grau
Heavy Duty Systems
Heavy Duty Group Headquarters
10930 N. Pamona Avenue
Kansas City, MO 64153
Telephone: (816) 891-2470

Air Cylinders

Bendix Ltd.
Douglas Road
Kingswood
Bristol
England
Telephone: 0117-671881

Catching Engineering
1733 North 25th Avenue
Melrose Park, IL 60160
Telephone: (708) 344-2334

TEC - Hackett Inc.
8909 Rawles Avenue
Indianapolis, IN 46219
Telephone: (317) 895-3670

Air Heaters

Fleetguard, Inc.
1200 Fleetguard Road
Cookeville, TN 38502
Telephone: (615) 526-9551

Kim Hotstart Co.
P.O. Box 11245
Spokane, WA 99211-0245
Telephone: (509) 534-6171

Air Starting Motors

Ingersoll Rand
Chorley New Road
Horwich
Bolton
Lancashire
England
BL6 6JN
Telephone: 01204-65544

Ingersoll-Rand Engine
Starting Systems
888 Industrial Drive
Elmhurst, IL 60126
Telephone: (708) 530-3875

StartMaster
Air Starting Systems
A Division of Sycon Corporation
9595 Cheney Avenue
P. O. Box 491
Marion, OH 43302
Telephone: (614) 382-5771

Alternators

Robert Bosch Ltd.
P.O. Box 98
Broadwater Park
North Orbital Road
Denham
Uxbridge
Middlesex UD9 5HG
England
Telephone: 01895-833633

Butec Electrics
Cleveland Road
Leyland
PR5 1XB
England
Telephone: 01744-21663

C.A.V. Electrical Equipment
P.O. Box 36
Warple Way
London
W3 7SS
England
Telephone: 01-743-3111

A.C. Delco Components Group
Civic Offices
Central Milton Keynes
MK9 3EL
England
Telephone: 01908-66001

C. E. Niehoff & Co.
2021 Lee Street
Evanston, IL 60202
Telephone: (708) 866-6030

Delco-Remy America
2401 Columbus Avenue
P.O. Box 2439
Anderson, IN 46018
Telephone: (317) 646-3528

Leece-Neville Corp.
400 Main Street
Arcade, NY 14009
Telephone: (716) 492-1700

Auxiliary Brakes

The Jacobs Manufacturing Company
Vehicle Equipment Division
22 East Dudley Town Road
Bloomfield, CT 06002
Telephone: (203) 243-1441

Belts

Dayco Rubber U.K.
Sheffield Street
Stockport
Cheshire
SK4 1RV
England
Telephone: 061-432-5163

T.B.A. Belting Ltd.
P.O. Box 77
Wigan
Lancashire
WN2 4XQ
England
Telephone: 01942-59221

Dayco Mfg.
Belt Technical Center
1955 Enterprize
Rochester Hills, MI 48309
Telephone: (810) 853-8300

Gates Rubber Company
900 S. Broadway
Denver, CO 80217

Goodyear Tire and
Rubber Company
Industrial Products Div.
2601 Fortune Circle East
Indianapolis, IN 46241
Telephone: (317) 898-4170

Catalytic Convertors

Donaldson Company, Inc.
1400 West 94th Street
P.O. Box 1299
Minneapolis, MN 55440
Telephone: (612) 887-3835

Nelson Division
Exhaust and Filtration Systems
1801 U.S. Highway 51 P.O. Box 428
Stoughton, WI 53589
Telephone: (608) 873-4200

Walker Manufacturing
3901 Willis Road
P.O. Box 157
Grass Lake, MI 49240
Telephone: (517) 522-5500

Coolant Level Switches

Robertshaw Controls Company
P.O. Box 400
Knoxville, TN 37901
Telephone: (216) 885–1773

Clutches

Twin Disc International S.A.
Chaussee de Namur
Nivelles
Belguim
Telephone: 067-224941

Twin Disc Incorporated
1328 Racine Street
Racine, WI 53403
Telephone: (414) 634-1981

Coolant Heaters

Fleetguard, Inc.
1200 Fleetguard Road
Cookeville, TN 38502
Telephone: (615) 526-9551

Drive Plates

Detroit Diesel Allison
Division of General Motors
Corporation
P.O. Box 894
Indianapolis, IN 46206-0894
Telephone: (317) 242-5000

Electric Starting Motors

Butec Electrics
Cleveland Road
Leyland
PR5 1XB
England
Telephone: 01744-21663

C.A.V. Electrical Equipment
P.O. Box 36
Warple Way
London
W3 7SS
England
Telephone: 01-743-3111

A.C. Delco Components Group
Civic Offices
Central Milton Keynes
MK9 3EL
England
Telephone: 0908-66001

Delco-Remy America
2401 Columbus Avenue
P.O. Box 2439
Anderson, IN 46018
Telephone: (317) 646-3528

Leece-Neville Corp.
400 Main Street
Arcade, NY 14009
Telephone: (716) 492-1700

Nippondenso Inc.
2477 Denso Drive
P.O. Box 5133
Southfield, MI 48086
Telephone: (313) 350-7500

Electronic Switches

Cutler-Hammer Products
Eaton Corporation
4201 N. 27th Street
Milwaukee, WI 53216
Telephone: (414) 449-6600

Engine Protection Controls

Flight Systems Headquarters
Hempt Road
P.O. Box 25
Mechanicsburg, PA 17055
Telephone: (717) 697-0333

The Nason Company
2810 Blue Ridge Blvd.
West Union, SC 29696
Telephone: (803) 638-9521

Teddington Industrial
Equipment
Windmill Road
Sunburn on Thames
Middlesex
TW16 7HF
England
Telephone: 09327-85500

Fan Clutches

Holset Engineering Co. Ltd.
P.O. Box A9
Turnbridge
Huddersfield, West Yorkshire
England HD6 7RD
Telephone: 01484-22244

Horton Industries, Inc.
P.O. Box 9455
Minneapolis, MN 55440
Telephone: (612) 378-6410

Rockford Clutch Company
1200 Windsor Road
P.O. Box 2908
Rockford, IL 61132-2908
Telephone: (815) 633-7460

Fans

Truflo Ltd.
Westwood Road
Birmingham
B6 7JF
England
Telephone: 021-557-4101

Hayes-Albion Corporation
Jackson Manufacturing Plant
1999 Wildwood Avenue
Jackson, MI 49202
Telephone: (517) 782-9421

Engineered Cooling Systems, Inc.
201 W. Carmel Drive
Carmel, IN 46032
Telephone: (317) 846-3438

Brookside Corporation
P.O. Box 30
McCordsville, IN 46055
Telephone: (317) 335-2014

TCF Aerovent Company
9100 Purdue Rd., Suite 101
Indianapolis, IN 46268-1190
Telephone: (317) 872-0030

Kysor-Cadillac
1100 Wright Street
Cadillac, MI 49601
Telephone: (616) 775-4681

Schwitzer
6040 West 62nd Street
P.O. Box 80-B
Indianapolis, IN 46206
Telephone: (317) 328-3010

Fault Lamps

Cutler-Hammer Products
Eaton Corporation
4201 N. 27th Street
Milwaukee, WI 53216
Telephone: (414) 449-6600

Filters

Fleetguard International Corp.
Cavalry Hill Industrial Park
Weedon
Northampton NN7 4TD
England
Telephone: 01327-41313

Fleetguard, Inc.
1200 Fleetguard Road
Cookeville, TN 38502
Telephone: (615) 526-9551

Flexplates

Corrugated Packing and
Sheet Metal
Hamsterley
Newcastle Upon Tyne
England
Telephone: 01207-560-505

Allison Transmission
Division of General Motors
Corporation
P.O. Box 894
Indianapolis, IN 46206-0894
Telephone: (317) 242-5000

Midwest Mfg. Co.
29500 Southfield Road, Suite 122
Southfield, MI 48076
Telephone: (313) 642-5355

Wohlert Corporation
708 East Grand River Avenue
P.O. Box 20217
Lansing, MI 48901
Telephone: (517) 485-3750

Fuel Coolers

Hayden, Inc.
1531 Pomona Road
P.O. Box 848
Corona, CA 91718-0848
Telephone: (909) 736-2665

Fuel Warmers

Fleetguard, Inc.
1200 Fleetguard Road
Cookeville, TN 38502
Telephone: (615) 526-9551

Gauges

A.I.S.
Dyffon Industrial Estate
Ystrad Mynach
Hengoed
Mid Glamorgan
CF8 7XD
England
Telephone: 01443-812791

Grasslin U.K. Ltd.
Vale Rise
Tonbridge
Kent
TN9 1TB
England
Telephone: 01732-359888

Icknield Instruments Ltd.
Jubilee Road
Letchworth
Herts
England
Telephone: 04626-5551

Superb Tool and Gauge Co.
21 Princip Street
Birmingham
B4 61E
England
Telephone: 021-359-4876

Kabi Electrical and Plastics
Cranborne Road
Potters Bar
Herts
EN6 3JP
England
Telephone: 01707-53444

Datcon Instruments
P.O. Box 128
East Petersburg, PA 17520
Telephone: (717) 569-5713

Rochester Gauges, Inc.
11616 Harry Hines Blvd.
P.O. Box 29242
Dallas, TX 75229
Telephone: (214) 241-2161

Governors

Woodward Governors Ltd.
P.O. Box 15
663/664 Ajax Avenue
Slough
Bucks
SL1 4DD
England
Telephone: 01753-26835

Woodward Governor Co.
P.O. Box 1519
Fort Collins, CO 80522
Telephone: (303) 482-5811
(800) 523-2831

Barber Colman Co.
1354 Clifford Avenue
Loves Park, IL 61132
Telephone: (815) 637-3000

United Technologies
Diesel Systems
1000 Jorie Blvd.
Suite 111
Oak Brook, IL 69521
Telephone: (312) 325-2020

Heat Sleeves

Bentley Harris Manufacturing Co.
100 Bentley Harris Way
Gordonville, TN 38563
Telephone: (313) 348-5779

Hydraulic and Power Steering Pumps

Hobourn Automotive
Temple Farm Works
Priory Road
Strood
Rochester
Kent, England
ME2 2BD
Telephone: 01634-71773

Honeywell Control Systems Ltd.
Honeywell House
Charles Square
Bracknell
Berks RG12 1EB
Telephone: 01344-4245

Sundstrand Hydratec Ltd.
Cheney Manor Trading Estate
Swindon
Wiltshire
SN2 2PZ
England
Telephone: 01793-30101

Sperry Vickers
P.O. Box 302
Troy, MI 48084
Telephone: (313) 280-3000

Z.F.
P.O. Box 1340
Grafvonsoden Strasse
5-9 D7070
Schwaebisch Gmuend
Germany
Telephone: 7070-7171-31510

In-Line Connectors

Pioneer-Standard Electronics, Inc.
5440 Neiman Parkway
Solon, OH 44139
Telephone: (216) 349-1300

Deutsch
Industrial Products Division
37140 Industrial Avenue
Hemet, CA 92343
Telephone: (714) 929-1200

Oil Heaters

Fleetguard, Inc.
1200 Fleetguard Road
Cookeville, TN 38502
Telephone: (615) 526-9551

Kim Hotstart Co.
P.O. Box 11245
Spokane, WA 99211-0245
Telephone: (509) 534-6171

Prelubrication Systems

RPM Industries, Inc.
Suite 109
55 Hickory Street
Washington, PA 15301
Telephone: (412) 228-5130

Radiators

JB Radiator Specialties, Inc.
P.O. Box 292087
Sacramento, CA 95829-2087
Telephone: (916) 381-4791

The G&O Manufacturing Company
100 Gando Drive
P.O. Box 1204
New Haven, CT 06505-1204
Telephone: (203) 562-5121

Young Radiator Company
2825 Four Mile Road
Racine, WI 53404
Telephone: (910) 271-2397

L and M Radiator, Inc.
1414 East 37th Street
Hibbing, MN 55746
Telephone: (218) 263-8993

Throttle Assemblies

Williams Controls, Inc.
14100 SW 72nd Avenue
Portland, OR 97224
Telephone: (503) 684-8600

Torque Converters

Twin Disc International S.A.
Chaussee de Namur
Nivelles
Belgium
Telephone: 067-224941

Twin Disc Incorporated
1328 Racine Street
Racine, WI 53403-1758
Telephone: (414) 634-1981

Rockford Powertrain, Inc.
Off-Highway Systems
1200 Windsor Road
P.O. Box 2908
Rockford, IL 61132-2908
Telephone: (815) 633-7460

Modine Mfg. Co.
1500 DeKoven Avenue
Racine, WI 53401
Telephone: (414) 636-1640

NOTES

Section S - Service Assistance

Section Contents

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Service Assistance

Routine Service and Parts

Personnel at Cummins Authorized Repair Locations can assist you with the correct operation and service of your engine. Cummins has a worldwide service network of more than 5,000 Distributors and Dealers who have been trained to provide sound advice, expert service, and complete parts support. Check the telephone directory yellow pages or refer to the directory in this section for the nearest Cummins Authorized Repair Location.

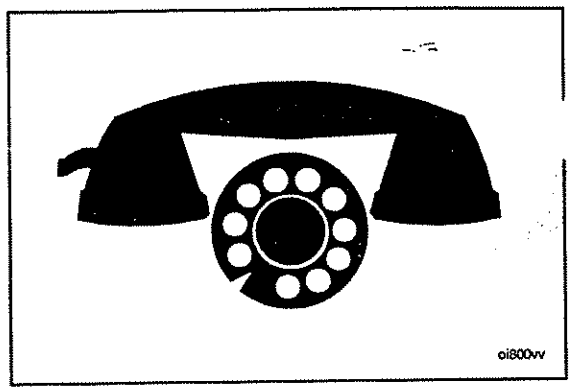
Emergency and Technical Service

The Cummins Customer Assistance Center provides a 24-hour, toll free telephone number to aid in technical and emergency service when a Cummins Authorized Repair Location can **not** be reached or is unable to resolve an issue with a Cummins product.

If additional assistance is required, call Toll-Free:

1-800-DIESELS
(1-800-343-7357)

- Includes all 50 states, Bermuda, Puerto Rico, Virgin Islands, and the Bahamas.
- Outside of North America contact your Regional Office. Telephone numbers and addresses are listed in the International Directory.



Problem Solving

Normally, any problem that arises with the sale, service, or repair of your engine can be handled by a Cummins Authorized Repair Location in your area. Refer to the telephone directory yellow pages for the one nearest you. If the problem has **not** been handled satisfactorily, follow the steps outlined below:

1. If the disagreement is with a Dealer, talk to the Cummins Distributor with whom he has his service agreement.
2. If the disagreement is with a Distributor, call the nearest Cummins Division or Regional Office; however, most problems are solved below the Division or Regional office level. Telephone numbers and addresses are listed in this section. Before calling, write down the following information:
   a. Engine model and serial number
   b. Type and make of equipment
   c. Total kilometers [miles] or hours of operation
   d. Warranty start date
   e. Nature of problem
   f. Summary of the current problem arranged in the order of occurrence
   g. Name and location of the Cummins Distributor or Dealer
3. If a problem can **not** be resolved satisfactorily through your Cummins Authorized Repair Location or Division Office, write to:

Customer Relations - 41403, Cummins Engine Company, Inc., Box 3005, Columbus, IN 47202-3005

Division and Regional Offices

NOTE: The following list contains offices in U.S., Canada, Australia, New Zealand, and Puerto Rico.

United States

Northern Division Office
Cummins Engine Company, Inc.
21 Southpark Blvd.
Greenwood, IN 46143
Telephone: (317) 885-4400
FAX: (317) 885–4423

Southern Division Office
Cummins Engine Company, Inc.
425 Franklin Road S.W.
Suite 500
Marietta, GA 30067
Telephone: (404) 423-1108
FAX: (404) 499-8240

Western Division Office
Cummins Engine Company, Inc.
5660 Greenwood Plaza Blvd.
Englewood, CO 80111
Telephone: (303) 773-2866
FAX: (303) 779–1629

Western Regional Office
Cummins Engine Company, Inc.
569 First Street West
Sonoma, CA 95476
Telephone: (707) 935-3842
FAX: N/A

Plains Regional Office
Cummins Engine Company, Inc.
1901 Central Drive
Suite 356
Bedford, TX 76021
Telephone: (817) 267-3172
FAX: N/A

Canada

Canadian Division Office
Cummins Diesel of Canada, Ltd.
700 Dorval Drive
Suite 600
Oakville, Ontario L6K 3V3
Telephone: (905) 842-8070
FAX: (905) 842-8075

Western Canada Regional Office
Cummins Diesel of Canada, Ltd.
18452 - 96th Avenue
Surrey, B.C. V3T 4W2
Telephone: (604) 882-5727
FAX: (604) 882–9110

Eastern Canada Regional Office
Cummins Diesel of Canada Ltd.
7200 Trans Canada Hwy.
Pt. Cuaire, Quebec H9R 1C0
Telephone: (514) 695–2402
FAX: (514) 695–8917

Central Canada Regional Office
Cummins Diesel of Canada Ltd.
4887 – 35th Street SE
Calgary, Alberta T2B 3C6
FAX: (403) 569–9974

Australia Regional Office

Diesel ReCon Australia
2 Caribbean Drive
Scoresby, Victoria 3179
Australia
Telephone: (61) 3-765-3222
FAX: (61) 3–763–0079

NOTE: This office also serves New Zealand.

Cummins Americas Regional Office

Cummins Caribbean
16085 N. W. 52nd Avenue
Hialeah, FL 33014
Telephone: (305) 621-1300

NOTE: This office serves Puerto Rico and South America excluding Brazil.

Distributors and Branches - United States

Alabama

Birmingham Distributor
Cummins Alabama, Inc.
2200 Pinson Highway
P.O. Box 1147
Birmingham, AL 35201
Telephone: (205) 841-0421
FAX: (205) 849–5926

Mobile Branch
Cummins Alabama, Inc.
1924 Beltline Highway,
I-65 North
P.O. Box 2566
Mobile, AL 36601
Telephone: (334) 456-2236
FAX: (334) 452–6419

Mobile Onan/Marine Branch
Cummins Alabama, Inc.
3422 Georgia Pacific Avenue
Mobile, AL 36617
Telephone: (334) 452-6426
FAX: (334) 473-6657

Montgomery Branch
Cummins Alabama, Inc.
2325 West Fairview Avenue
P.O. Box 9271
Montgomery, AL 36108
Telephone: (334) 263-2594
FAX: (334) 263–2594

Alaska

Anchorage - (Branch of Seattle)
Cummins Northwest, Inc.
2618 Commercial Drive
Anchorage, AK 99501-3905
Telephone: (907) 279-7594
FAX: (907) 276-6340

Arizona

Phoenix Distributor and Branch
Cummins Southwest, Inc.
2239 N. Black Canyon Hgwy
Phoenix, AZ 85009
Telephone: (602) 252-8021
FAX: (602) 253–6725

Tucson Branch
Cummins Southwest, Inc.
1912 West Prince Road
Tucson, AZ 85705
Telephone: (602) 887-7440
FAX: (602) 887–4173

Arkansas

Little Rock - (Branch of Memphis)
Cummins Mid-South, Inc.
6600 Interstate 30
Little Rock, AR 72209
Telephone:
Sales: (501) 569-5600
Service: (501) 569–5656
Parts: (501) 569–5613
FAX: (501) 565–2199

California

San Leandro Distributor
Cummins West, Inc.
14775 Wicks Blvd.
San Leandro, CA 94577–6779
Telephone: (510) 351-6101
FAX: (510) 352–3925

Arcata Branch
Cummins West, Inc.
4801 West End Road
Arcata, CA 95521
Telephone: (707) 822–7392
FAX: (707) 822–7585

Bakersfield Branch
Cummins West, Inc.
4601 East Brundage Lane
Bakersfield, CA 93307
Telephone: (805) 325-9404
FAX: (805) 861–8719

Fresno Branch
Cummins West, Inc.
2740 Church Avenue
Fresno, CA 93706
Telephone: (209) 495–4745
FAX: (209) 486–7402

Redding Branch
Cummins West, Inc.
20247 Charlanne Drive
Redding, CA 96002
Telephone: (916) 222–4070
FAX: (916) 224–4075

Stockton Branch
Cummins West, Inc.
41 West Yokuts Avenue
Suite 131
Stockton, CA 95207
Telephone: (209) 473–0386
FAX: (209) 478–2454

West Sacramento Branch
Cummins West, Inc.
2661 Evergreen Avenue
West Sacramento, CA 95691
Telephone: (916) 371-0630
FAX: (916) 371–2849

Los Angeles Distributor
Cummins Cal Pacific Inc.
1939 Deere Avenue (Irvine)
Irvine, CA 92714
Telephone: (714) 253-6000
FAX: (714) 253-6070 or 253–6080

Montebello Branch
Cummins Cal Pacific Inc.
1105 South Greenwood Avenue
Montebello, CA 90640
Telephone: (213) 728–8111
FAX: (213) 889–7422

Rialto Branch
Cummins Cal Pacific Inc.
3061 S. Riverside Avenue
Rialto, CA 92377
Telephone: (909) 877-0433
FAX: (909) 877-3787

San Diego Branch
Cummins Cal Pacific Inc.
310 N. Johnson Avenue
El Cajon, CA 92020
Telephone: (619) 593-3093
FAX: (619) 593–0600

Ventura Branch
Cummins Cal-Pacific Inc.
3958 Transport St.
Ventura, CA 93003
Telephone: (805) 644–7281
FAX: (805) 644–7284

Colorado

Denver Distributor
Cummins Rocky Mountain, Inc.
5100 East 58th Avenue
Commerce City, CO 80022
Telephone: (303) 287-0201
FAX: (303) 288–7080

Denver Onan/Industrial Branch
Cummins Rocky Mountain, Inc.
5100 East 58th Ave.
Commerce City, CO 80022
Telephone: (303) 286-7697
FAX: (303) 287–4837

Durango Branch
Cummins Rocky Mountain, Inc.
13589 County Road 213
Durango, CO 81301
Telephone: (970) 259–7470
FAX: (970) 259–7482

Grand Junction Branch
Cummins Rocky Mountain, Inc.
2380 U.S. Highway 6 & 50
P.O. Box 339
Grand Junction, CO 81501
Telephone: (303) 242-5776
FAX: (303) 243–5495

Connecticut

Bronx Distributor
Cummins Metropower, Inc.
632 Cromwell Ave.
Suite A
Rocky Hill, CT 06067
Telephone: (860) 529–7043

Hartford Distributor
Cummins - Connecticut, Inc.
260 Murphy Road
Hartford, CT 06114
Telephone: (203) 527-9156
FAX: (203) 527–9955

Florida

Tampa Distributor
Cummins Southeastern Power, Inc.
Corporate Office
5421 N. 59th Street
Tampa, FL 33610
Telephone: (813) 621-7202
FAX: (813) 621–8250

Ft. Myers Branch
Cummins Southeastern Power, Inc.
2671 Edison Avenue, Unit #3
Ft. Myers, FL 33916
Telephone: (813) 337-1211
FAX: (813) 337-5374

Jacksonville Branch
Cummins Southeastern Power, Inc.
2060 West 21st Street
P.O. Box 12036
Jacksonville, FL 32209
Telephone: (904) 355-3437
FAX: (904) 354–4594

Hialeah (Miami) Branch
Cummins Southeastern Power, Inc.
9900 N.W. 77th Court
Hialeah Gardens, FL 33016
Telephone: (305) 821-4200
FAX: (305) 557-2992

Orlando Branch
Cummins Southeastern Power, Inc.
4820 North
Orange Blossom Trail
Orlando, FL 32810
Telephone: (407) 298-2080
FAX: (407) 290-8727

Tampa Branch
Cummins Southeastern Power, Inc.
5910 E. Hillsborough Avenue
P. O. Box 11737
Tampa, FL 33680
Telephone: (813) 626-1101
FAX: (813) 628-4183

Georgia

Atlanta Distributor
Cummins South, Inc.
5125 Georgia Highway 85
College Park, GA 30349–5976
Telephone: (404) 763-0151
FAX: (404) 766–2132

Albany Branch
Cummins South, Inc.
1915 W. Oakridge Drive
Albany, GA 31707–4938
Telephone: (912) 888-6210
FAX: (912) 883–1670

Atlanta Branch
Cummins South, Inc.
100 University Avenue, S.W.
Atlanta, GA 30315-2202
Telephone: (404) 527-7800
FAX: (404) 527–7832

Augusta Branch
Cummins South, Inc.
1255 New Savannah Road
Augusta, GA 30901-3891
Telephone: (706) 722-8825
FAX: (706) 722–7553

Savannah Branch
Cummins South, Inc.
8 Interchange Court
Savannah, GA 31401–1627
Telephone: (912) 232-5565
FAX: (912) 232–5145

Hawaii

Kapolei Distributor
Cummins Hawaii Diesel Power, Inc.
91–230 Kalaeloa Blvd.
Kapolei, HI 96707
Telephone: (808) 682–8110
FAX: (808) 682–8477

Idaho

Boise - (Branch of Salt Lake City)
Cummins Intermountain, Inc.
2851 Federal Way
P.O. Box 5212
Boise, ID 83705
Telephone: (208) 336-5000
FAX: N/A

Pocatello - (Branch of Salt Lake City)
Cummins Intermountain, Inc.
14299 Highway 30 West
Pocatello, ID 83201
Telephone: (208) 234-1661
FAX: (208) 234–1662

Illinois

Chicago Distributor
Cummins Northern Illinois, Inc.
7145 Santa Fe Drive
Hodgkins, IL 60525
Telephone: (708) 579-9222
FAX: (708) 352-7547

Bloomington-Normal - (Branch of Indianapolis)
Cummins Mid-States Power, Inc.
P.O. Box 348
(at U.S. 51 N and I-55)
414 W. Northtown Road
Bloomington-Normal, IL 61761
Telephone: (309) 452-4454
FAX: (309) 452–1642

Harrisburg (Branch of St. Louis)
Cummins Gateway, Inc.
Rt. 4, Box 629
Harrisburg, IL 62946
Telephone: (618) 273-4138
FAX: (618) 273–4531

Rock Island - (Branch of Omaha)
Cummins Great Plains Diesel, Inc.
7820 - 42nd Street West
P.O. Box 4445
Rock Island, IL 61204
Telephone: (309) 787-4300
FAX: (309) 787–4397

Indiana

Indianapolis Distributor
Cummins Mid-States Power, Inc.
P.O. Box 42917
3762 West Morris Street
Indianapolis, IN 46242-0917
Telephone: (317) 243-7979
FAX: (317) 240–1925

Evansville - (Branch of Louisville)
Cummins Cumberland, Inc.
7901 Highway 41 North
Evansville, IN 47711
Telephone: (812) 867-4400
FAX: (812) 421–3282

Ft. Wayne Branch
Cummins Mid-States Power, Inc.
3415 Coliseum Blvd. West
(At Jct. I-69 & 30/33)
Ft. Wayne, IN 46808
Telephone: (219) 482-3691
FAX: (219) 484–8930

Gary - (Branch of Chicago)
Cummins Northern Illinois, Inc.
1440 Texas Street
Gary, IN 46402
Telephone: (219) 885-5591
FAX: (219) 883-4817

Indianapolis Branch
Cummins Mid-States Power, Inc.
P. O. Box 42917
3621 West Morris Street
Indianapolis, IN 46242-917
Telephone: (317) 244-7251
FAX: (317) 240–1215

Onan Branch
Mid-States Power & Refrigeration
Division of Cummins Mid-States Power
4301 W. Morris Street
P.O. Box 42917
Indianapolis, IN 46240-0917
Telephone: (317) 240-1867
FAX: (317) 240-1975

Iowa

Cedar Rapids - (Branch of Omaha)
Cummins Great Plains Diesel, Inc.
625 - 33rd Avenue SW
P.O. Box 1107
Cedar Rapids, IA 52406
Telephone: (319) 366-7537 (24 hours)
FAX: (319) 366-7562

Des Moines - (Branch of Omaha)
Cummins Great Plains Diesel, Inc.
1680 N.E. 51st Avenue
P.O. Box B
Des Moines, IA 50313
Telephone: (515) 262-9591
Parts: (515) 262-9744
FAX: (515) 262-0626

Des Moines - (Branch of Omaha)
Midwestern Power Products
Division of Cummins Great Plains Diesel, Inc.
5194 N.E. 17th Street
Des Moines, IA 50313
Telephone: (515) 264-1650
FAX: (515) 264-1651

Kansas

Colby - (Branch of Kansas City, Missouri)
Cummins Mid-America, Inc.
1880 South Range
Colby, KS 67701
Telephone: (913) 462-3945
FAX: (913) 462-3970

Garden City - (Branch of Kansas City, Missouri)
Cummins Mid-America, Inc.
2208 West Mary
Garden City, KS 67846
Telephone: (316) 275-2277
FAX: (316) 275-2533

Wichita - (Branch of Kansas City, Missouri)
Cummins Mid-America, Inc.
5101 North Broadway
Wichita, KS 67219
Telephone: (316) 838-0875
FAX: (316) 838-0704

Kentucky

Louisville Distributor
Cummins Cumberland, Inc.
(Corporate Office)
304 Whittington Parkway
Suite 200
Louisville, KY 40220
Telephone: (502) 426-9300
FAX: (502) 327-9851

Hazard Branch
Cummins Cumberland, Inc.
Highway 15 South
P.O. Box 510
Hazard, KY 41701
Telephone: (606) 436-5718
FAX: (606) 436-4038

Louisville Branch
Cummins Cumberland, Inc.
9820 Bluegrass Parkway
Louisville, KY 40299
Telephone: (502) 491-4263
FAX: (502) 499-0896

Louisiana

Morgan City - (Branch of Memphis)
Cummins Mid-South, Inc.
Hwy. 90 East
P.O. Box 1229
Amelia, LA 70340
Telephone: (504) 631-0576
FAX: (504) 631-0081

New Orleans - (Branch of Memphis)
Cummins Mid-South, Inc.
110 E. Airline Highway
Kenner, LA 70062
Telephone: (504) 468-3535
FAX: (504) 465-3408

Maine

Bangor (Branch of Boston)
Cummins Northeast, Inc.
142 Target Industrial Circle
Bangor, ME 04401
Telephone: (207) 941-1061
FAX: (207) 945-3170

Scarborough - (Branch of Boston)
Cummins Northeast, Inc.
10 Gibson Road
Scarborough, ME 04074
Telephone: (207) 883-8155
FAX: (207) 883-5526

Maryland

Baltimore Distributor
Cummins Chesapeake Power, Inc.
3140 Washington St.
Baltimore, MD 21230-1090
Telephone: (410) 633-5161
FAX: (410) 633-6031/5540

Baltimore Branch
Cummins Chesapeake Power, Inc.
3140 Washington Boulevard
Baltimore, MD 21230-1090
Telephone: (410) 644-6500
FAX: (410) 644-2438

Massachusetts

Boston Distributor
Cummins Northeast, Inc.
100 Allied Drive
Dedham, MA 02026
Telephone: (617) 329-1750
FAX: (617) 329-4428

West Springfield Branch
Cummins Northeast, Inc.
177 Rocus Street
Springfield, MA 01104
Telephone: (413) 737-2659
FAX: (413) 731-1082

Mexico

Tijuana - (Branch of Los Angeles)
Distribuidora Cummins De Baja
Blvd. 3ra. Oeste No. 17523
Fracc. Industrial
Garita de Otay C.P. 22400
Tijuana, Baja California
Mexico
Telephone: 011-52-66-238433
FAX: 011-52-66-238649

Michigan

Detroit (Novi) Distributor
Cummins Michigan, Inc.
41216 Vincenti Court
Novi, MI 48375
Telephone: (810) 478-9700
FAX: (810) 478-1570

Blissfield, Michigan
Diesel Fuel Systems, Inc.
Subsidiary of Cummins Michigan Inc.
211 N. Jipson Street
Blissfield, MI 49228
Telephone: (517) 486-4324
FAX: (517) 486-3614

Dearborn Branch
Cummins Michigan, Inc.
3760 Wyoming Avenue
Dearborn, MI 48120
Telephone: (313) 843-6200
FAX: (313) 843-6070

Grand Rapids Branch
Cummins Michigan, Inc.
3715 Clay Avenue, S.W.
Grand Rapids, MI 49508
Telephone: (616) 538-2250
FAX: (616) 538-3830

Grand Rapids Branch
Standby Power, Inc.
7580 Expressway Drive S.W.
Grand Rapids, MI 49548
Telephone: (616) 281-2211
FAX: (616) 281-3177

Iron Mountain - (Branch of De Pere)
Cummins Great Lakes, Inc.
P.O. Box 703
1901 Stevenson Avenue
Iron Mountain, MI 49801
Telephone: (906) 774-2424
(800) 236-2424
FAX: (906) 774–1190

Novi Branch
Cummins Michigan, Inc.
25100 Novi Road
Novi, MI 48375
Telephone: (810) 380-4300
FAX: (810) 380-0910

Saginaw Branch
Cummins Michigan, Inc.
722 N. Outer Drive
Saginaw, MI 48605
Telephone: (517) 752-5200
FAX: (517) 752-4194

Standby Power - (Branch of Detroit)
Standby Power, Inc.
12130 Dixie
Redford, MI 48239
Telephone: (313) 538-0200
FAX: (313) 538-3966

Minnesota

St. Paul Distributor
Cummins North Central, Inc.
2690 North Cleveland Avenue
St. Paul, MN 55113
Mailing Address:
P.O. Box 64578
St. Paul, MN 55164
Telephone: (612) 636-1000
FAX:
Office/Sales: (612) 638–2442
Parts/Service: (612) 638–2497

Duluth Branch
Cummins Diesel Sales, Inc.
3115 Truck Center Drive
Duluth, MN 55806–1786
Telephone: (218) 628-3641
FAX: (218) 628–0488

Mississippi

Jackson - (Branch of Memphis)
Cummins Mid-South, Inc.
325 New Highway 49 South
P.O. Box 54224
Jackson, MS 39288-4224
Telephone:
Admin.: (601) 932-7016
Parts: (601) 932-2720
Service: (601) 939-1800
FAX: (601) 932–7399

Missouri

Kansas City Distributor
Cummins Mid-America, Inc.
1760 Universal
P.O. Box 4985
Kansas City, MO 64120
General Accounting Office
Telephone: (816) 483-5070
FAX: (816) 483–5013

Kansas City Branch
Cummins Mid-America, Inc.
3527 Gardner Avenue
Kansas City, MO 64120
Telephone: (816) 483-6313
FAX: (816) 483–4073

Kansas City Fuel Systems Branch
Cummins Mid-America, Inc.
2810 Nicholson
Kansas City, MO 64120
Telephone: (816) 241-3400
FAX: (816) 241–5434

Joplin Branch
Cummins Mid-America, Inc.
3507 East 20th Street
Joplin, MO 64801
Telephone: (417) 623-1661
FAX: (417) 623–1817

Springfield Branch
Cummins Mid-America, Inc.
3637 East Kearney
Springfield, MO 65803
Telephone: (417) 862-0777
FAX: (417) 862-4429

St. Louis Distributor
Cummins Gateway, Inc.
7210 Hall Street
St. Louis, MO 63147
Telephone: (314) 389-5400
FAX: (314) 389–9671

Columbia Branch
Cummins Gateway, Inc.
5221 Highway 763 North
Columbia, MO 65202-1028
Telephone: (314) 449-3711
FAX: (314) 449–3712

Sikeston Branch
Cummins Gateway, Inc.
101 Keystone Drive
Sikeston, MO 63801
Telephone: (314) 472-0303
FAX: (314) 472–0306

Montana

Billings - (Branch of Denver)
Cummins Rocky Mountain, Inc.
5151 Midland Road
P.O. Box 30377
Billings, MT 59101
Telephone: (406) 245-4194
FAX: (406) 245–7923

Great Falls - (Branch of Denver)
Cummins Rocky Mountain, Inc.
415 Vaughn Road (59404)
P.O. Box 1199
Great Falls, MT 59403
Telephone: (406) 452-8561
FAX: (406) 452–9911

Missoula - (Branch of Seattle)
Cummins Northwest, Inc.
4950 North Reserve Street
Missoula, MT 59802-1498
Telephone: (406) 728-1300
FAX: (406) 728-8523

Nebraska

Omaha Distributor and Branch
Cummins Great Plains Diesel, Inc.
5515 Center Street
P.O. Box 6068
Omaha, NE 68106
Telephone: (402) 551-7678 (24 Hours)
FAX: (402) 551–1952

Kearney Branch
Cummins Great Plains Diesel, Inc.
515 Central Avenue
P.O. Box 1326
Kearney, NE 68847
Telephone: (308) 234-1994
FAX: (308) 234–5776

Nevada

Elko - (Branch of Salt Lake City)
Cummins Intermountain, Inc.
5370 East Idaho Street
Elko, NV 89801
Telephone: (702) 738-6405
FAX: (702) 738–1719

Las Vegas - (Branch of Salt Lake City)
Cummins Intermountain, Inc.
2750 Losee Road
North Las Vegas, NV 89036
Mailing Address:
P.O. Box 3997
North Las Vegas, NV 89036–3998
Telephone: (702) 399-2339
FAX: (702) 399–7457

Sparks - (Branch of Salt Lake City)
Cummins Intermountain, Inc.
150 Glendale Avenue
Sparks, NV 89431
Telephone: (702) 331-4983
FAX: (702) 331–7429

New Jersey

Newark - (Branch of Bronx)
Cummins Metropower, Inc.
41-85 Doremus Ave.
Newark, NJ 07105
Telephone: (201) 242-2255
FAX: (201) 242–6142

New Mexico

Albuquerque - (Branch of Phoenix)
Cummins Southwest, Inc.
1921 Broadway N.E.
Albuquerque, NM 87102
Telephone: (505) 247-2441
FAX: (505) 842–0436

Farmington - (Branch of Phoenix)
Cummins Southwest, Inc.
1101 North Troy King Road
Farmington, NM 87401
Telephone: (505) 327-7331
FAX: (505) 326–2948

New York

Bronx Distributor
Cummins Metropower, Inc.
890 Zerega Avenue
Bronx, NY 10473
Telephone: (718) 892-2400
FAX: (718) 892–0055

Albany - (Branch of Boston)
Cummins Northeast, Inc.
101 Railroad Avenue
Albany, NY 12205
Telephone: (518) 459-1710
FAX: (518) 459–7815

Buffalo - (Branch of Boston)
Cummins Northeast, Inc.
480 Lawrence Bell Dr.
Williamsville, NY 14221-7090
Telephone: (716) 631-3211
FAX: (716) 626–0799

Rochester - (Branch of Boston)
Cummins Northeast, Inc.
3543 Winton Place
Rochester, NY 14623

Syracuse - (Branch of Boston)
Cummins Northeast, Inc.
6193 Eastern Avenue
Syracuse, NY 13211
Telephone: (315) 437-2751
FAX: (315) 437-8141

North Carolina

Charlotte Distributor
Cummins Atlantic, Inc.
11101 Nations Ford Road (28273)
P.O. Box 240729
Charlotte, NC 28224-0729
Telephone: (704) 588-1240
FAX: (704) 587-4870

Charlotte Branch
Cummins Atlantic, Inc.
3700 North Interstate 85
Charlotte, NC 28206
Telephone: (704) 596-7690
FAX: (704) 596–3038

Greensboro Branch
Cummins Atlantic, Inc.
513 Preddy Boulevard (27406)
P.O. Box 22066
Greensboro, NC 27420-2066
Telephone: (910) 275-4531
FAX: (910) 275–8304

Wilson Branch
Cummins Atlantic, Inc.
1514 Cargill Avenue (27893)
P.O. Box 1177
Wilson, NC 27894-1117
Telephone: (919) 237-9111
FAX: (919) 237–9132

North Dakota

Fargo - (Branch of St. Paul)
Cummins Diesel Sales, Inc.
4050 West Main Avenue (58103)
P.O. Box 2111
Fargo, ND 58107
Telephone: (701) 282-2466
FAX: (701) 281–2543

Grand Forks - (Branch of St. Paul)
Cummins Diesel Sales, Inc.
4728 Gateway Drive (58201)
P.O. Box 12637
Grand Forks, ND 58208–2637
Telephone: (701) 775-8197
FAX: (701) 775–4833

Minot - (Branch of St. Paul)
Cummins Diesel Sales, Inc.
1501 - 20th Avenue, S.E. (58701)
P.O. Box 1179
Minot, ND 58702
Telephone: (701) 852-3585
FAX: (701) 852–3588

Ohio

Columbus Distributor and Branch
Cummins Ohio, Inc.
4000 Lyman Drive
Hilliard (Columbus), OH 43026
Telephone: (614) 771-1000
FAX: (614) 771–0769

Akron Branch
Cummins Ohio, Inc.
1033 Kelly Avenue
Akron, OH 44306
Telephone: (216) 773-7821
FAX: (216) 773–2201

Cincinnati Branch
Cummins Ohio, Inc.
10470 Evendale Drive
Cincinnati, OH 45241
Telephone: (513) 563-6670
FAX: (513) 563–0594

Cleveland Branch
Cummins Ohio, Inc.
7585 Northfield Road
Cleveland, OH 44146
Telephone: (216) 439-6800
FAX: (216) 439–7390

Strasburg Branch
Cummins Ohio, Inc.
777 South Wooster Avenue
Box 136
Strasburg, OH 44680
Telephone: (216) 878-5511
FAX: (216) 878–7666

Toledo Branch
Cummins Ohio, Inc.
801 Illinois Avenue
Maumee
(Toledo), OH 43537
Telephone: (419) 893-8711
FAX: (419) 893–5362

Youngstown Branch
Cummins Ohio, Inc.
7145 Masury Road
Hubbard
(Youngstown), OH 44425
Telephone: (216) 534-1935
FAX: (216) 534–5606

Oklahoma

Oklahoma City - (Branch of Arlington)
Cummins Southern Plains, Inc.
5800 West Reno
P.O. Box 1636
Oklahoma City, OK 73101-1636
Telephone: (405) 946-4481 (24 hours)
FAX: (405) 946–3336

Tulsa - (Branch of Arlington)
Cummins Southern Plains, Inc.
9725 E. Admiral Place
P.O. Box 471616
Tulsa, OK 74147–1616
Telephone: (918) 838-2555 (24 hours)
FAX: (918) 838–9818

Oregon

Bend - (Branch of Seattle)
Cummins Northwest, Inc.
3500 N. Highway 97 (97701-5729)
P.O. Box 309
Bend, OR 97709-0309
Telephone: (503) 389-1900
FAX: (503) 389–1909

Coburg/Eugene - (Branch of Seattle)
Cummins Northwest, Inc.
91201 Industrial Parkway
Coburg, OR 97401
(Mailing Address)
P.O. Box 10877
Eugene, OR 97440-2887
Telephone: (503) 687-0000
FAX: (503) 687–1977

Medford - (Branch of Seattle)
Cummins Northwest, Inc.
4045 Crater Lake Highway
Medford, OR 97504-9796
Telephone: (503) 779-0151
FAX: (503) 772–2395

Pendleton - (Branch of Seattle)
Cummins Northwest, Inc.
223 S.W. 23rd Street
Pendleton, OR 97801-1810
Telephone: (503) 276-2561
FAX: (503) 276-2564

Portland - (Corporate Branch of Seattle)
Cummins Northwest, Inc.
4711 N. Basin Avenue
P.O. Box 2710 (97208-2710)
Portland, OR 97217-3557
Telephone: (503) 289-0900
FAX: (503) 286-5938

Portland - (Branch of Seattle)
Cummins Northwest, Inc.
4711 N. Basin Avenue
P. O. Box 2710 (97208-2710)
Portland, OR 97217-3557
Telephone: (503) 289-0900
FAX: (503) 286-5938

Pennsylvania

Philadelphia Distributor
Cummins Power Systems, Inc.
2727 Ford Road
Bristol, PA 19007-6895
Telephone: (215) 785-6005 and
(609) 563-0005
FAX: (215) 785-4085

Bristol Branch
Cummins Power Systems, Inc.
2727 Ford Road
Bristol, PA 19007-6895
Telephone: (215) 785-6005 and
(609) 563-0005
FAX: (215) 785-4728

Clearfield Branch
Cummins Power Systems, Inc.
501 Williams Street
Clearfield, PA 16830-1426
Telephone: (814) 765-2421
FAX: (814) 765-2988

Harmar Branch
Cummins Power Systems, Inc.
3 Alpha Drive
Harmar, PA 15238-2901
Telephone: (412) 820-8300
FAX: (412) 820-8308

Harrisburg Branch
Cummins Power Systems, Inc.
4499 Lewis Road
Harrisburg, PA 17111-2541
Telephone: (717) 564-1344
FAX: (717) 558-8217

Monroeville Branch
Cummins Power Systems, Inc.
2740 Mosside Boulevard
Monroeville, PA 15146-2712
Telephone: (412) 856-6700
FAX: (412) 856-9822

Puerto Rico

Puerto Nuevo - (Branch of Tampa)
Cummins Diesel Power, Inc.
#31 Calle "C"
El Matadero
Puerto Nuevo, Puerto Rico 00920
Telephone: (809) 793-0300
FAX: (809) 793-1072

South Carolina

Charleston - (Branch of Charlotte)
Cummins Atlantic, Inc.
3028 Montague Avenue
Charleston, SC 29418
Telephone: (803) 554-5112
FAX: (803) 745-0745

Charleston - (Onan Branch of Charlotte)
Cummins Atlantic Inc.
Atlantic Power Generation
3028 West Montague Avenue
Charleston, SC 29418
Telephone: (803) 554-9804
FAX: (803) 745-0745

Columbia - (Branch of Charlotte)
Cummins Atlantic, Inc.
1233 Bluff Road (29201)
P.O. Box 13543
Columbia, SC 29201-3543
Telephone: (803) 799-2410
FAX: (803) 779-3427

South Dakota

Sioux Falls - (Branch of Omaha)
Cummins Great Plains Diesel, Inc.
701 East 54th Street North
Sioux Falls, SD 57104
Telephone: (605) 336-1715
FAX: (605) 336-1748

Tennessee

Memphis Distributor & Distribution Center
Cummins Mid-South, Inc.
666 Riverside Drive
P.O. Box 3080
Memphis, TN 38103
Telephone: (901) 577-0666
FAX: (901) 522-8758

Chattanooga - (Branch of Atlanta)
Cummins South, Inc.
1509 East 26th Street
Chattanooga, TN 37407-1095
Telephone: (615) 629-1447
FAX: (615) 629-1494

Knoxville - (Branch of Louisville)
Cummins Cumberland, Inc.
1211 Ault Road
Knoxville, TN 37914
Telephone: (615) 523-0446
FAX: (615) 523-0343

Memphis Branch
Cummins Mid-South, Inc.
1784 E. Brooks Road
Memphis, TN 38116
Telephone:
Sales/Admin.: (901) 345-7424
Parts: (901) 345-1784
Service: (901) 345-6185
FAX: (901) 346-4735

Nashville - (Branch of Louisville)
Cummins Cumberland, Inc.
706 Spence Lane
Nashville, TN 37217
Telephone: (615) 366-4341
FAX: (615) 366-5693

Texas

Arlington Distributor
Cummins Southern Plains, Inc.
600 N. Watson Road
P.O. Box 90027
Arlington, TX 76004-3027
Telephone: (817) 640-6801 (24 Hours)
FAX: (817) 640-6852

Amarillo Branch
Cummins Southern Plains, Inc.
5224 Interstate 40 -
Expressway East
P.O. Box 31570
Amarillo, TX 79120-1570
Telephone: (806) 373-3793 (24 hours)
FAX: (806) 372-8547

Corpus Christi Branch
Cummins Southern Plains, Inc.
1302 Corn Products Road
P.O. Box 48
Corpus Christi, TX 78403-0048
Telephone: (512) 289-0700 (24 hours)
FAX: (512) 289-7355

Dallas Branch
Cummins Southern Plains, Inc.
3707 Irving Boulevard
Dallas, TX 75247
Telephone: (214) 631-6400 (24 hours)
FAX: (214) 631-2322

El Paso - (Branch of Phoenix)
Cummins Southwest, Inc.
14333 Gateway West
El Paso, TX 79927
Telephone: (915) 852-4200
FAX: (915) 852-3295

Fort Worth Branch
Cummins Southern Plains, Inc.
3250 North Freeway
Fort Worth, TX 76111
Telephone: (817) 624-2107 (24 hours)
FAX: (817) 624-3296

Houston Branch
Cummins Southern Plains, Inc.
4750 Homestead Road
P.O. Box 1367
Houston, TX 77251-1367
Telephone: (713) 675-7421 (24 hours)
FAX: (713) 675–1515

Mesquite Branch
Cummins Southern Plains, Inc.
2615 Big Town Blvd.
Mesquite, TX 75150
Telephone: (214) 321-5555 (24 hours)
FAX: (214) 328–2732

Odessa Branch
Cummins Southern Plains, Inc.
1210 South Grandview
P.O. Box 633
Odessa, TX 79760-0633
Telephone: (915) 332-9121 (24 hours)
FAX: (915) 333–4655

San Antonio Branch
Cummins Southern Plains, Inc.
6226 Pan Am Expressway North
P.O. Box 18385
San Antonio, TX 78218–0385
Telephone: (512) 655-5420 (24 hours)
FAX: (512) 655–3865

Stafford Onan Branch
Southern Plains Power
A Division of Cummins Southern Plains
11100 W. Airport Blvd.
Stafford, TX 77477
Mailing Address:
P.O. Box 2088
Houston, TX 77252–2088
Telephone: (713) 879–2828
FAX: (713) 879–2867

Utah

Salt Lake City Distributor
Cummins Intermountain, Inc.
1030 South 300 West
P.O. Box 25428
Salt Lake City, UT 84125
Telephone: (801) 355-6500
FAX: (801) 524–1351

Vernal Branch
Cummins Intermountain, Inc.
1435 East 335 South
P.O. Box 903
Vernal, UT 84078
Telephone: (801) 789-5732
FAX: N/A

Virginia

Richmond - (Branch of Charlotte)
Cummins Atlantic, Inc.
3900 Deepwater Terminal Road
Richmond, VA 23234
Telephone: (804) 232-7891
FAX: (804) 232-7428

Roanoke - (Branch of Charlotte)
Cummins Atlantic, Inc.
5307 Peters Creek Road
P.O. Box 7237
Roanoke, VA 24019-7237
Telephone: (703) 362-1673
FAX: (703) 362-1304

Tidewater - (Branch of Charlotte)
Cummins Atlantic, Inc.
Atlantic Power Generation
3729 Holland Blvd.
Chesapeake, VA 23323
Telephone: (804) 485-4848
FAX: (804) 485-5085

Washington

Seattle Distributor
Cummins Northwest, Inc.
811 S.W. Grady Way (98055-2944)
P.O. Box 9811
Renton, WA 98057–9811
Telephone: (206) 235-3400
FAX: (206) 235–8202

Chehalis Branch
Cummins Northwest, Inc.
1200 N.W. Maryland
Chehalis, WA 98532-1813
Telephone: (206) 748-8841
FAX: (206) 748–8843

Spokane Branch
Cummins Northwest, Inc.
East 3904 Trent Avenue (99202-4471)
P.O. Box 2746 -
Terminal Annex
Spokane, WA 99220-2746
Telephone: (509) 534-0411
FAX: (509) 534–0416

Tacoma Branch
Cummins Northwest, Inc.
3701 Pacific Highway East
Tacoma, WA 98424-1135
Telephone: (206) 922-2191
FAX: (206) 922–2379

Yakima Branch
Cummins Northwest, Inc.
1905 East Central Avenue (98901-3609)
P.O. Box 9129
Yakima, WA 98909-0129
Telephone: (509) 248-9033
FAX: (509) 248–9035

West Virginia

Charleston - (Branch of Louisville)
Cummins Cumberland, Inc.
Charleston Ordnance Center
P.O. Box 8456
South Charleston, WV 25303
Telephone: (304) 744-6373
FAX: (304) 744-8605

Fairmont - (Branch of Louisville)
Cummins Cumberland, Inc.
South Fairmount Exit, I-79
145 Middletown Road
Fairmont, WV 26554
Telephone: (304) 367-0196
FAX: (304) 367–1077

Wisconsin

DePere Distributor
Cummins Great Lakes, Inc.
Corporate Office
875 Lawrence Drive
P.O. Box 5070
DePere, WI 54115–5070
Telephone: (414) 337-1991
FAX: (414) 337-9746

Chippewa Falls Branch
Cummins Great Lakes, Inc.
4860 Hallie Road
Chippewa Falls, WI 54729
Telephone: (715) 720-0680
FAX: (715) 720–0685

DePere Branch
Cummins Great Lakes, Inc.
939 Lawrence Drive
P. O. Box 5070
DePere, WI 54115–5070
Telephone: (414) 336-9631
(800) 236–1191
FAX: (414) 336–8984

Milwaukee Branch
Cummins Great Lakes, Inc.
9401 South 13th Street
P.O. Box D
Oak Creek, WI 53154
Telephone: (414) 768-7400
(800) 472-8283
FAX: (414) 768-9441

Wausau Branch
Cummins Great Lakes, Inc.
4703 Rib Mountain Drive
Wausau, WI 54401
Telephone: (715) 359-6888
(800) 236-3744
FAX: (715) 359-3744

Wyoming

Gillette - (Branch of Denver)
Cummins Rocky Mountain, Inc.
2700 Hwy. 14 & 16 North
P.O. Box 1207 (82717)
Gillette, WY 82716
Telephone: (307) 682-9611
FAX: (307) 682–8242

Rock Springs - (Branch of Salt Lake City)
Cummins Intermountain, Inc.
2000 Foothill Blvd.
P.O. Box 1634
Rock Springs, WY 82901
Telephone: (307) 362-5168
FAX: (307) 362–5171

Distributors and Branches - Canada

Alberta

Edmonton Distributor
Cummins Alberta
14755 - 121A Avenue
Edmonton, Alberta T5L 2T2, Canada
Telephone: (403) 455-2151
FAX: (403) 454-9512

Calgary Branch
Cummins Alberta
4887 - 35th Street S.E.
Calgary, Alberta T2B 3H6, Canada
Telephone: (403) 569-1122
FAX: (403) 569-0027

Grande Prairie
Cummins Alberta - Grande Praire
RR2, Site 9, Box 22
Sexsmith, AB CN T0H 3C0
Telephone: N/A

Hinton Branch
Cummins Alberta
135 Veats Avenue
Hinton, Alberta T7V 1S8, Canada
Telephone: (403) 865-5111
FAX: (403) 865-5714

Lethbridge Branch
Cummins Alberta
240 - 24th Street North
Lethbridge, Alberta T1H 3T8, Canada
Telephone: (403) 329-6144
FAX: (403) 320-5383

British Columbia

Vancouver Distributor
Cummins British Columbia
18452 - 96th Avenue
Surrey, B.C., Canada
V4N 3P8
Telephone: (604) 882-5000
FAX: (604) 882-5080

Kamloops Branch
Cummins British Columbia
976 Laval Crescent
Kamloops, B.C. Canada V2C 5P5
Telephone: (604) 828-2388
FAX: (604) 828-6713

Prince George Branch
Cummins British Columbia
102- 3851- 18th Avenue
Prince George, B.C. V2N 1B1
Telephone: (604) 564-9111
FAX: (604) 564-5853

Sparwood Branch
Cummins British Columbia
731 Douglas Fir Road
Sparwood, B.C. VOB 2GO, Canada
Telephone: (604) 425-0522
FAX: (604) 425–0323

Tumbler Ridge Branch
Cummins British Columbia
Industrial Site, Box 226
Tumbler Ridge, B.C.
Canada VOC 2WO
Telephone: (604) 242-4217
FAX: (604) 242–4906

Manitoba

Winnipeg Distributor
Cummins Mid-Canada Ltd.
489 Oak Point Road
P.O. Box 1860
Winnipeg, MB R3C 3R1, Canada
Telephone: (204) 632-5470
FAX: (204) 697–0267

New Brunswick

Fredericton - (Branch of Montreal)
Cummins Diesel
Branch of Cummins Americas, Inc.
R.R.#1 Doak Road
Fredericton,
New Brunswick E3B 4X2, Canada
Telephone: (506) 451-1929
FAX: (506) 451-1921

Newfoundland

St. John's - (Branch of Montreal)
Cummins Diesel
Branch of Cummins Americas, Inc.
122 Clyde Avenue
Donovans Industrial Park
Mount Pearl, Newfoundland A1N 4S3
Canada
Telephone: (709) 747-0176
FAX: (709) 747–2283

Wabush - (Branch of Montreal)
Cummins Diesel
Branch of Cummins Americas, Inc.
Wabush Industrial Park
Wabush, Newfoundland A0R 1B0
Telephone: (709) 282-3626
FAX: (709) 282–3108

Nova Scotia

Halifax - (Branch of Montreal)
Cummins Diesel
Branch of Cummins Americas, Inc.
50 Simmonds Drive
Dartmouth, Nova Scotia B3B 1R3
Telephone: (902) 468-7938
FAX: (902) 468–5177
Parts: (902) 468–6560

Ontario

Toronto Distributor
Cummins Ontario Inc.
Corporate Office & Parts Distribution Centre
301 Wyecroft Road
Oakville, Ontario L6K 2H2, Canada
Telephone: (905) 844-5851
FAX: (905) 844–7040

Toronto Branch
Cummins Ontario Inc.
150 N. Queen Street
Etobicoke, Ontario, Canada M9C 1A8
Telephone: (416) 621-9921
FAX: (416) 633-8343

Kenora - (Branch of Winnipeg)
Cummins Mid-Canada Ltd.
P.O. Box 8
Kenora, Ontario P9N 3X1
Telephone: (807) 548–1941
FAX: (807) 548–8302

Ottawa Branch
Cummins Ontario Inc.
3189 Swansea Crescent
Ottawa, Ontario K1G 3W5, Canada
Telephone: (613) 736-1146
FAX: (613) 736-1202

Thunder Bay Branch
Cummins Ontario Inc.
1400 W. Walsh Street
Thunder Bay
Ontario P7E 4X4
Telephone: (807) 577-7561
FAX: (807) 577–1727

Whitby Branch
Cummins Ontario Inc.
1311 Hopkins Street
Whitby, Ontario L1N 2C2, Canada
Telephone: (905) 668-6886
FAX: (905) 668-1375

Quebec

Montreal Distributor
Cummins Diesel
Branch of Cummins Americas, Inc.
7200 Trans Canada Highway
Pointe Claire, Quebec H9R 1C2, Canada
Telephone: (514) 695-8410
FAX: (514) 695–8917

Montreal Branch
Cummins Diesel
Branch of Cummins Americas, Inc.
7200 Trans Canada Highway
Pointe Claire, Quebec H9R 1C2, Canada
Telephone: (514) 695-8410
Sales: (514) 695-4555
Parts: (514) 694-5880
FAX: (514) 695–8917

Quebec City Branch
Cummins Diesel
Branch of Cummins Americas, Inc.
2400 Watt Street
Ste. Foy, Quebec G1P 3T3, Canada
Telephone: (418) 651-2911
FAX: (418) 651–0965
Parts: (418) 651–8434

Saskatchewan

Lloydminster - (Branch of Winnipeg)
Cummins Mid-Canada Ltd.
3709 – 44th Street
P.O. Box 959
Lloydminster, SK S9V 0Y9
Telephone: (306) 825–2062
FAX: (306) 825–6702

Regina - (Branch of Winnipeg)
Cummins Mid-Canada Ltd.
110 Kress Street
P.O. Box 98
Regina, SK S4P 2Z5, Canada
Telephone: (306) 721-9710
FAX: (306) 721–2962

Saskatoon - (Branch of Winnipeg)
Cummins Mid-Canada, Ltd.
3001 Faithful Avenue
P.O. Box 7679
Saskatoon, SK S7K 4R4, Canada
Telephone: (306) 933-4022
FAX: (306) 242–1722

Distributors and Branches - Australia

Sydney (Lansvale)
Cummins Diesel Sales & Service
P.O. Box 150
Cambramatta, 2166
New South Wales, Australia
Location:
164-170 Hume Highway
Lansvale, 2166, Australia
Telephone: (61-2) 728-6211

Branches:

Adelaide
Cummins Diesel Sales & Service
P.O. Box 108
Blair Athol, 5084
South Australia, Australia
Location:
45-49 Cavan Road
Gepps Cross, 5094
Telephone: (61-8) 262-5211

Brisbane
Cummins Diesel Sales & Service
P.O. Box 124
Darra, 4076
Queensland, Australia
Location:
33 Kimberley Street
Darra, 4076, Australia
Telephone: (61-7) 375-3277

Cairns
Cummins Diesel Sales & Service
P.O. Box 7189
Cairns Mail Centre, 4870
Queensland, Australia
Location:
Cnr. Toohey& Knight Streets
Portsmith, Cairns, 4870
Telephone: (61-70) 35-1400

Campbellfield
Cummins Diesel Sales & Service
Private Bag 9
Campbellfield, 3061
Victoria, Australia
Location:
1788-1800 Hume Highway
Campbellfield, 3061
Telephone: (613) 357-9200

Dandenong
Cummins Diesel Sales & Service
Lot 7 Greens Road
Dandenong, 3175
Victoria, Australia
Telephone: (613) 706-8088

Darwin
Cummins Diesel Sales & Service
P.O. Box 37587
Winnellie, 0821
Northern Territory, Australia
Location:
Lot 1758 Graffin Crescent
Winnellie, 0821
Telephone: (61-89) 47-0766

Devonport
Cummins Diesel Sales & Service
P.O. Box 72E
Tasmania, Australia
Location:
2 Matthews Way
Devonport, 7310
Telephone: (61-04) 24-8800

Emerald
Cummins Diesel Sales & Service
P.O. Box 668
Emerald, 4720
Queensland, Australia
Location:
Capricorn Highway
Emerald, 4720
Telephone: (61-79) 82-4022

Grafton
Cummins Diesel Sales & Service
P.O. Box 18
South Grafton, 2461
New South Wales, Australia
Location:
18-20 Induna Street
South Grafton, 2461
Telephone: (61-66) 42-3655

Hexham
Cummins Diesel Sales & Service
21 Galleghan Street
Hexham, 2322
New South Wales, Australia
Telephone: (61-49) 64-8466

Kalgoorlie
Cummins Diesel Sales & Service
P.O. Box 706
Kalgoorlie, 6430
Western Australia, Australia
Location:
16 Atbara Street
Kalgoorlie, 6430
Telephone: (61-90) 21-2588 or 21-2994

Mackay
Cummins Diesel Sales & Service
P.O. Box 842
Mackay, 4740
Queensland, Australia
Location:
4 Presto Avenue
Mackay, 4746
Telephone: (61-79) 55-1222

Mount Gambier
Cummins Diesel Sales & Service
P.O. Box 2219
Mount Gambier, 5290
South Australia, Australia
Location:
2 Avey Road
Mount Gambier, 5290
Telephone: (61-87) 25-6422

Penrith
Cummins Diesel Sales & Service
P.O. Box 132
Cambridge Park, 2747
New South Wales, Australia
Location:
7 Andrews Road
Penrith, 2750
Telephone: (61-47) 29-1313

Queanbeyan
Cummins Diesel Sales & Service
P.O. Box 527
Queanbeyan, 2620
New South Wales, Australia
Location:
15-27 Bayldon Road
Queanbeyan, 2620
Telephone: (61-62) 97-3433

Swan Hill
Cummins Diesel Sales & Service
P.O. Box 1264
Swan Hill, 3585
Victoria, Australia
Location:
5 McAllister Road
Swan Hill, 3585
Telephone: (61-50) 32-1511

Tamworth
Cummins Diesel Sales & Service
P.O. Box 677
Tamworth, 2320
New South Wales, Australia
Location:
Lot 65 Gunnedah Road
Tamworth, 2340
Telephone: (61-67) 65-5455

Welshpool
Cummins Diesel Sales & Service
P. O. Box 52
Welshpool, 6986
Western Australia, Australia
Location:
50 Kewdale Road
Welshpool, 6106
Telephone: (61-9) 458-5911

Wodonga
Cummins Diesel Sales & Service
P.O. Box 174
Wodonga, 3690
Victoria, Australia
Location:
9-11 McKoy Street
Wodonga, 3690
Telephone: (61-60) 24-3655

Distributors and Branches - New Zealand

Auckland

Cummins Diesel Sales & Service (NZ) Ltd.
Private Bag 92804
Penrose, Auckland, New Zealand
Location:
440 Church Street
Penrose
Telephone: (64-9) 579-0085

Branches:

Auckland

Cummins Diesel Engines
Private Bag 92804
Penrose, Auckland, New Zealand
Location:
440 Church Street
Penrose
Telephone: (64-9) 579-0085

Christchurch

Cummins Diesel Engines
P.O. Box 16-149
Hornby, Christchurch, New Zealand
Location:
35 Parkhouse Road
Sockburn, Christchurch
Telephone: (64-3) 348-8170

Mt. Maunganui

Cummins Diesel Engines
P.O. Box 4005
Mt. Maunganui, New Zealand
Location:
101 Totara Street
Mt. Maunganui
Telephone: (64-7) 575-0545

Palmerston North

Cummins Diesel Engines
P.O. Box 9024
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Location:
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Telephone: (64-6) 356-2209

Regional Offices - International

North Africa Regional Office - Algiers

Cummins Corporation
Bureau de Liaison
38, Lotissement Benachour Abdelkader
Cheraga
42300 Wilaya de Tipasa
Algeria
Telephone: (213) 2374326

Country Covered: Algeria

European Regional Office - Mechelen

Cummins Diesel N.V.
Blarenberglaan 4
Industriepark Noord 2
2800 Mechelen
Brussels
Telephone: (32-15) 20003

Countries Covered:

- Austria
- Belgium
- Czech Republic
- Denmark
- Finland
- Greece
- Hungary
- Iceland
- Israel
- Luxembourg
- Netherlands
- Norway
- Portugal
- Slovakia
- Spain
- Sweden
- Switzerland

Cumbrasa Regional Office - Brazil

Cummins Brasil S.A.
Rua Jati, 266
07180-900 Guarulhos
Sao Paulo, Brazil

Mailing Address:
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07180-900 Guarulhos
Sao Paulo, Brazil
Telephone: (55-11) 945-9811

Country Covered: Brazil

Beijing Regional Office - China

Cummins Corporation
China World Tower, Suite 917
China World Trade Center
No. 1 Jian Guo Men Wai
Beijing 100004
People's Republic of China
Telephone: (86-1) 505-4209/10

Countries Covered:

- China
- Mongolia

Bogota Regional Office - Columbia

Cummins Engine Co. de Colombia S.A.
Carrera 11A No. 90-15 Of. 601/602
Bogota, D.E., Colombia
Telephone: (57-1) 610-4849

Mailing Address:
Apartado Aereo 90988
Bogota D.E., Colombia

Countries Covered:

- Argentina
- Bolivia
- Chile
- Colombia
- Ecuador
- Paraguay
- Peru
- Uruguay

Lyon Regional Office - France

Cummins Diesel Sales Corporation
39, rue Ampere - Zone Industrielle
69680 Chassieu
France
Telephone: (33) 72-22-92-72

Countries Covered:

- Algeria
- France
- Guadeloupe
- Guyana
- Martinique
- New Caledonia
- Reunion

Gross-Gerau Regional Office - Germany

Cummins Diesel Deutschland GmbH
Odenwaldstr. 23
D-6080 Gross-Gerau
Germany
Telephone: (49-6152) 174-0

Countries Covered:

- Albania
- Bulgaria
- *Czech Republic
- Germany
- Luxembourg
- Poland
- Romania
- Southeastern Europe
- Slovika

*Marine Only

Hong Kong Regional Office - Hong Kong

Cummins Engine H.K. Ltd.
Unison Industrial Centre
15th Floor, Units C & D
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Fo Tan, Shatin, N.T.
Hong Kong
Telephone: (852) 606-5678

Country Covered: Hong Kong

Pune Kirloskar Regional Office - India

Kirloskar Cummins Limited
Kothrud
Pune - 411 029, India
Telephone: (91-212) 33-0240, 33-5435, 33-1105

Countries Covered:

- Bhutan
- India
- Nepal

Milan Regional Office - Italy

Cummins Diesel Italia S.P.A.
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Country Covered: Italy

North Asia Regional Office - Japan

Cummins Diesel Sales Corporation
1-12-10 Shintomi
Chuo-ku, Tokyo 104
Japan
Telephone: (81-3) 3555-3131/2/3/4/5

Country Covered: Japan

Seoul Regional Office - Korea

Cummins Korea Ltd.
5th Floor, Hye Sung Building
35-26 Sam Sung Dong, Kang Nam Ku
Seoul, South Korea
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Country Covered: South Korea

Cummsa Regional Office - Mexico

Cummins, S.A. de C.V.
Arquimedes No. 209
Col. Polanco
11560 Mexico, D.F.
Mexico
Telephone: (52-5) 254-3822/3783/3622

Mailing/Shipping Address:
Gonzalez de Castilla Inc.
P.O. Box 1391
4605 Modern Lane
Modern Industrial Park
Laredo, TX 78040
Telephone: (512) 722-5207

Country Covered: Mexico

Moscow Regional Office - Russia

Cummins Engine Co., Inc.
Park Place
Office E708
Leninsky Prospect 113
Russia 11798
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Countries Covered:

Armenia	Lithuania
Azerbaijan	Moldova
Bolarus	Russia
Estonia	Tadzhikstan
Georgia	Turkmenistan
Kirghizia	Ukraina
Latvia	Uzbekistan

South And East Asia Area Office - Singapore

Cummins Diesel Sales Corporation
8 Tanjong Penjuru
Jurong Industrial Estate
Singapore 2260
Telephone: (65) 265-0155

Countries Covered:

Bangladesh	Malaysia
Brunei	Mongolia
Burma/Mynamar	Philippines
Cambodia	Singapore
China	Sri Lanka
Hong Kong	Taiwan
Indonesia	Thailand
Laos	Vietnam
Macau	

Taipei Regional Office - Taiwan

Cummins Corporation - Taiwan
12th Floor, No. 149
Min-Sheng E. Road
Section 2
Taipei, Taiwan
R.O.C. 104
Telephone: (886-2) 515-0891

Country Covered: Taiwan

Turkey and Iran Regional Office - Turkey

Cummins Corporation
Istanbul Office
Buyukdere Cad.
Beytem Han, Kat 11
Sisli 80220
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Countries Covered: Iran, Turkey

Middle East/Africa Regional Office - Daventry (U.K.)

Cummins Engine Company Ltd.
Royal Oak Way South
Daventry, Northants NN11 5NU
England
Telephone: (44-1327) 76000

Countries Covered:

MIDEAST

Afghanistan	Jordan	Saudi Arabia
Bahrain	Kuwair	Sudan
Cyprus	Lebanon	Syria
Djibouti	Oman	U.A.E.
Egypt	Pakistan	Yemen
Iraq	Qatar	

NORTH/WEST AFRICA

Benin	Gabon	Mauritania
Burkina-Paso	Gambia	Morocco
Cameroon	Ghana	Niger
Cape Verde	Guinea	Nigeria
Central African Republic	Guinea-Bissau	Sao Tome & Principe
Chad	Liberia	Senegal
Cote d'Ivoire	Libya	Siera Leone
Equatorial Guinea	Mali	Togo
	Malta	Tunisia

SOUTH AFRICA

Botswana	Namibia	Swaziland
Lesotho	South Africa	

New Malden Regional Office - U.K.

Cummins Engine Company Limited
46-50 Coombe Road
New Malden
Surrey KT3 4QL
England
Telephone: (44-81) 949-6171

Countries Covered:

Ireland	
United Kingdom	

Latin America Regional Office - Miramar (U.S.A.)

Cummins Americas, Inc.
Miramar Park of Commerce
3450 Executive Way
Miramar, FL 33025
Telephone: (305) 431-5511

Countries Covered:

Argentina	Guatemala	
Bolivia	Honduras	
Chile	Nicaragua	
Colombia	Panama	
Costa Rica	Paraguay	
Dominican Republic	Peru	
El Salvador	Uruguay	
Eucador	Venezuela	

Caracas Regional Office - Venezuela

Cummins Engine Company
Oficina de Delegado
Torre La Primera, Oficina 5-D
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Miami, FL 33102-0010 U.S.A.
Telephone: (58-2) 32-0563, 32-718

Counties Covered:

Costa Rica	Honduras	
Dominican Republic	Nicaragua	
El Salvador	Panama	
Guatemala	Venezuela	

East/Southern Africa Regional Office - Harare, Zimbabwe

Cummins Zimbabwe (Private) Limited
72 Birmingham Road
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Southerton
Harare, Zimbabwe
Telephone: (263-4) 67645, 60553, 69220

Countries Covered:

Angola	Reunion	
Burundi	Rwanda	
Comoros Island	Seychelles	
Congo	Somalia	
Ethiopia	Tanzania	
Kenya	Uganda	
Madagascar	Zaire	
Malawi	Zambia	
Mauritius	Zimbabwe	
Mozambique		

Distributors - International

ABU DHABI
- See United Arab Emirates

AFGHANISTAN
- See Middle East Regional Office

ALBANIA
- See Germany Regional Office - Gross-Gerau

ALGERIA

Algiers
Cummins Corporation
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AMERICAN SAMOA
- See South Pacific Regional Office

ANDORRA
- See European Regional Office - Mechelen

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ARUBA, ISLAND OF
- See Netherlands Antilles

AUSTRIA

Neudoerfl
Cummins Diesel Motorenvertriebsges
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BAHAMAS

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Hialeah Gardens, FL 33016
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BELGIUM

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(32-2) 216-81-10

BELIZE

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Telephone: (813) 621-7202

BENIN
- See Togo

BERMUDA

Bronx (Office in U.S.A.)
Cummins Metropower, Inc.
890 Zerega Avenue
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Telephone: (718) 892-2400

BHUTAN

Pune (Office in India)
Cummins Diesel Sales &
Service (India) Ltd.
35A/1/2, Erandawana
Pune - 411 038, India
(State of Maharashtra) India
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331635/330066/
330166/330356/
31703

BOLIVIA

La Paz
Machinery & Auto Service
Casilla 4042
La Paz, Bolivia
Location:
Av. 20 de Octubre Esq.
Rosendo Gutierrez
Telephone: (591-2) 379650, 366394

BONAIRE, ISLAND OF
- See Netherlands Antilles

BOTSWANA
- See East and Southern Africa Regional Office - Harare

BRAZIL

Ananindeua
Marcos Marcelino & Companhia
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4143/4012

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Distribuidora Cummins
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31950-640 Olhos D'Agua Norte
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Campo Grande
Distribuidora Cummins
Mato Grosso Ltda.
Rodovia BR 163 Km 01
79060-000 Campo Grande
Mato Grosso do Sul, Brazil
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Curitiba
Distribuidora Cummins Parana S.A.
Rua Brasilio Itibere, 2195
80230 Curitiba, Parana
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Fortaleza
Distribuidora Cummins Diesel
Do Nordeste Ltda.
Av. da Abolicao, 3882,
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60165-081 Fortaleza, Ceara
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Goianian
Distribuidora de Motores Cummins
Centro Oeste Ltda.
Av. Caiapo 777 - Setor Sta. Genoveva
74672-400 Goiania, Goias
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Manaus
Distribuidora Cummins
Amazonas Ltda.
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Porto Alegre
Distribuidora Cummins
Meridional S.A.
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Rio de Janeiro
Distribuidora Cummins
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Companhia Distribuidora
de Motores Cummins
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Sao Paulo, Brazil
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BRITISH VIRGIN ISLANDS
- See Puerto Rico

BRUNEI
- See Malaysia

BURKINA - FASO
- See North/West Africa Regional Office - Daventry

BULGARIA
-See Germany Regional Office - Gross-Gerau

BURMA

Kuala Lumpur (Office In Malaysia)
Contact: Scott &
English (M) Sdn Bhd
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50710 Kuala Lumpur
West Malaysia
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West Malaysia
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BURUNDI

Brussels (Office in Belgium)
Bia, S.A.
Rameistraat, 123
B-3090 - Overijse, Belgium
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CAMBODIA
- See South & East Asia Regional Office
- Singapore

CANARY ISLANDS

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Cummins Ventas y
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Torrelaquna, 56
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Telephone: (34-91) 3672000/3672404

CAPE VERDE
- See North/West Africa Regional Office
- Daventry

CENTRAL AFRICAN REPUBLIC
- See North/West Africa Regional Office
- Daventry

CEYLON
- See Sri Lanka

CHAD
- See North/West Africa Regional Office
- Daventry

CHILE

Santiago
Distribuidora Cummins Diesel
S.A.C.I.
Casilla Postal 1230
Calle Bulnes 1203
Santiago, Chile
Corporate Office:
Av. Providencia 2653, Office 1901
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697-3566/7/8,
697-2709

CHINA, PEOPLE'S REPUBLIC
- See China Regional Office - Beijing

COLOMBIA

Barranquilla
Cummins de Colombia S.A.
Apartado Aereo 5347
Barranquilla, Colombia
Location: Calle 30, No. 19 - 21
Telephone: (57-58) 40-02-06/40-13-46

Bogota
Cummins Colombiana Ltda.
Apartado Aereo No. 7431
Bogota, D.E. Colombia
Location:
Av. Americas X Carrera
42C No. 19-45
Telephone: (57-1) 244-5688/5882

Bucaramanga
Cummins API, Ltda.
Apartado Aereo 352
Bucaramanga, Colombia
Location:
Autopista a Giron, Km 7
Telephone: (57-76) 468060

Cali
Distribuidora Cummins del Valle, Ltda.
Apartado Aereo No. 6398
Cali, Colombia
Location:
Av. 3a. # 39-35 - Vipasa
Telephone: (57-3) 65-4343

Medellin
Equipos Tecnicos Ltda.
Apartado Aereo No. 2046
Medellin, Colombia
Location: Carrera 52 No. 10-184
Telephone: (57-4) 255-4200

Pereira
Equipos Tecnicos Ltda. C.Q.R.
Apartado Aereo No. 1240
Pereira, Colombia
Location: Carrera 8a. No. 45-39
Telephone: (57-63) 366341

COMOROS
- See East and Southern Africa Regional Office - Harare

CONGO, PEOPLE'S REPUBLIC

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Bia, S.A.
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Overijse, Belgium
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CORSICA
- See France

COSTA RICA

San Jose
Servicios Unidos, S.A.
P.O. Box 559
San Jose, Costa Rica
Location:
100 metros al este de
Excelsior Antiguo
Curridabat, San Jose
Telephone Office: (506) 53-93-93
Telephone Service Shop:
(506) 26-00-76

CUBA

Miami (Office in U.S.A.)
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9900 N.W. 77 Court
Hialeah Gardens, FL 33016
Telephone: (305) 821-4200

CYPRUS

Nicosia
Alexander Dimitriou & Sons Ltd.
P.O. Box 1932
Nicosia, Cyprus
Location:
4 Salamis Avenue
Telephone: (357-2) 349450

CZECH REPUBLIC
- See European Regional Office - Mechelen

DENMARK

Glostrup
Preben Lange Industrimaskiner A/S
Post Box 166
2605 Broendby, Denmark
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Midtager 22
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DJIBOUTI
- See Middle East Regional Office - Daventry

DOMINICA

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DOMINICAN REPUBLIC

Santo Domingo
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P.O. Box 292-2 Feria
Santo Domingo
Dominican Republic, ZP-6
Location:
Calle Jose A. Soler
No. 3, ESQ.
Avenida Lope de Vega
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DUBAI
- See United Arab Emirates

ECUADOR

Guayaquil
Motores Cummins (MOTCUM) S.A.
P.O. Box 1062
Guayaquil, Ecuador
Location:
Avenida Carlos Julio
Arosemena Km. 4
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Quito
Rectificadora Botar S.A.
P.O. Box 17-01-3344
Quito, Ecuador
Location:
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Telephone: (593-2) 465-176/177/
178/195/197

EGYPT

Cairo
ADAT
P.O. Box 1572
Cairo, Egypt
Sales and Service Location:
25, Pyramid Road
Giza, Cairo, Egypt
Telephone: (20-2) 384-6607/384-6609
385-4001/2/4/5/6/8/9

EL SALVADOR

San Salvador
Salvador Machinery
Company, S.A. de C.V.
P.O. Box 125
San Salvador, El Salvador
Location:
Blvd. Ejercito Nacional
Telephone: (503) 711022, 228388

ENGLAND
- See United Kingdom

EQUATORIAL GUINEA
- See North/West Africa Regional Office - Daventry

ESTONIA
- See Moscow Regional Office - Moscow

FAROE ISLANDS

Wellingborough (Office in United Kingdom)
Cummins Diesel
Denington Industrial Estate
Wellingborough
Northants NN8 2QH,
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Telephone: (44-933) 276231

FERNANDO PO
- See Spain

FIJI
- See Cummins Diesel Sales & Service New Zealand Ltd.

FINLAND

Helsinki
Machinery OY
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SF 00511 Helsinki, Finland
Location:
Teollisuuskatu 29
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FRANCE

Lyon
Cummins Diesel
Sales Corporation
39, rue Ampere Z.I.
69680 Chassieu, France
Telephone: (33) 72-22-92-72
Parts and Service Telephone:
(33) 72-22-92-69

GABON
- See North/West Africa Regional Office - Daventry

GAMBIA
Senegal (Matforce)

GEORGIA
- See Moscow Regional Office - Moscow

GERMANY

Gross-Gerau
Cummins Diesel Deutschland GmbH
P.O. Box 1134
D-6080 Gross-Gerau,
Germany
Location: Odenwaldstr. 23
Telephone: (49-6152) 174-0

GHANA

Accra
Leyland DAF (Ghana) Ltd.
P.O. Box 2969
Accra, Ghana
Location:
39/40 Ring Road South
Industrial Estate
Telephone: (233-21) 22-88-06

GREECE

Athens
Eliopoulos Brothers Ltd.
P.O.B. 51528
14 Km. National Rd.
Athens-Lamia
14510 Kifissia, Greece
Telephone: (30-1) 6202401/6202066/
6201955

GREENLAND
- See Denmark

GRENADA

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GUADELOUPE

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Hialeah Gardens, FL 33016
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GUAM

Barrigada
Mid-Pac Far East, Inc.
Airport Industrial Park
825 Tiyan Parkway
Barrigada, Guam 96921
Telephone: (671) 632-5160

GUATEMALA

Guatemala City
Maquinaria y Equipos, S.A.
P.O. Box 2304
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Carretera Amatitlan
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GUINEA BISSAU
- See North/West Africa Regional Office - Daventry

GUYANA

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GUYANA, FRENCH

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HOLLAND
- See Netherlands

HONDURAS

Tegucigalpa
Comercial Laeisz
Honduras, S.A.
P.O. Box 1022
Tegucigalpa, D.C., Honduras
Location:
Zona La Burrera,
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Telephone: (504) 333570/335615

HONG KONG

Kowloon
Cummins Engine H. K. Ltd.
P.O. Box 840 Shatin
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Location:
Unison Industrial Centre
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27-31 Au Pui Wan Street
Fo Tan, Shatin, Hong Kong
Telephone: (852) 606-5678

INDIA

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Cummins Diesel Sales &
Service (India) Ltd.
35A/1/2, Erandawana
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Telephone: (91-212) 331234, 331554,
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330166, 330356,
331703

Bombay
Cummins Diesel Sales &
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Bombay 400001, India
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Service (I) Ltd.
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2470774

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Cummins Diesel Sales &
Service (I) Ltd.
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Ranchi
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Service (I) Ltd.
'Shanti Kunj' C-202, Vidyalaya Marg
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P.O. Box 64/KBYL
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IRAN

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Technical Service Development
Company
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IRAQ
- See Middle East Regional Office - Daventry

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IVORY COAST
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Amman, Jordan
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Lusaka Road
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KOREA, SOUTH

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Hwa Chang Trading Co., Ltd.
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869-1411/2/3

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Kuwait
General Transportation &
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LAOS
- See South and East Asia Regional Office - Singapore

LATVIA
- See Moscow Regional Office - Moscow

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LESOTHO
- See South Africa

LIBYA
- See North/West Africa Regional Office
- Daventry

LIECHTENSTEIN
- See Switzerland

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MACAU
- See Hong Kong

MADAGASCAR
- See East and Southern Africa Regional Office - Harare

MADEIRA ISLANDS
- See Portugal

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MALI
- See Senegal (Matforce)

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670-63-61, 670-62-33

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Merida
Cummins Del Sureste, S.A. de C.V.
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Esquina Calle 100
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Puebla, Pue. Mexico
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Queretaro
Distribuidor Cummins Del Centro, S.A.
de C.V.
Blvd. Bernardo Quintana No. 518
Col. Arboledas
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12-62-94, 14-04-16,
14-08-81, 14-15-91

Tlalnepantla
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Sor Juana Ines de la Cruz No. 555
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390-12-27

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MOZAMBIQUE
- See East and Southern Africa Regional Office - Harare

NAMIBIA (Southwest Africa)

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NEW CALEDONIA
- See South Pacific Regional Office - Melbourne

NEW GUINEA
- See Papua New Guinea

NICARAGUA

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- See United Kingdom

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PAKISTAN

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- See Middle East Regional Office - Daventry

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PHILIPPINES

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POLAND
- See Germany Regional Office - Gross-Gerau

PORTUGAL

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REUNION
- See Lyon Regional Office - Lyon

RIO DE ORO
- See Spain

ROMANIA

- See Germany Regional Office - Gross-Gerau

RUSSIA

- See Moscow Regional Office - Moscow

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SAN MARINO

- See Italy

SAO TOME AND PRINCIPE

- See North/West Africa Regional Office - Daventry

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SCOTLAND

- See United Kingdom

SENEGAL

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SLOVAKIA

- See European Regional Office - Mechelen

SOLOMON ISLANDS

- See South Pacific Regional Office - Melbourne

SOMALIA

- See East and Southern Africa Regional Office - Harare

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SOUTHWEST AFRICA

- See Namibia

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SPANISH GUINEA

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SWAZILAND

- See South Africa

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TAHITI, ISLAND OF

- See French Polynesia

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TONGA, ISLAND OF
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UKRAINA
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UPPER VOLTA
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U.S.S.R.
- See Moscow Regional Office - Moscow

VATICAN CITY
- See Italy

VENEZUELA

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WESTERN SAMOA
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YEMEN, SOUTH
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YUGOSLAVIA
- See Southeastern Europe

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NOTES

Section TS - Troubleshooting Symptoms

Section Contents

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Procedures and Techniques

A thorough analysis of the customer's complaint is the key to successful troubleshooting. The more information known about a complaint, the faster and easier the problem can be solved.

The Troubleshooting Symptom Charts are organized so that a problem can be located and corrected by doing the easiest and most logical things first. Complete all steps in the sequence shown from top to bottom.

It is **not** possible to include all the solutions to problems that can occur; however, these charts are designed to stimulate a thought process that will lead to the cause and correction of the problem.

Follow these basic troubleshooting steps:

- Get all the facts concerning the complaint
- Analyze the problem thoroughly
- Relate the symptoms to the basic engine systems and components
- Consider any recent maintenance or repair action that can relate to the complaint
- Double-check before beginning any disassembly
- Solve the problem by using the symptom charts and doing the easiest things first
- Determine the cause of the problem and make a thorough repair
- After repairs have been made, operate the engine to make sure the cause of the complaint has been corrected

Troubleshooting Symptoms Charts

Use the charts on the following pages of this section to aid in diagnosing specific engine symptoms. Read each row of blocks from top to bottom. Follow through the chart to identify the corrective action.

⚠ WARNING ⚠

Troubleshooting presents the risk of equipment damage, personal injury or death. Troubleshooting must be performed by trained experienced technicians.

Engine Will Not Crank or Cranks Slowly (Air Starter)

Cause	Correction
Air pressure is low in the air tanks	Increase air pressure with an external air source.
OK ↓	
Starting motor is malfunctioning or starting motor is **not** correct	Check the starting motor operation. Compare the starting motor with the engine and vehicle specifications. Refer to the manufacturer's instructions.
OK ↓	
Crankshaft rotation is impaired	Check crankshaft for ease of rotation. Refer to Overhead Set in Section 6 for instructions to rotate the crankshaft..

Engine Will Not Crank or Cranks Slowly (Electric Starter)

Cause	Correction
Battery cables or connections are loose, broken, or corroded (excessive resistance)	Check the battery cables and connections.
OK	
Lubricating oil does **not** meet specifications for operating conditions	Change the oil and filters. Refer to Section 5. Use the oil type recommended in Section V.
OK	
Battery capacity is below specification	Refer to Electrical System Specifications in Section E and V. Replace the batteries if necessary.
OK	
Battery temperature is below specification	Check the battery heater (if equipped) for correct operation. Refer to the manufacturer's instructions.
OK	
Battery voltage is low	Check the batteries and the unswitched battery supply circuit. Refer to the OEM service manual.
OK	
Crankshaft rotation is impaired	Check crankshaft for ease of rotation. Refer to Overhead Set in Section 6 for instructions to rotate the crankshaft..

Engine Difficult to Start or Will Not Start (Exhaust Smoke)

Cause	Correction
Fuel level low in the tank	Fill the supply tank.
OK	
Fuel connections on the low pressure side of the pump are loose	Tighten all fuel fittings and connections between the fuel tanks and the fuel pump.
OK	
Air in the fuel system	Check for air in the fuel system. Tighten or replace the fuel connections, fuel lines, fuel tank stand pipe and fuel filters as necessary. Bleed air from the system. Refer to Section A.
OK	
No fuel in the fuel pump	The low pressure pump is malfunctioning. Contact a Cummins Authorized Repair Location.
OK	
Air intake system restriction is above specification	Check the air intake system for restriction. Clean or replace the air filter and inlet piping as necessary. Refer to Section 4.
OK	
Exhaust system restriction is above specification	Check the exhaust system for restrictions. Contact a Cummins Authorized Repair Facility.
OK	
Fuel shutoff valve(s) closed (electronic controlled injection)	Check the fuel shutoff valve and circuit. Contact a Cummins Authorized Repair Facility.

Engine Difficult to Start or Will Not Start (No Exhaust Smoke)

Cause	Correction
Fuel level low in the tank	Fill the supply tank.
OK	
Fuel supply line restriction between the fuel pump and the injectors	Check the fuel supply line from the fuel pump to the cylinder head for sharp bends which can cause restrictions.
OK	
Fuel connections on the low pressure side of the pump are loose	Tighten all fuel fittings and connections between the fuel tanks and the fuel pump.
OK	
Air in the fuel system	Check for air in the fuel system. Tighten or replace the fuel connections, fuel lines, fuel tank stand pipe and fuel filters as necessary. Bleed air from the system. Refer to Section A.
OK	
Fuel filter or fuel suction line is restricted	Replace the fuel filter. Refer to Section 5. Check the fuel suction line for restriction.
OK	
No fuel in the fuel pump	The low pressure pump is malfunctioning. Contact a Cummins Authorized Repair Location.
OK	
Air intake system restriction is above specification	Check the air intake system for restriction. Clean or replace the air filter and inlet piping as necessary. Refer to Section 4.
OK	
Exhaust system restriction is above specification	Check the exhaust system for restrictions. Contact a Cummins Authorized Repair Facility.
OK	
Fuel shutoff valve(s) closed (electronic controlled injection)	Check the fuel shutoff valve and circuit. Contact a Cummins Authorized Repair Facility.

Engine Starts But Will Not Keep Running

Cause	Correction
Air in the fuel system	Check for air in the fuel system. Tighten or replace the fuel connections, fuel lines, fuel tank stand pipe and fuel filters as necessary. Bleed air from the system. Refer to Section A.
OK ⇩	
Engine driven units are engaged	Disengage engine driven units.
OK ⇩	
Fuel is waxing due to cold weather	Check the fuel heater, if installed. Weather conditions can require a fuel heater.
OK ⇩	
Fuel filter or fuel suction line is restricted	Replace the fuel filter. Refer to Section 5. Check the fuel suction line for restriction.
OK ⇩	
Fuel grade is **not** correct for the application or the fuel quality is poor	Operate the engine from a tank of good fuel. Refer to Fuel Recommendations and Specifications in Section V.
OK ⇩	
Air intake system restriction is above specification	Check the air intake system for restriction. Clean or replace the air filter and inlet piping as necessary. Refer to Section 4.
OK ⇩	
Exhaust system restriction is above specification	Check the exhaust system for restrictions. Contact a Cummins Authorized Repair Facility.

Engine Will Not Shut Off

Cause	Correction
Key switch circuit is malfunctioning	Check the vehicle key switch circuit. Refer to the OEM service manuals.
OK ⇩	
Engine is running on fumes drawn into the air intake	Check the air intake ducts. Locate and isolate the source of the fumes. Repair as necessary. Refer to the OEM service manuals.
OK ⇩	
Fuel pump rack is stuck	Replace the fuel pump. Refer to Section A.
OK ⇩	
Turbocharger oil seal is leaking	Check the turbocharger compressor and turbine seals. Contact a Cummins Authorized Repair Facility. .

Lubricating Oil Pressure Low

Cause	Correction
Lubricating oil level is above or below specification	Check the oil level. Add or drain oil if necessary. Refer to Section 3, 5 and A.Check the dipstick calibration.
OK	
Lubricating oil temperature switch, gauge, or sensor malfunctioning or **not** in the correct location	Check the oil temperature switch, gauge, or sensor for correct operation and location.
OK	
Lubricating oil does **not** meet specifications for operating conditions	Change the oil and filters. Refer to Section 5. Use the oil type recommended in Section V.
OK	
Lubricating oil filter is plugged	Change the oil and filter. Refer to Section 5. Review the oil change interval. Refer to Section V.
OK	
Lubricating oil is contaminated with coolant or fuel	Contact a Cummins Authorized Repair Facility.Refer to the Lubricating Oil Contaminated symptom tree.
OK	
Lubricating oil temperature is above specification	Contact a Cummins Authorized Repair Facility..

Coolant Temperature Above Normal — Gradual Overheat

Cause	Correction
Coolant level is below specification	Inspect the engine and radiator for external coolant leaks. Repair if necessary. Add coolant. Refer to Section 7.
OK ⇩	
Radiator fins are damaged or obstructed with debris	Inspect the radiator fins. Clean and repair the fins as necessary. Refer to the manufacturer's instructions.
OK ⇩	
Radiator hose is collapsed, restricted, or leaking	Inspect the radiator hoses. Refer to Section 6.
OK ⇩	
Fan drive belt is loose	Check the belt tension and tighten if necessary. Refer to Procedure 008-002 A.
OK ⇩	
Lubricating oil level is above or below specification	Check the oil level. Add or drain oil if necessary. Refer to Section 5.Check the dipstick calibration.
OK ⇩	
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 if necessary. Refer to the OEM service manual.
OK ⇩	
Radiator cap is **not** correct, is malfunctioning, or has low pressure rating	Check the radiator pressure cap. Refer to the OEM service manual.
OK ⇩	
Coolant temperature gauge is malfunctioning	Test the temperature gauge. Repair or replace the gauge if necessary. Refer to the OEM service manual.
OK ⇩	
Cold weather radiator cover or winterfront is closed	Open the cold weather radiator cover or the winterfront. Maintain a minimum of 775 cm^2 [120 in^2] or approximately 28 cm x 28 cm [11 in x 11 in] of opening at all times. Refer to Section 1.

Coolant Temperature is Above Normal — Sudden Overheat

Cause	Correction
Fan drive belt is broken	Check the fan drive belt. Replace the belt if necessary. Refer to Section A.
OK ⇩	
Coolant level is below specification	Inspect the engine and radiator for external coolant leaks. Repair if necessary. Add coolant. Refer to Section 5.
OK ⇩	
Radiator hose is collapsed, restricted, or leaking	Inspect the radiator hoses. Refer to Section 6.
OK ⇩	
Coolant temperature gauge is malfunctioning	Test the temperature gauge. Repair or replace the gauge if necessary. Refer to the OEM service manual.

Coolant Temperature is Below Normal

Cause	Correction
Radiator shutters are stuck open or opening early	Check the shutter operation. Repair or replace the shutters if necessary. Refer to the OEM service manualand Section .
OK ⇩	
Coolant temperature gauge is malfunctioning	Test the temperature gauge. Repair or replace the gauge if necessary. Refer to the OEM service manual.
OK ⇩	
Engine is operating at low ambient temperature	Check the winterfront, shutters, and under hood air. Refer to Cold Weather Operation, Bulletin No. 3387266, and Section 1. Use intake air from under the hood in cold weather.
OK ⇩	
Thermostat is **not** correct or is malfunctioning	Check the thermostat for the correct part number and for correct operation. Contact a Cummins Authorized Repair Facility. .
OK ⇩	
Thermostat seal is damaged, missing, or **not** installed correctly	Check the thermostat seal. Check the thermostat for correct seating. Contact a Cummins Authorized Repair Facility. .

Smoke, Black — Excessive

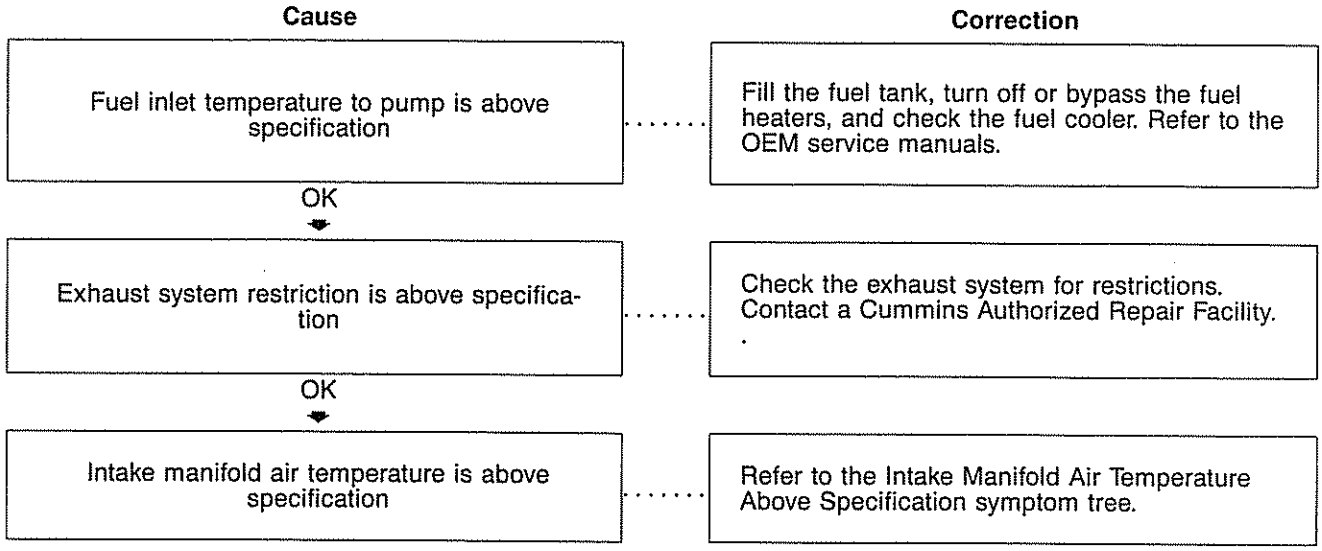
Cause	Correction
Air intake system restriction is above specification	Check the air intake system for restriction. Clean or replace the air filter and inlet piping as necessary. Refer to Section 4.
OK ↓	
Fuel grade is **not** correct for the application or the fuel quality is poor	Operate the engine from a tank of good fuel. Refer to Fuel Recommendations and Specifications in Section V.
OK ↓	
Overhead adjustments are **not** correct	Adjust the overhead settings. Refer to Section 6.
OK ↓	
Air intake or exhaust leaks	Check for loose or damaged piping connections and missing pipe plugs. Check the turbocharger and exhaust manifold mounting. Refer to Section.
OK ↓	
Injector is malfunctioning	Replace the malfunctioning injector. Contact a Cummins Authorized Repair Facility. . .

Engine Power Output Low

Cause	Correction
Drive train is **not** correctly matched to the engine	Check for correct gearing and drive train components. Refer to the OEM vehicle specifications.
OK ⇩	
Engine is operating above recommended altitude	Engine power decreases above recommended altitude. Refer to the Engine Data Sheet for specifications.
OK ⇩	
Fuel filter or fuel suction line is restricted	Replace the fuel filter. Refer to Section 5. Check the fuel suction line for restriction.
OK ⇩	
Lubricating oil level is above specification	Check the oil level. Verify the dipstick calibration and oil pan capacity. Fill the system to the specified level. Refer to Section 3.
OK ⇩	
Air intake system restriction is above specification	Check the air intake system for restriction. Clean or replace the air filter and inlet piping as necessary. Refer to Section 4.
OK ⇩	
Air in the fuel system	Check for air in the fuel system. Tighten or replace the fuel connections, fuel lines, fuel tank stand pipe and fuel filters as necessary. Bleed air from the system. Refer to Section A.
OK ⇩	
Overhead adjustments are **not** correct	Adjust the overhead settings. Refer to Section 6.
OK ⇩	
Fuel grade is **not** correct for the application or the fuel quality is poor	Operate the engine from a tank of good fuel. Refer to Fuel Recommendations and Specifications in Section V.
OK ⇩	

(Continued)

Engine Power Output Low (Continued)



Engine Will Not Reach Rated Speed (RPM)

Cause	Correction
Load is excessive for engine horsepower rating	Reduce the vehicle load or use a lower gear.
OK ↓	
Tachometer is **not** calibrated or is malfunctioning	Compare the tachometer reading with a hand tachometer or an electronic service tool reading. Calibrate or replace the tachometer as necessary. Refer to the OEM service manuals.
OK ↓	
Fuel grade is **not** correct for the application or the fuel quality is poor	Operate the engine from a tank of good fuel. Refer to Fuel Recommendations and Specifications in Section V.
OK ↓	
Fuel injection pump is malfunctioning	Replace the fuel injection pump. Refer to Section A.
OK ↓	
Fuel inlet restriction	Check for fuel inlet restriction. Contact a Cummins Authorized Repair Facility.

Smoke, White — Excessive

Cause	Correction
Engine is cold	Allow the engine to warm to operating temperature. If the engine will **not** reach operating temperature, refer to the Coolant Temperature Below Normal symptom tree.
OK ⇩	
Fuel grade is **not** correct for the application or the fuel quality is poor	Operate the engine from a tank of good fuel. Refer to Fuel Recommendations and Specifications in Section V.
OK ⇩	
Air in the fuel system	Check for air in the fuel system. Tighten or replace the fuel connections, fuel lines, fuel tank stand pipe and fuel filters as necessary. Bleed air from the system. Refer to Section A.
OK ⇩	
Low pressure fuel system is malfunctioning	Replace the fuel supply pump. Refer to Section A.
OK ⇩	
Static injection timing is **not** correct	Check the static injection timing. Contact a Cummins Authorized Repair Facility..

Section V - Maintenance Specifications

Section Contents

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Specifications

General Specifications

Valve Settings:
- Intake Valve Adjustment ..... 0.43 mm [0.017 in]
- Exhaust Valve Adjustment ..... 0.80 mm [0.032 in]

QST30 Aspiration: ..... Turbocharged and Aftercooled

Bore and Stroke: ..... 140 mm x 165 mm [5.51 in x 6.5 in]

Compression Ratio: 14.0:1

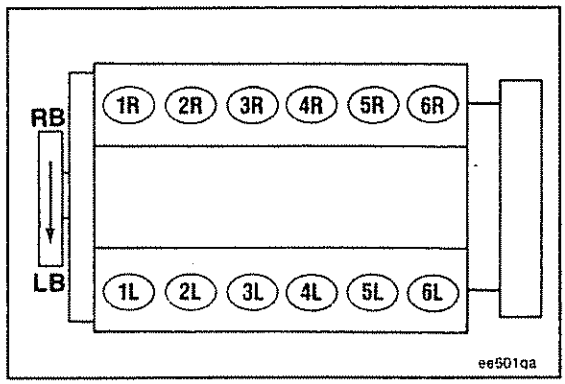
Displacement: ..... 30.5 Liters [1860 cu in]

Firing Order: R1–L1–R5–L5–R3–L3–R6–L6–R2–L2–R4–L4

Type: ..... 4 Cycle, 50 Degree Vee, 12 Cylinder

Weight: ..... 2998 kg [6610 lb]

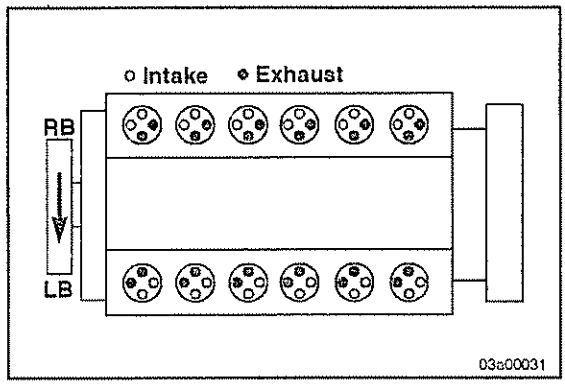
Crankshaft Rotation (Viewed from the front of the engine): ..... Clockwise



Cylinder Numbering Sequence:

RB = Right bank of cylinders

LB = Left bank of cylinders



Intake and Exhaust valve locations.

Fuel System

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

Maximum Allowable Restriction to Pump:
- With clean filter ..... 64 mm Hg [2.5 in Hg]
- With dirty filter ..... 100 mm Hg [4.0 in Hg]

Maximum allowable return line restriction ..... 63 mm Hg [2.5 in Hg]

Maximum allowable return line restriction:
- With check valves and overhead tanks ..... 518 mm Hg [20.4 in Hg]

Minimum allowable fuel tank vent capability:
- With 63 mm Hg [2.5 in Hg] or less back pressure ..... 425 L/hr [15 cu ft/hr]

Lubricating Oil System

Oil Pressure, Main Oil Rifle (15W40 oil at 107°C [225°F]:
- Maximum at Rated RPM: ..... 448 kPa [65 psi]
- Minimum at Rated RPM: ..... 245 kPa [36 psi]
- Minimum at Idle RPM: ..... 98 kPa [14 psi]

Oil Temperature — Maximum ..... 120° C [250° F]

Oil Pan Capacity
- Sump only ..... 76 liter [20 U. S. gal]
- Sump only ..... 132 liter [35 U.S. gal]

Oil Filter Capacity (Each Filter)
- Full flow filter (4 spin-on filters required) ..... 2.65 liter [0.70 U.S. gal]
- Bypass filter (2 spin-on filters required) ..... 2.27 liter [0.60 U. S. gal]

NOTE: The total lubricating oil system capacity is the summation of the oil pan capacity at the high mark on the dipstick, the full flow oil filter capacity, and the capacity of any bypass filters that are used.

Total System Capacity
- When using 75 liter [20 U. S. gal] oil pan: ..... 90 liter [24 U.S. gal]
- When using 132 liter [35 U.S. gal] oil pan: ..... 148 liter [39 U.S. gal]

Cooling System

Coolant Capacity (Engine Only) ..... 85 liters [22.4 U.S. gal]

Standard Modulating Thermostat Range ..... 77 to 90° C [170° to 194° F]

Minimum Pressure Cap ..... 48 kPa [7 psi]

Coolant Temperature
- Minimum Top Tank ..... 71° C [160° F]
- Maximum at Engine Outlet ..... 100° C [212° F]

Maximum Deaeration Time ..... 25 min

Minimum Drawdown
- Of System Capacity ..... 8 %

Air Intake System

NOTE: Engine intake air **must** be filtered to prevent dirt and debris from entering the engine. If the intake air piping is damaged or loose, unfiltered air will enter the engine and cause premature wear.

Maximum Intake Restriction with Heavy Duty Air Cleaner:

With Clean Filter Element ..... 305 mm H_20 [12 in H_20]

With Dirty Filter Element ..... 635 mm H_20 [25 in H_20]

Exhaust System

Back Pressure - Maximum (at rated speed and load) ..... 75 mm Hg [3 in Hg]

Exhaust Pipe Size Normally Acceptable ..... 152 mm [6 in]

Electrical System

Minimum Recommended Battery Capacity

Engine Model	Temperature Range	System Voltage	Cold Cranking Ampere	Ampere Hours	Reserve Capacity
QST30	-18° to 0° C [0° to 32° F]	24 VDC	1800	400	640

NOTE: The number of plates within a given battery size determines reserve capacity. Reserve capacity is the length of time which sustained cranking can occur.

NOTE: CCA ratings are based on two 12 volt batteries in series.

Battery cable sizes — American wire gauge (Maximum length in cranking motor circuit)

24 to 32 volt

No. 00 ..... 6.1 meters [20 ft]
No. 000 ..... 8.2 meters [27 ft]
No. 0000 or two No. 0 (See Note) ..... 10.7 meters [35 ft]
Two No. 00 ..... 13.7 meters [45 ft]

Minimum cranking speed without starting aid ..... 150 RPM

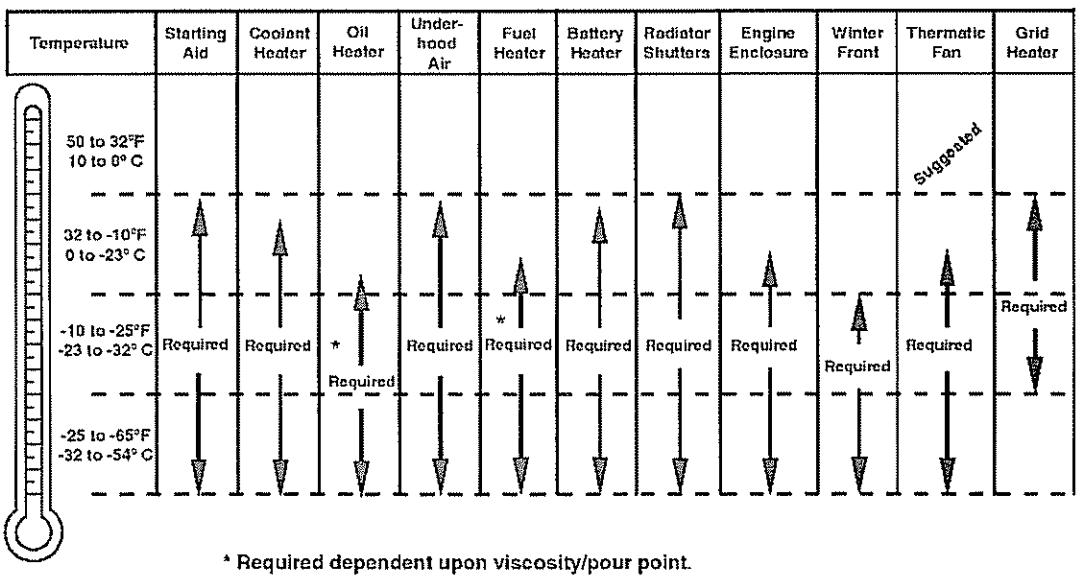
NOTE: Two strands of No. 0 cable can be used in place of one No. 0000 cable providing all connections are carefully made to ensure equal current flow in each parallel cable.

Refer to the following illustration to determine the temperature for which a cold weather starting aid is required.

⚠ WARNING ⚠

NEVER use starting fluid if the grid heater option is used. Use of starting fluid, which contains ether, can cause an explosion, resulting in personal injury and damage to the engine.

Cold Weather Operating Aids



* Required dependent upon viscosity/pour point.

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Fuel Recommendations and Specifications

General Information

⚠ WARNING ⚠

Do not mix gasoline or alcohol with diesel fuel. These mixtures can cause explosions.

⚠ CAUTION ⚠

Due to the precise tolerances of diesel injection systems, it is extremely important that the fuel be kept clean and free of dirt or water. Dirt or water in the system can cause severe damage to both the fuel pump and the injectors.

Cummins Engine Company, Inc. recommends the use of ASTM No. 2 D fuel. The use of No. 2 diesel fuel will result in optimum engine performance.

At operating temperatures below 0°C [32°F], acceptable performance can be obtained by using blends of No. 2 D and No. 1 D.

NOTE: Lighter fuels can reduce fuel economy.

The viscosity of the fuel **must** be kept above 1.3 cSt at 40°C [104°F] to provide adequate fuel system lubrication.

The following chart lists acceptable alternate fuels for QST30 engines.

Acceptable Substitute Fuels - Cummins Fuel System

No. 1D Diesel	No. 2D Diesel	No. 1K Kerosene	Jet-A	Jet-A1	JP-5	JP-8	Jet-B	JP-4	CITE
1	OK	1	1	1	OK	OK	NOT OK	NOT OK	NOT OK

1. OK - ONLY if fuel lubricity is adequate. Refer to Fuel for Cummins Engines, Bulletin No. 3379001.
2. Acceptable ONLY if
   - chrome plated injector plated injector plungers fuel additive AND the heavy duty carbon graphite bushed gear pump are used, or
   - the fuel is blended with enough fuel additive to increase the lubricity above the minimum level. Refer to Fuel for Cummins Engines, Bulletin No. 3379001.

NOTE: Any adjustment to compensate for reduced performance with a fuel system using subsitute fuel is **not** warrantable.

Additional information for fuel recommendations and specifications can be found in Fuel for Cummins Engines, Bulletin No. 3379001. See ordering information in the Section L.

Lubricating Oil Recommendations and Specifications

General Information

The use of quality engine lubricating oils combined with appropriate oil drain and filter change intervals is a critical factor in maintaining engine performance and durability.

Cummins Engine Company, Inc. recommends the use of oil that meets the American Petroleum Institute (API) performance categories of CF-4, CG-4, CF-4/SG, or CG-4/SH. Oil with an older API classification of CD or CE may be used in areas of the world outside North America where oils meeting the current API categories are not available. However, if using CD or CE classification oil, the oil **must** be changed at the standard service interval and only extended if scheduled oil sampling is used for close monitoring of oil condition. Oil with an API classification of CC may be used in areas of the world outside North America where oils meeting the current API categories are not available, but if used, they **must** be changed at one half the normal recommended service intervals. Oil with an API classification of CA or CB **must not** be used.

The oil supplier is responsible for the quality and performance of their product.

Cummins Engine Company, Inc. recommends engine oil with a nominal ash content of 1 to 1.5 percent mass. Oils with higher ash contents, up to 1.85 percent ash, can be used in areas where the sulfur content of the fuel is normally 1 to 1.5 percent mass. Limiting ash content is critical to the prevention of valve and piston deposit formation.

For further details and discussion of engine lubricating oils for Cummins engines, refer to Bulletin No. 3810340-02, Cummins Engine Oil Recommendations.

New Engine Break-in Oils

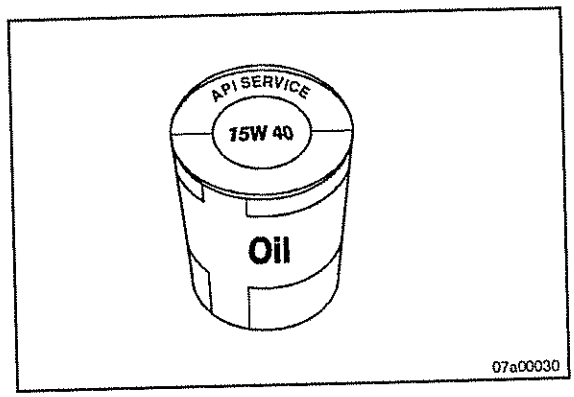
Special break-in engine lubricating oils are **not** recommended for new or rebuilt Cummins engines. Use the same type oil during the break-in as that which is used in normal operation.

Additional information regarding lubricating oil availability throughout the world is available in the E.M.A. Lubricating Oils Data Book for Heavy Duty Automotive and Industrial Engines. The data book can be ordered from the Engine Manufacturers Association, One Illinois Center, 111 East Wacker Drive, Chicago, IL U.S.A. 60601. The telephone number is: (312) 644-6610.

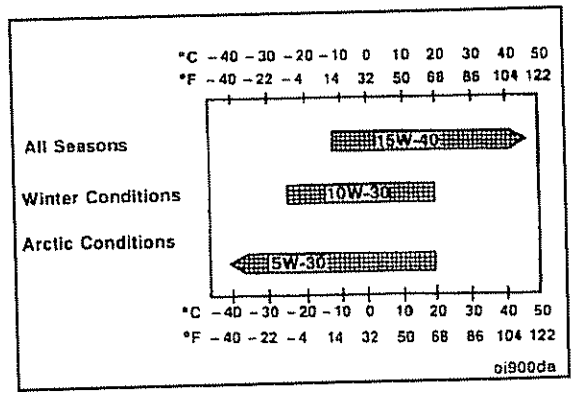
Viscosity Recommendations

The viscosity of an oil is a measure of its resistance to flow. The Society of Automotive Engineers has classified engine oils in viscosity grades. Oils that meet the **low** temperature (-18° C [0° F]) requirement carry a grade designation with a W suffix. Oils that meet both the **low** and **high** temperature requirements are referred to as multi-grade or multi-viscosity grade oils.

Cummins Engine Co., Inc. has found that the use of multigrade lubricating oil improves oil consumption control and engine cranking in cold conditions while maintaining lubrication at high operating temperatures and can contribute to improved fuel consumption.



Cummins Engine Company, Inc.® recommends the use of multigrade lubricating oils with the viscosity grades for the ambient temperatures indicated. This picture shows only the preferred oil grades.



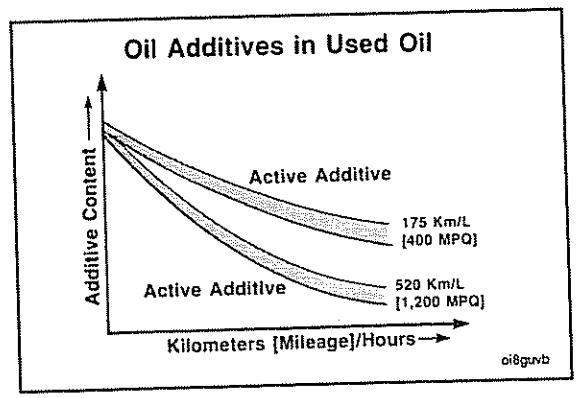
Single grade oils can be substituted for short durations until the recommended multigrade is procured. **Arctic Condition** oils are available commercially with better low temperature properties. Consult your supplier.

⚠ CAUTION ⚠

When single grade oil is used, make sure the oil will be operating within the temperature ranges indicated in the table below.

The primary criterion for selecting an oil viscosity grade is the lowest temperature the oil will experience while in the engine oil sump. Bearing problems can be caused by the lack of lubrication during the cranking and start up of a cold engine when the oil being used is too viscous to flow properly. Change to a lower viscosity grade of oil as the temperature of the oil in the engine oil sump reaches the lower end of the ranges shown in the picture and table.

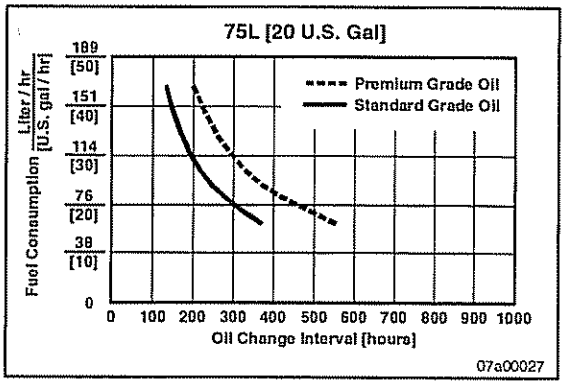
As the engine oil becomes contaminated, essential oil additives are depleted. Lubricating oils protect the engine as long as these additives are functioning properly. Progressive contamination of the oil between oil and filter change intervals is normal. The amount of contamination will vary depending on the operation of the engine, hours or miles on the oil, fuel consumed, and new oil added.



NOTE: Do **not** extend oil and filter change intervals beyond 250 hours or 6 months, whichever occurs first, unless the Chart Method is used. On generator drives, the intervals are 250 hours or 12 months, whichever occurs first. Refer to the charts below. Improperly applied extended oil and filter change intervals will decrease engine life due to factors such as corrosion, deposits, and wear.

There are two recommended methods used to determine the proper oil and filter change interval:

- Fixed Hours Method (based on fixed hours, or months; whichever occurs first).
- Chart Method (based on known fuel consumption rates).



Oil Drain Intervals

The Chart Method is recommended to provide the lowest total cost of operation while still protecting the engine. Premium grade oils are 15W40, CG-4 and 15W40, CG-4/SH.

Use the Chart Method with the required information listed below to determine the correct oil and filter change interval for your engine:

- Fuel consumption rate
- Oil Sump Capacity

NOTE: Premium oils are recommended for the QST30 engines. Due to differing availability outside North America, standard grade oil change intervals are also depicted.

Determine fuel consumption rates:

- To use the Chart Method effectively, accurate fuel consumption records **must** be kept and maintained.
- As fuel consumption rates change because of changes in operation or duty cycle of a particular engine, the oil change interval established by the Chart Method must be re-evaluated based on the change in oil and/or fuel consumption.

The following practices are suggested when extending oil changes past 250 hours:

- Oil analysis
- Premium oils (15W40, CG-4 and 15W40, CG-4/SH)
- Microglass oil filters if extended past 750 hours

		Oil HIGH Level			
Engine Model	Oil Pan Part No.	Liter	[U.S. Gal]	Oil Filter	Capacity
QST30	3093701	75	[20]	Full Flow (each) LF670	2.65 Liter (each) [0.7 U.S. Gal]
QST30	3093702	132	[35]	Full Flow (each) LF670	2.65 Liter (each) [0.7 U.S. Gal]

Determine the total lubricating oil system capacity.

Example: An engine has oil pan, Part No. 3093701, and uses the standard full-flow filter head (4 LF670 filters) and two spin-on bypass filter (LF777).
Total capacity (24 U.S. gal) = 20 U.S. gal (oil pan) + 2.8 U.S. gal (4 x LF670 filters) + 1.2 U.S. gal (2 LF777 filter)

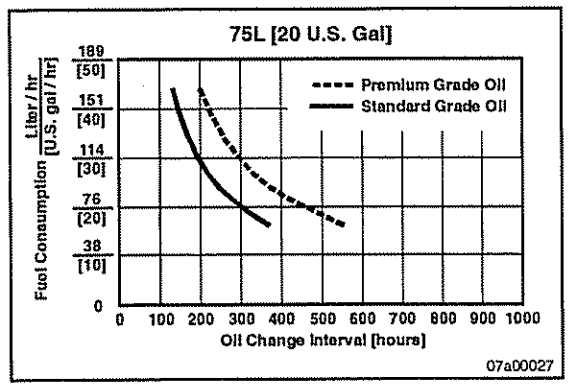
For our example, assume the average fuel consumption equals 30 U.S. gallons per hour.

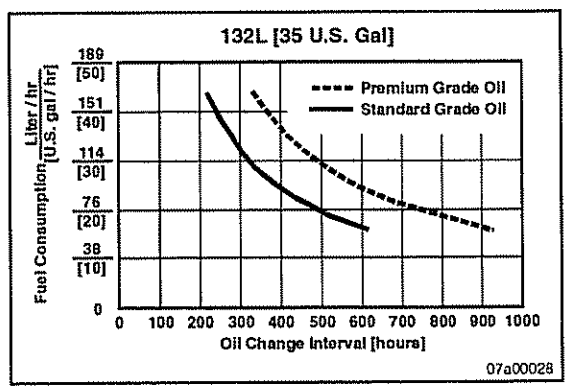
To read the chart:

Select the chart entitled 75L [20 U.S. Gal]. For engines equipped with the 132L [35 U.S. Gal] oil pan, use the chart below.

Find the fuel consumption rate in U.S. gallons per hour on the left vertical axis and draw a horizontal line from left to right across the chart, parallel with the bottom of the chart, until it intersects the curve.

From the intersection point on the curve, draw a line perpendicular to the bottom of the chart. The number across the bottom of the chart represents the oil change interval in hours.





Coolant Recommendations and Specifications

General Information

Cummins recommends the use of fully formulated antifreeze or coolant containing a precharge of Supplemental Coolant Additive (SCA). The antifreeze or coolant **must** meet the specifications outlined in The Maintenance Council (TMC) Recommended Practice (RP) 329 (ethylene glycol) or RP 330 (propylene glycol). The use of fully formulated antifreeze or coolant significantly simplifies cooling system maintenance.

Copies of TMC specifications can be obtained through Cummins Engine Company, Inc., or by contacting:

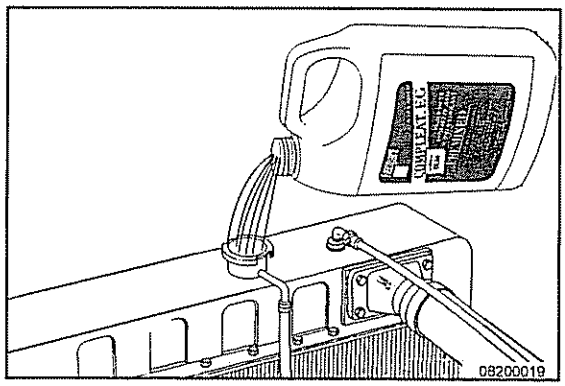
The Maintenance Council
American Trucking Association
2200 Mill Road
Alexandria, VA 22314–5388
Phone (703) 833–1763
Fax (703) 836–6070

Fully formulated **antifreeze** contains balanced amounts of antifreeze, SCA, and buffering compounds, but does **NOT** contain 50% (percent) water. Fully formulated **coolant** contains balanced amounts of antifreeze, SCA, and buffering compounds already premixed 50/50 with deionized water.

The following pages will give an explanation of water, antifreeze, and SCA's. They will also explain how to test antifreeze and SCA levels.

This section also contains information on cooling system maintenance and a coolant treatment chart that is used to determine the correct SCA service filter.

Alternative maintenance practices for cooling systems can be found in Cummins Coolant Requirements and Maintenance, Bulletin No. 3666132.



Fully Formulated Coolant/Antifreeze

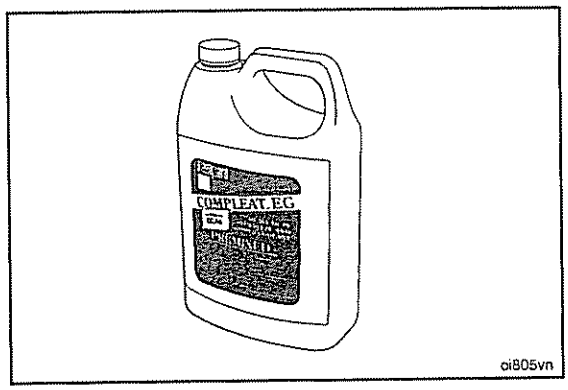
Cummins Engine Company, Inc. recommends using either a 50/50 mixture of good quality water and fully formulated antifreeze, or fully formulated coolant when filling the cooling system. The fully formulated antifreeze or coolant **must** meet TMC RP 329 or TMC RP 330 specifications.

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

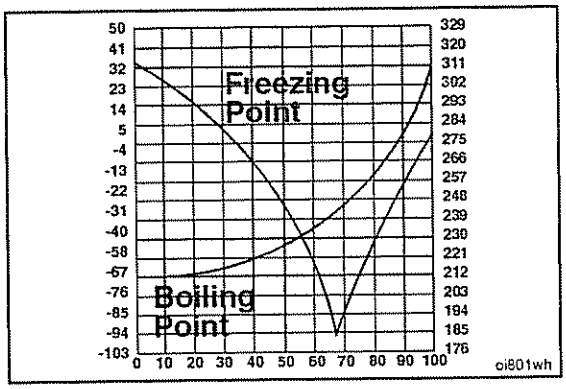
18200001

Good quality water is important for cooling system performance. Excessive levels of calcium and magnesium contribute to scaling problems, and excessive levels of chlorides and sulfates cause cooling system corrosion.

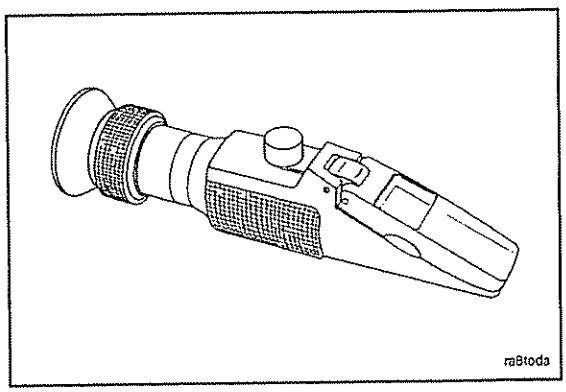
Cummins Engine Company, Inc. recommends using Fleetguard® Compleat. It is available in both glycol forms (ethelyne and propylene) and complies with TMC standards.



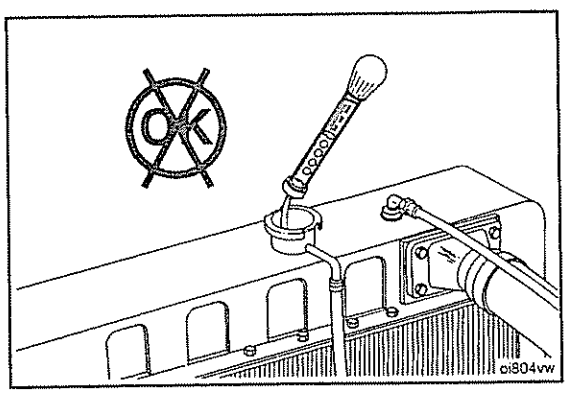
Fully formulated antifreeze **must** be mixed with good quality water at a 50/50 ratio (40 to 60% working range). A 50/50 mixture of antifreeze and water gives a —36°C [-34°F] freeze point and a boiling point of 110°C [228°F], which is adequate for locations in North America. The actual lowest freeze point of ethylene glycol antifreeze is at 68%. Using higher concentrations of antifreeze will raise the freeze point of the solution and increase the possibility of a silicate gel problem.

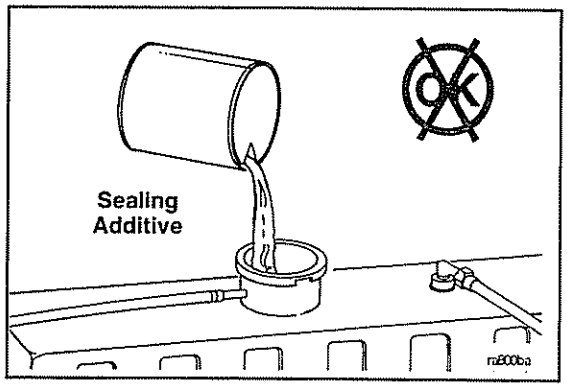


A refractometer **must** be used to **accurately** measure the freeze point of the coolant.



Do **not** use a floating ball hydrometer. Using floating ball hydrometers can give incorrect reading.

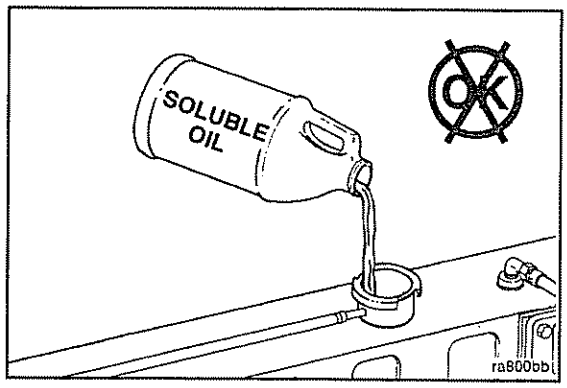




Cooling System Sealing Additives

Do **not** use sealing additives in the cooling systems. The use of sealing additives will:

- build up in coolant low flow areas,
- clog coolant filters,
- plug radiator and oil cooler.



Cooling System Soluble Oils

Do **not** use soluble oils in the cooling system. The use of soluble oils will:

- allow cylinder liner pitting,
- corrode brass and copper,
- damage heat transfer surfaces,
- damage seals and hoses.

Fleetguard® DCA4 Service Filters and Liquid Precharge

DCA4 Service Filters:		DCA (Fleetcool) Service Filters:	
Part No.	SCA Units	Part No.	SCA Units
WF2070	2	WF2050	2
WF2071	4	WF2051	4
WF2072	6	WF2052	6
WF2073	8	WF2053	8
WF2074	12	Not Available	12
WF2075	15	WF2054	15
WF2076	23	WF2055	23
WF2077	(blank filter without SCAs)	WF2077	(blank filter without SCAs)

DCA4 Liquid			DCA (Fleetcool) Liquid		
Part No.	Size	SCA Units	Part No.	Size	SCA Units
DCA60L	0.47 l [1 U.S. pt.]	5	DCA30L	0.47 l [1 U.S. pt.]	5
DCA65L	1.89 l [2 U.S. qt.]	20	DCA35L	1.89 l [2 U.S. qt.]	20
DCA70L	3.78 l [1 U.S. gal]	40	DCA40L	3.78 l [1 U.S. gal]	40
DCA75L	18.9 l [5 U.S. gal]	200	DCA45L	18.9 l [5 U.S. gal]	200
DCA80L	208 l [55 U.S. gal]	2200	DCA50L	208 l [55 U.S. gal]	2200

Maintenance Intervals for Cooling Systems up to 76 Liters [20 U.S. Gallons]

Service Interval			Install service filter(s) and/or liquid containing number of SCA units below: System Size in Liters [U.S. Gallons]			
Kilometers	[Miles]	[Hours]	4-19 [1-5]	19-38 [6-10]	42-57 [11-15]	60-76 [16-20]
72001-80000	[45001-50000]	1126-1250	8	12	23	30
64001-72000	[40001-45000]	1001-1125	4	12	15	26
56001-64000	[35001-40000]	876-1000	4	8	12	23
48001-56000	[30001-35000]	751-875	4	6	12	20
40001-48000	[25001-30000]	626-750	4	6	10	18
32001-40000	[20001-25000]	501-625	2	6	8	15
24001-32000	[15001-20000]	376-500	2	4	6	12
16001-24000	[10001-15000]	251-375	2	4	6	8
0-16000	[0-10000]	0-250	2	2	4	6

Maintenance Intervals for Cooling System up to 1514 Liters [400 U.S. Gallons]

Service	Install service filter(s) and/or liquid containing number of SCA units below: System Size in Liters [U.S. Gallons]									
Interval Hours	79-144 [21-30]	117-189 [31-50]	193-284 [51-75]	288-378 [76-100]	382-568 [101-150]	572-757 [151-200]	761-946 [201-250]	950-1135 [251-300]	1139-1325 [301-350]	1329-1574 [351-400]
751-1000	25	50	80	100	150	200	250	300	350	400
501-750	20	35	60	75	110	150	190	225	260	300
251-500	15	25	40	50	75	100	125	150	175	200
0-250	10	15	20	25	40	50	65	75	90	100

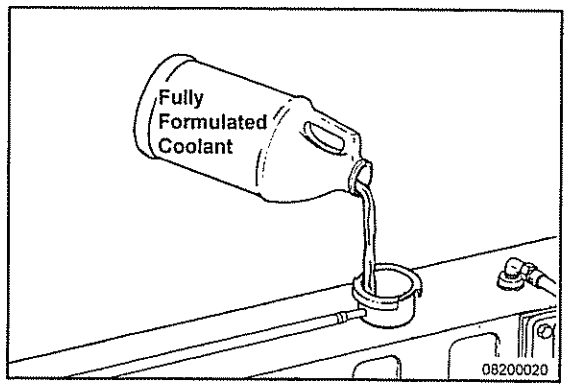
Notes:

A. Consult the vehicle equipment manufacturer's maintenance information for total cooling system capacity.

B. When draining and replacing the coolant, **always** pre-charge the cooling system to a SCA level of 1.5 units per gallon. This concentration level **must never** be allowed to go below 1.2 units and **must** be controlled when the level is greater than 3 units. Action needed when the level goes below 1.2 is a filter and liquid pre-charge; from 1.2 to 3.0 units, filter only; above 3.0, test at every oil change until level falls to 3.0 or below.

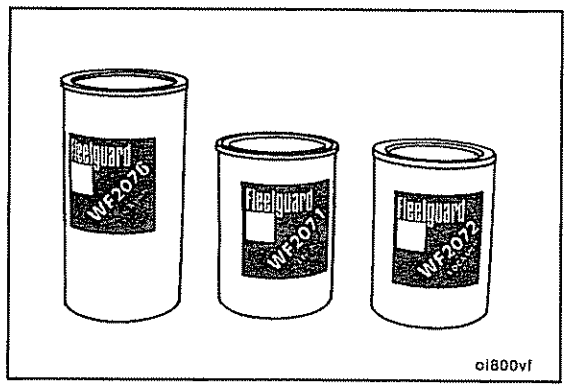
NOTE: When performing service which requires draining the cooling system, take special precautions to collect it in a clean container, seal it to prevent contamination, and save for reuse.

C. Change coolant filters at each oil change to protect the cooling system. Consult the coolant capacity chart to determine the correct coolant filter for a given cooling system capacity and oil drain interval.



Supplemental Coolant Additive (SCA)

Fully formulated products contain SCA's and are required to protect the cooling system from fouling, solder blooming, and general corrosion. The cooling filter is required to protect the coolant system from abrasive materials, debris, and precipitated coolant additives.

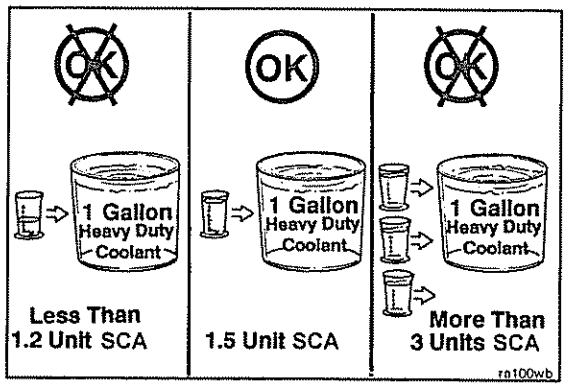


Supplemental coolant additives, or equivalent, are used to prevent liner pitting, corrosion, and scale deposits in the cooling system.

Use the correct Fleetguard® coolant filter to maintain the recommended SCA concentration in the system.

Maintain the correct concentration by changing the service filter at each oil drain interval.

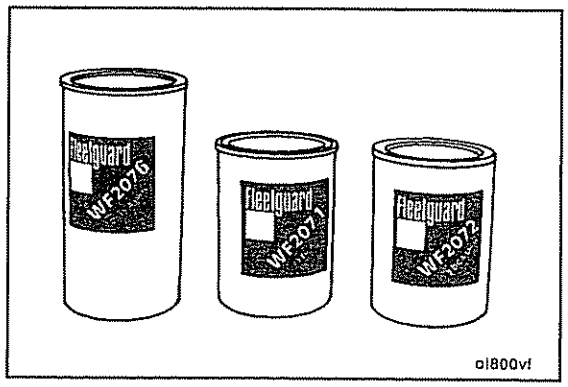
NOTE: The correct filter is determined by the total cooling system capacity and oil drain interval. Refer to the Coolant Capacity Charts.



⚠ CAUTION ⚠

Insufficient concentration of the coolant additives will result in liner pitting and engine failure.

The SCA concentration **must not** fall below 1.2 units or exceed 3 units per gallon of cooling system capacity.



Use the correct Fleetguard® coolant filter to maintain the recommended SCA concentration in the system.

Maintain the correct concentration by changing the service coolant filter at each oil drain interval.

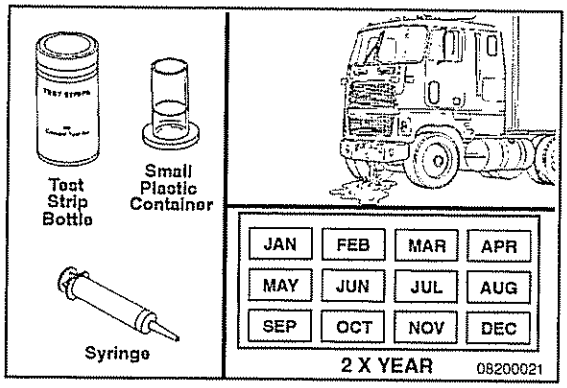
NOTE: The correct filter is determined by the total cooling system capacity and oil drain interval.

Testing SCA Concentration Level CC-2602 Test Kit

Carefully follow the instructions to test the coolant and take the appropriate action recommended by the kit.

Precautions and Instructions for Proper Kit Use

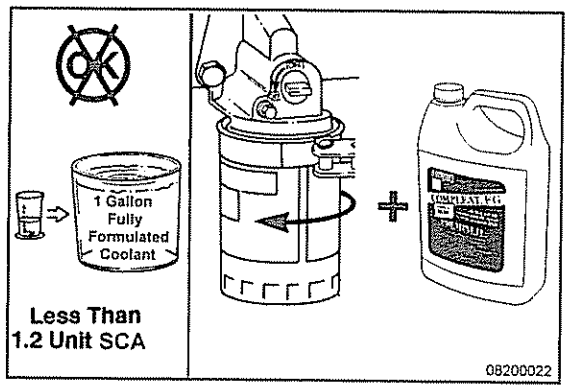
- The coolant sample to be tested **must** be between 10° and 54°C [50° and 130°F]. If the sample is too cold or too hot, you will get incorrect results.
- To get the best color match results, compare test strip pads to the color chart in daylight or under cool white fluorescent lighting. If unsure about a specific color match when a test does fall between two colors on the color chart, choose the lower numbered block. It is safer to underestimate your results than to overestimate.
- The test strips do have a limited shelf life and are sensitive to humidity and extreme heat. Proper handling and storage is necessary to protect the life of the strips.
- Keep the cap tightly sealed on the test strip bottle except when removing a strip. Store away from direct sunlight and in an area where the temperature will generally stay below 32°C [90°F].
- Do **not** use the test strips after the expiration date stamped on the bottle.
- Discard the kit if any of the pads on the unused strips have turned light brown or pink.
- Use one strip at a time and take care **not** to touch any of the pads on the strip. Doing so will contaminate the pads and affect the test results.
- If the strip container is left uncapped for 24 hours, moisture in the air will render the strips useless, although no discoloration will be evident.
- Only use the color chart supplied with the kit.
- Clean and dry the sample cup and syringe after each use. This will prevent contaminating future samples.
- Following the correct test times is very important. Use a clock or stopwatch.



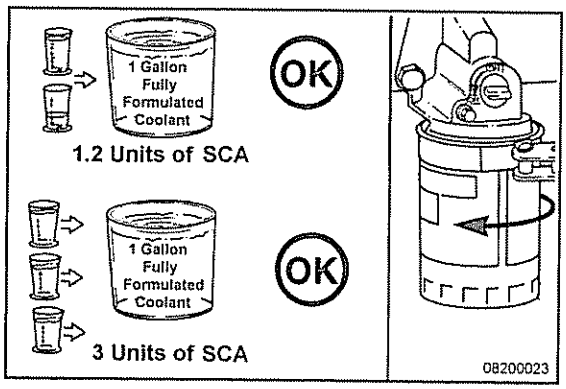
Test Intervals

Testing is recommended if the operator is **not** sure of his cooling system condition due to leaks, uncontrolled topping off of the system, or major coolant loss.

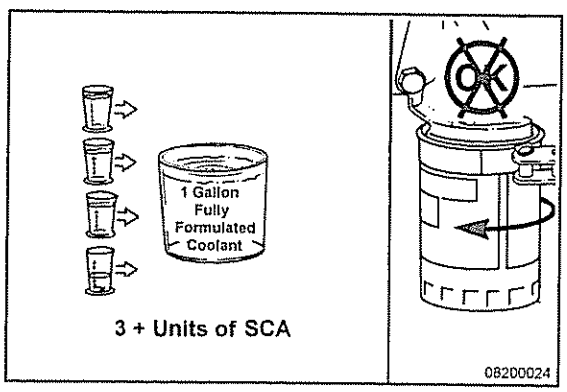
Testing is also recommended twice a year to monitor the SCA level. If the SCA level is above 3 units, test at subsequent oil drain intervals until the concentration is back under 3 units. When the concentration is back under 3 units, start installing the correct service filters at each drain interval.



If the concentration is below 1.2 units per gallon, replace the filter and precharge with liquid.



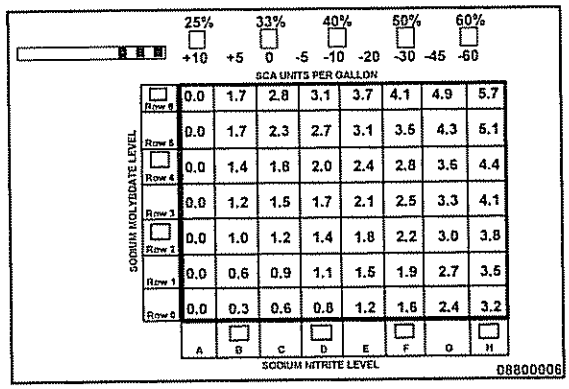
If the concentration is 1.2 to 3 units per gallon, replace the filter.



If the concentration is above 3 units per gallon, do **not** replace the service filter. Test the coolant at subsequent oil drain intervals until the concentration is back under 3 units. When the concentration is back under 3 units, start installing service filters at each oil change interval.

NOTE: Do **not** utilize the test kit to maintain minimum SCA concentration levels (i.e., 1.5 units).

NOTE: In some instances the A or B reading can be high. However, it is the combined reading that is important. **Therefore, always follow the chart.**



CC2602 Coolant Test Kit	– Works with any SCA formulation (Call 1-800-521-4005 if you have this test kit and the color chart does not show the number of units of SCA per gallon of coolant.
Probablizer:	
•3318169S Plug	– Installs on the engine for easy coolant sampling
• 3318168S Cap	– Use with Monitor C bottle to sample coolant
• CC2700 Monitor C	– Lab analysis of coolant samples

Call the following numbers to get answers to any questions you may have about cooling system maintenance.

Cummins: 1-800-DIESELS
1-800-521-4005

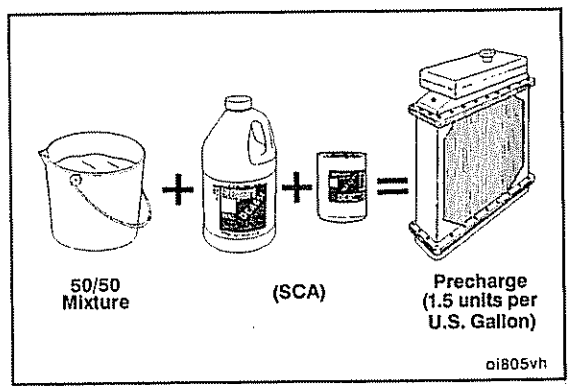
1-800-22-FILTERS
1 - 800 - 223 - 4583

00200003

Coolant Replacement Requirements

Drain and flush the cooling system after 6,000 hours, or 2 years of service. Refill with either new **fully formulated coolant** or a 50/50 mixture of good quality water and fully formulated antifreeze, and install the correct service coolant filter.

NOTE: If the coolant is **not** going to be reused, dispose of used coolant/antifreeze in accordance with federal, state, and local laws and regulations.



Drive Belt Tension

Belt Chart

SAE Belt Size	Belt Tension Gauge Part No.		Belt Tension New		Tension Range* Used Belt	
	Click-Type	Burroughs	N	lbf	N	lbf
0.380 in	3822524	N/A	620	140	270 - 490	60 - 110
0.440 in	3822524	N/A	620	140	270 - 490	60 - 110
1/2 in	3822524	ST-1138	620	140	270 - 490	60 - 110
11/16 in	3822524	ST-1138	620	140	270 - 490	60 - 110
3/4 in	3822524	ST-1138	620	140	270 - 490	60 - 110
7/8 in	3822524	ST-1138	620	140	270 - 490	60 - 110
4 rib K	3822524	ST-1138	620	140	270 - 490	60 - 110
5 rib K	3822524	ST-1138	670	150	270 - 530	60 - 120
6 rib K	3822525	ST-1293	710	160	290 - 580	65 - 130
8 rib K	3822525	ST-1293	890	200	360 - 710	80 - 160
10 rib K	3822525	3823138	1110	250	440 - 890	100 - 200
12 rib K	3822525	3823138	1330	300	530 - 1070	120 - 240
15 rib K	3822525	3823138	1670	375	670 - 1340	150 - 300
16 rib L**	N/A	3376344	2490	560	1160 - 2315	260 - 520
20 rib L**	N/A	3823772	3115	700	1470 - 2890	330 - 650
21 rib K	N/A	xxxxxxx	1330	300	1330	300

* A belt is considered used if it has been in service for ten minutes or longer.

** If used belt tension is less than the minimum value, tighten the belt to the maximum used belt value. The minimum value is usually 50 percent below the maximum value.

Note:

1. Chart does **not** apply to automatic belt tensioners.
2. K section V-ribbed belts have 3.5 mm [0.140 in] rib width.
3. L section V-ribbed belts have 4.7 mm [0.185 in] rib width.
4. V-ribbed belt tension averages are:
   - K section, 25 lb/rib new, 10 to 20 lb/rib used belt.
   - L section, 35 lb/rib new, 16 to 32 lb/rib used belt.
5. Belt manufacturers typical belt tension recommendations are:
   - V-belts have similar tension values to those listed above.
   - K section, 40 lb/rib new, 16 to 35 lb/rib used belt.
   - L section, 45 lb/rib new, 20 to 40 lb/rib used belt.
6. Tension specifications are based on a cold belt. Hot shut down tension varies greatly depending on speed and load temperature, but is approximately 30 percent higher.

Engine Component Torque Values

General Specifications

Component	Wrench Size mm [in]	Torque Value N•m	Torque Value [ft-lb]
Oil Drain Plug	12	60	45
Crosshead Adjusting Screw Locknut with Adapter	17	45	35
Crosshead Adjusting Screw Locknut without Adapter	17	60	45
Valve Adjusting Screw Locknut with Adapter	17	45	35
Valve Adjusting Screw Locknut without Adapter	17	60	45
Rocker Lever Cover	12	7	62 in-lb
Thermostat Housing Mounting Capscrews	17	115	85
Fan Belt Idler Assembly	[5/8]	60	45
Fan Belt Tensioner Capscrews	17	60	45
Air Compressor Unloader Valve Body Capscrew	[9/16]	14	10
Air Compressor Unloader Valve Cap	[9/16]	40	30
Fan Idler Control Rod Capscrews	[5/8]	90	65
Fan Idler Capscrew	17	45	35
Fan Idler Control Rod Adjusting Screw Locknut	[5/16]	60	45
Fan Idler Arm Shock Absorber	[5/8]	60	45
Adjusting Link and Alternator Mounting Capscrews	17	55	40
Fuel Supply Lines (Low Pressure)		27	20
Fuel Lines (High Pressure)		24	17
Fuel Tube Locknut	18	39	29
Fuel Line Support Clamps		10	7
Fuel Filter Relief Valve		11	95 in-lb
Overflow Valve/Overflow Connection		27	20
Fuel Drain Line Manifold Banjo Capscrew		9	80 in-lb
Fuel Return Line Spill Tube Banjo Capscrew		9	80 in-lb
Injector Clamp Capscrew		65	48
Fuel Pump Bracket Mounting Capscrews		65	48
Open Drive Fuel Pump Coupling Capscrews	19	108	80
Fuel Pump Bracket Capscrews		65	48
Open Drive Fuel Pump Pinch Bolt		160	120
Flange Mounting Capscrews		65	48
Two Piece Fuel Pump Drive Gear Capscrews		115	84
Fan Hub Assembly to Fan Support (12 pt capscrew)	[5/8]	290	215
Fuel Pump Locking Pin Cap		30	22

Arctic Operation

General Information

If an engine is operated in ambient temperatures consistently below -23° C [-10° F] and there are no provisions to keep the engine warm when it is not in operation, use a synthetic CE/SF engine oil with adequate low temperature properties such as 5W-30.

The oil supplier **must** be responsible for meeting the performance service specifications.

△ CAUTION △

The use of a synthetic base oil does not justify extended oil change intervals. Extended oil change intervals can decrease engine life due to factors such as corrosion, deposits, and wear.

Section W - Warranty

Section Contents

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Cummins Warranty, Worldwide Generator Drive

Engines Warranted

This warranty applies to new Engines sold by Cummins Engine Company, Inc., hereinafter 'Cummins', and delivered to the first user on or after June 1, 1993 that are used in generator drive application anywhere in the world where Cummins approved service is available. These Engines will have the following rating designations:

Standby Power Rating

Engines of this rating are applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. Under no condition is an Engine allowed to operate in parallel with the public utility at the Standby Power rating. This rating should be applied where reliable utility power is available. A standby rated engine is to be sized for a maximum of an 80 percent average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating. Standby rating should never be applied except in true emergency power outages. Negotiated power outages contracted with a utility company are not considered an emergency.

Unlimited Time Running Prime Power Rating

Engines with this rating are available for an unlimited number of hours per year in a variable load application. Variable load is not to exceed a 70 percent average of the Prime Power Rating during any operating period of 250 hours. Total operating time at 100 percent Prime Power shall not exceed 500 hours per year.

A 10 percent overload capability is available for a period of one hour within a twelve hour period of operation. Total operating time at the 10 percent overload power shall not exceed 25 hours per year.

Limited Time Running Prime Power Rating

Engines of this rating are available for a limited number of hours in a non-variable load application. It is intended for use in situations where power outages are contracted, such as in utility power curtailment. Engines may be operated in parallel to the public utility up to 750 hours per year at power levels never to exceed the Prime Power rating.

Limited Time Running Prime Power ratings differ from Unlimited Time Running in that even though the maximum power output of the engines are the same, the Limited Time Running allows the Engine to be parallel to Public Utility and run at the full Prime Power rating and must never exceed the Prime Power rating.

Continuous/Base Power Rating

Engines with this rating are available for supplying utility power at a constant 100 percent load for an unlimited number of hours per year. No overload capability is available for this rating.

Continuous/Base Power ratings differ from Unlimited Time Running Prime Power ratings in that the Continuous/Base Load ratings are significantly reduced from the Prime Power ratings. Continuous/Base Load ratings have no load factor or application restrictions.

Coverage

Base Engine Warranty

This warranty covers any failures of the Engine, under normal use and service, which result from a defect in material or factory workmanship (Warrantable Failure).

Coverage begins with the sale of the Engine by Cummins and continues for the Duration stated below. The Duration commences either on the date of delivery of the Engine to the first user, or on the date the Engine is first leased, rented or loaned, or when the Engine has been operated for 50 hours, whichever occurs first.

Base Engine Warranty

Rating	Duration Whichever Occurs First	
	Months	Hours
Standby Power	24	400
Unlimited Prime Power	12	Unlimited
Limited Prime Power	12	750
Continuous/Base Power	12	Unlimited

Extended Major Components Warranty

The Extended Major Components Warranty applies to Engines other than B and C series and covers Warrantable Failures of the Engine cylinder block, camshaft, crankshaft and connecting rods (Covered Parts). Bushing and bearing failures are not covered. This coverage begins with the expiration of the Base Engine Warranty and continues for the following stated Duration. The Duration commences either on the date of delivery of the Engine to the first user, or on the date the Engine is first leased, rented or loaned, or when the Engine has been operated for 50 hours, whichever occurs first.

Extended Major Components Warranty

Rating	Duration Whichever Occurs First	
	Months	Hours
Standby Power	36	600
Unlimited Prime Power	36	10,000
Limited Prime Power	36	2,250
Continuous/Base Power	36	10,000

Consumer Products

This warranty on Consumer Products in the United States is a LIMITED warranty. **CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.** Any implied warranties applicable to Consumer Products terminate concurrently with the expiration of the express warranties applicable to the product. In the United States, some states do not allow the exclusion of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the limitations or exclusions herein may not apply to you.

These warranties are made to all Owners in the chain of distribution, and Coverage continues to all subsequent Owners until the end of the periods of Coverage.

Cummins Responsibilities

During Base Engine Warranty

Cummins will pay for all parts and labor needed to repair the damage to the Engine resulting from a Warrantable Failure when performed during normal business hours. All labor costs will be paid in accordance with Cummins published Standard Repair Time guidelines.

Cummins will pay for the lubricating oil, antifreeze, filter elements, and other maintenance items that are not reusable due to the Warrantable Failure.

Cummins will pay reasonable travel expenses for mechanics to travel to and from the Engine site, including meals, mileage, and lodging when the repair is performed at the site of the failure.

Cummins will pay reasonable labor costs for Engine removal and reinstallation when necessary to repair a Warrantable Failure.

During the Extended Major Components Warranty

Cummins will pay for the repair or, at its option, replacement of the defective Covered Part and any Covered Part damaged by a Warrantable Failure of the defective Covered Part.

Owner's Responsibilities

During the Base Engine Warranty

Owner is responsible for the cost of lubricating oil, antifreeze, filter elements and other maintenance items replaced during warranty repairs unless such items are not reusable due to the Warrantable Failure.

During the Extended Major Components Warranty

Owner is responsible for the cost of all labor needed to repair the Engine, including the labor cost for Engine removal and reinstallation. When Cummins elects to repair a part instead of replacing it, the Owner is not responsible for the labor needed to repair the part.

Owner is responsible for the cost of all parts required for the repair except for the defective Covered Part and any Covered Part damaged by a Warrantable Failure of the defective Covered Part.

Owner is responsible for the cost of lubricating oil, antifreeze, filter elements and other maintenance items replaced during repair of a Warrantable Failure.

During the Base Engine and Extended Major Components Warranties

Owner is responsible for the operation and maintenance of the Engine as specified in the applicable Cummins Operation and Maintenance Manual. Owner is also responsible for providing proof that all recommended maintenance has been performed.

Before the expiration of the applicable warranty, Owner must notify a Cummins distributor, authorized dealer or other repair location approved by Cummins of any Warrantable Failure and make the Engine available for repair by such facility. Locations in the United States and Canada are listed in the Cummins United States and Canada Sales and Service Directory; other locations are listed in the Cummins International Sales and Service Directory.

Owner is responsible for communication expenses, meals, lodging and similar costs incurred as a result of a Warrantable Failure.

Owner is responsible for non-Engine repairs, "downtime" expenses, fines, all applicable taxes, all business costs and other losses resulting from a Warrantable Failure.

Owner is responsible for providing sufficient access to and reasonable ability to remove the Engine from the installation in the event of a Warrantable Failure.

Owner is responsible for maintaining an operating Engine hourmeter. If the hourmeter is not operational, engine usage will be estimated at 400 hours per month.

Limitations

Cummins is not responsible for failures or damage resulting from what Cummins determines to be abuse or neglect, including, but not limited to: operation without adequate coolants or lubricants; overfueling; overspeeding; lack of maintenance of lubricating, cooling or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications to the Engine. Cummins is also not responsible for Engine performance problems or failures caused by incorrect oil or fuel, or by water, dirt or other contaminants in the fuel or oil.

This warranty does not apply to accessories supplied by Cummins which bear the name of another company. Such non-warranted accessories include, but are not limited to: alternators, starters, fans, air conditioning compressors, clutches, filters, transmissions, air cleaners and safety shutdown switches.

Before a claim for excessive oil consumption will be considered, Owner must submit adequate documentation to show that consumption exceeds Cummins published standards.

Failure of belts and hoses supplied by Cummins are not covered beyond the first 500 hours or one year of operation, whichever occurs first after the warranty start date.

Parts used to repair a Warrantable Failure may be new Cummins parts, Cummins approved rebuilt parts, or repaired parts. Cummins is not responsible for failures resulting from the use of parts not approved by Cummins.

A new Cummins or Cummins-approved rebuilt part used to repair a Warrantable Failure assumes the identity of the part it replaced and is entitled to the remaining coverage hereunder.

Cummins is not responsible for Engine performance problems or failures resulting from:

1. Use or application of the Engine inconsistent with its rating designation as set forth above.
2. Inadequate or incorrect installations deviating from Cummins Generator Drive Installation Guidelines.

CUMMINS IS NOT RESPONSIBLE FOR WEAR OR WEAROUT OF COVERED PARTS.

CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

THE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS IN REGARD TO THESE ENGINES. CUMMINS MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

In the United States* and Canada, this warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Outside the United States* and Canada, in case of consumer sales, in some countries, the Owner has statutory rights which cannot be affected or limited by the terms of this warranty.

Nothing in this warranty excludes or restricts any contractual rights the owner may have against third parties.

Cummins Warranty, Industrial United States and Canada

Coverage

PRODUCTS WARRANTED

This warranty applies to new Engines sold by Cummins Engine Company, Inc., hereinafter 'Cummins', and delivered to the first user on or after February 1, 1993, that are used in industrial (off-highway) applications in the United States* and Canada, except for Engines used in marine, generator drive and certain defense applications, for which different warranty coverage is provided.

BASE ENGINE WARRANTY

This warranty covers any failures of the Engine, under normal use and service, which result from a defect in material or factory workmanship (Warrantable Failure).

Coverage begins with the sale of the Engine by Cummins. Coverage continues for two years or 2,000 hours of operation, whichever occurs first, from the date of delivery of the Engine to the first user, or from the date the unit is first leased, rented or loaned, or when the Engine has been operated for 50 hours, whichever occurs first. If the 2,000 hour limit is exceeded during the first year, coverage continues until the end of the first year.

EXTENDED MAJOR COMPONENTS WARRANTY

The Extended Major Components Warranty covers Warrantable Failures of the Engine cylinder block, camshaft, crankshaft and connecting rods (Covered Parts).

Bushing and bearing failures are not covered.

This coverage begins with the expiration of the Base Engine Warranty and ends three years or 10,000 hours of operation from the date of delivery of the Engine to the first user, or from the date the unit is first leased, rented or loaned, or from when the Engine has been operated for 50 hours, whichever occurs first.

CONSUMER PRODUCTS

The warranty on Consumer Products in the United States is a LIMITED warranty. **CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.** Any implied warranties applicable to Consumer Products in the United States terminate concurrently with the expiration of the express warranties applicable to the product. In the United States, some states do not allow the exclusion of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the limitations or exclusions herein may not apply to you.

These warranties are made to all Owners in the chain of distribution, and Coverage continues to all subsequent Owners until the end of the periods of Coverage.

Cummins Responsibilities

DURING THE BASE ENGINE WARRANTY

Cummins will pay for all parts and labor needed to repair the damage to the Engine resulting from a Warrantable Failure.

Cummins will pay for the lubricating oil, antifreeze, filter elements, and other maintenance items that are not reusable due to the Warrantable Failure.

Cummins will pay reasonable costs for mechanics to travel to and from the equipment site, including meals, mileage and lodging, when the repair is performed at the site of the failure.

Cummins will pay reasonable labor costs for Engine removal and reinstallation when necessary to repair a Warrantable Failure.

DURING THE EXTENDED MAJOR COMPONENTS WARRANTY

Cummins will pay for the repair or, at its option, replacement of the defective Covered Part and any Covered Part damaged by a Warrantable Failure of the defective Covered part.

Owners Responsibilities

DURING THE BASE ENGINE WARRANTY

Owner is responsible for the cost of lubricating oil, antifreeze, filter elements and other maintenance items provided during warranty repairs unless such items are not reusable due to the Warrantable Failure.

DURING THE EXTENDED MAJOR COMPONENTS WARRANTY

Owner is responsible for the cost of all labor needed to repair the Engine, including the labor to remove and reinstall the Engine. When Cummins elects to repair a part instead of replacing it, Owner is not responsible for the labor needed to repair the part.

Owner is responsible for the cost of all parts required for the repair except for the defective Covered Part and any Covered Part damaged by a Warrantable Failure of the defective Covered Part.

Owner is responsible for the cost of lubricating oil, antifreeze, filter elements and other maintenance items replaced during repair of a Warrantable Failure.

DURING THE BASE ENGINE AND EXTENDED MAJOR COMPONENTS WARRANTIES

Owner is responsible for the operation and maintenance of the Engine as specified in the applicable Cummins Operation and Maintenance Manual. Owner is also responsible for providing proof that all recommended maintenance has been performed.

Before the expiration of the applicable warranty, Owner must notify a Cummins distributor, authorized dealer or other repair location approved by Cummins of any Warrantable Failure and make the Engine available for repair by such facility. Locations in the United States and Canada are listed in the Cummins Off Highway Authorized Dealer Directory.

Owner is responsible for communication expenses, meals, lodging and similar costs incurred as a result of a Warrantable Failure.

Owner is responsible for non-Engine repairs, "downtime" expenses, cargo damage, fines, all applicable taxes, all business costs and other losses resulting from a Warrantable Failure.

Limitations

Cummins is not responsible for failures or damage resulting from what Cummins determines to be abuse or neglect, including, but not limited to: operation without adequate coolants or lubricants; overfueling; overspeeding; lack of maintenance of lubricating, cooling or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications of the Engine. Cummins is also not responsible for failures caused by incorrect oil or fuel or by water, dirt or other contaminants in the fuel or oil.

For power units and fire pumps (package units), this warranty applies to accessories, except for clutches and filters, supplied by Cummins which bear the name of another company.

Except for power units and fire pumps, this warranty does not apply to accessories which bear the name of another company. Such non-warranted accessories include, but are not limited to: alternators, starters, fans, air conditioning compressors, clutches, filters, transmissions, torque converters, steering pumps, and non-Cummins fan drives, engine compression brakes and air compressors.

Cummins Compusave units are covered by a separate warranty.

Before a claim for excessive oil consumption will be considered, Owner must submit adequate documentation to show that consumption exceeds Cummins published standards.

Failures of belts and hoses supplied by Cummins are not covered beyond the first 500 hours or one year of operation, whichever occurs first.

Parts used to repair a Warrantable Failure may be new Cummins parts, Cummins approved rebuilt parts, or repaired parts. Cummins is not responsible for failures resulting from the use of parts not approved by Cummins.

A new Cummins or Cummins-approved rebuilt part used to repair a Warrantable Failure assumes the identity of the part it replaced and is entitled to the remaining coverage hereunder.

CUMMINS DOES NOT COVER WEAR OR WEAROUT OF COVERED PARTS.

CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

THESE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS IN REGARD TO THESE ENGINES. CUMMINS MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Emission Warranty

PRODUCTS WARRANTED

This emission warranty applies to new Engines, except the QST30, marketed by Cummins that are used in the United States* in vehicles designed for Industrial off-highway use. This warranty applies to Engines delivered to the ultimate purchaser on or after January 1, 1996.

COVERAGE

Cummins warrants to the ultimate purchaser and each subsequent purchaser that the Engine is designed, built and equipped so as to conform at the time of sale by Cummins with all U.S. Federal emission regulations applicable at the time of manufacture and that it is free from defects in workmanship or material which would cause it not to meet these regulations within the longer of the following periods: (A) Five years or 3,000 hours of operation, whichever occurs first, as measured from the date of delivery of the Engine to the ultimate purchaser, or (B) The Base Engine Warranty.

If the vehicle in which the Engine is installed is registered in the state of California, a separate California Emission Warranty also applies.

LIMITATIONS

Failures, other than those resulting from defects in materials, or workmanship, are not covered by this warranty.

Cummins is not responsible for failures or damage resulting from what Cummins determines to be abuse or neglect, including, but not limited to: operation without adequate coolant or lubricants; overfueling; overspeeding; lack of maintenance of lubricating, cooling or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications of the Engine. Cummins is also not responsible for failures caused by incorrect fuel or by water, dirt or other contaminants in the fuel.

Cummins is not responsible for non-Engine repairs, "downtime" expenses, cargo damage, fines, all business costs or other losses resulting from a Warrantable Failure.

CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

* Includes American Samoa, the Commonwealth of Northern Mariana Islands, Guam, Puerto Rico, and the U.S. Virgin Islands.

Cummins Warranty, Industrial International

Coverage

PRODUCTS WARRANTED

This warranty applies to new Engines sold by Cummins Engine Company, Inc., hereinafter 'Cummins', and delivered to the first user on or after February 1, 1993, that are used in industrial (off-highway) applications anywhere in the world where Cummins-approved service is available, except the United States* and Canada. Different warranty coverage is provided for Engines used in marine, generator drive and certain defense applications.

BASE ENGINE WARRANTY

This warranty covers any failures of the Engine, under normal use and service, which result from a defect in material or factory workmanship (Warrantable Failure).

Coverage begins with the sale of the Engine by Cummins. Coverage continues for two years or 2,000 hours of operation, whichever occurs first, from the date of delivery of the Engine to the first user, or from the date the unit is first leased, rented or loaned, or when the Engine has been operated for 50 hours, whichever occurs first. If the 2,000 hour limit is exceeded during the first year, coverage continues until the end of the first year.

EXTENDED MAJOR COMPONENTS WARRANTY

The Extended Major Components Warranty covers Warrantable Failures of the Engine cylinder block, camshaft, crankshaft and connecting rods (Covered Parts).

Bushing and bearing failures are not covered.

This coverage begins with the expiration of the Base Engine Warranty and ends three years or 10,000 hours of operation, after the date of delivery of the Engine to the first user, or from the date the unit is first leased, rented or loaned, or from when the Engine has been operated for 50 hours, whichever occurs first.

These warranties are made to all Owners in the chain of distribution, and Coverage continues to all subsequent Owners until the end of the periods of Coverage.

Cummins Responsibilities

DURING THE BASE ENGINE WARRANTY

Cummins will pay for all parts and labor needed to repair the damage to the Engine resulting from a Warrantable Failure.

Cummins will pay for the lubricating oil, antifreeze, filter elements, and other maintenance items that are not reusable due to a Warrantable Failure.

Cummins will pay reasonable costs for mechanics to travel to and from the equipment site, including meals, mileage and lodging, when the repair is performed at the site of the failure.

Cummins will pay reasonable labor costs for Engine removal and reinstallation when necessary to repair a Warrantable Failure.

DURING THE EXTENDED MAJOR COMPONENTS WARRANTY

Cummins will pay for the repair or, at its option, replacement of the defective Covered Part and any Covered Part damaged by a Warrantable Failure of the defective Covered part.

Owners Responsibilities

DURING THE BASE ENGINE WARRANTY

Owner is responsible for the cost of lubricating oil, antifreeze, filter elements and other maintenance items replaced during warranty repairs unless such items are not reusable due to the Warrantable Failure.

DURING THE EXTENDED MAJOR COMPONENTS WARRANTY

Owner is responsible for the cost of all labor needed to repair the Engine, including the labor to remove and reinstall the Engine. When Cummins elects to repair a part instead of replacing it, Owner is not responsible for the labor needed to repair the part.

Owner is responsible for the cost of all parts required for the repair except for the defective Covered Part and any Covered Part damaged by a Warrantable Failure of the defective Covered Part.

Owner is responsible for the cost of lubricating oil, antifreeze, filter elements and other maintenance items replaced during repair of a Warrantable Failure.

DURING THE BASE ENGINE AND EXTENDED MAJOR COMPONENTS WARRANTIES

Owner is responsible for the operation and maintenance of the Engine as specified in the applicable Cummins Operation and Maintenance Manual. Owner is also responsible for providing proof that all recommended maintenance has been performed.

Before the expiration of the applicable warranty, Owner must notify a Cummins distributor, authorized dealer or other repair location approved by Cummins of any Warrantable Failure and make the product available for repair by such facility. Locations are listed in the Cummins International Sales and Service Directory.

Owner is responsible for communication expenses, meals, lodging and similar costs incurred as a result of a Warrantable Failure.

Owner is responsible for non-Engine repairs, "downtime" expenses, cargo damage, fines, all applicable taxes, all business costs and other losses resulting from a Warrantable Failure.

Limitations

Cummins is not responsible for failures or damage resulting from what Cummins determines to be abuse or neglect, including, but not limited to: operation without adequate coolants or lubricants; overfueling; overspeeding; lack of maintenance of lubricating, cooling or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications of the Engine. Cummins is also not responsible for failures caused by incorrect oil or fuel or by water, dirt or other contaminants in the fuel or oil.

Accessories, except for clutches and filters, supplied by Cummins as part of a fire pump or power unit (package units) are covered for the duration of the Base Engine Warranty period.

Starters, alternators, power steering pumps and non-Cummins air compressors supplied by Cummins on B or C Series Engines that are not supplied as part of a package unit are covered for six months from the date of delivery of the Engine to the first user, or the date the Engine is first leased, rented or loaned, or from when the Engine has been operated for 50 hours, whichever occurs first.

Except for the accessories noted previously, Cummins does not warrant accessories which bear the name of another company. Such non-warranted accessories include, but are not limited to: fans, air conditioning compressors, clutches, filters, transmissions, torque converters, steering pumps, non-Cummins fan drives, and air cleaners.

Cummins Compusave units are covered by a separate warranty.

Before a claim for excessive oil consumption will be considered, Owner must submit adequate documentation to show that consumption exceeds Cummins published standards.

Failures of belts and hoses supplied by Cummins are not covered beyond the first 500 hours or one year of operation, whichever occurs first.

Parts used to repair a Warrantable Failure may be new Cummins parts, Cummins approved rebuilt parts, or repaired parts. Cummins is not responsible for failures resulting from the use of parts not approved by Cummins.

A new Cummins or Cummins-approved rebuilt part used to repair a Warrantable Failure assumes the identity of the part it replaced and is entitled to the remaining coverage hereunder.

CUMMINS DOES NOT COVER WEAR OR WEAROUT OF COVERED PARTS.

CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

THESE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS IN REGARD TO THESE ENGINES. CUMMINS MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

In case of consumer sales, in some countries, the Owner has statutory rights which cannot be affected or limited by the terms of this warranty.

Nothing in this warranty excludes or restricts any contractual rights the Owner may have against third parties.

NOTES

Cummins Customized Parts Catalog

Cummins is pleased to announce the availability of a parts catalog compiled specifically for you. Unlike the generic versions of parts catalogs that support general high volume parts content; Cummins Customized catalogs contains only the new factory parts that were used to build your engine.

The catalog cover, as well as the content, is customized with you in mind. You can use it in your shop, at your worksite, or as a coffee table book in your RV or boat. The cover contains your name, company name, address, and telephone number. Your name and engine model identification even appears on the catalog spine. Everybody will know that Cummins created a catalog specifically for you.

This new catalog was designed to provide you with the exact information you need to order parts for your engine. This will be valuable for customers that do not have easy access to the Cummins Electronic Parts Catalog or the Cummins Parts Microfilm System.

Additional Features of the Customized Catalog include:

- Engine Configuration Data
- Table of Contents
- Separate Option and Parts Indexes
- Service Kits (when applicable)
- ReCon Part Numbers (when applicable)

ORDERING THE CUSTOMIZED PARTS CATALOG

Customers can call Gannett Marketing Services at 1-800-646-5609 and order by credit card. Ask for bulletin 3672139 the Customized Parts Catalog. North American customers can mail in the attached postage pre-paid order card.

ATTENTION: INTERNATIONAL CUSTOMERS (outside U.S.A.) insert the completed Customized Catalog order form in an envelope and mail to the address printed on the order form. Or, use the E-mail address **catalog@gdms.com** to place an order for a Customized Parts Catalog.

Contact GDMS for the current price; Freight will be an additional expense.

This information is required to provide a Customized Parts Catalog:

- Name
- Street Address
- Company Name (optional)
- Telephone no.
- Credit Card No.
- Cummins Engine Serial Number (located on the engine dataplate)

Unfortunately not all Cummins Engines can be supported by this parts catalog. Engines older than 1984 or newer than 3 months may not have the necessary parts information to compile a catalog. We will contact you if this occurs and explain why we are unable to fill your order.

Customized Parts Catalogs are produced specifically for a single customer. This means they are not returnable for a refund. If we make an error and your catalog is not useable, we will correct that error by sending you a new catalog.

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MAIL CODE 40905
BOX 3005
COLUMBUS, IN 47202-3005

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- ☐ **Extended Coverage - Automotive Market**
- ☐ **Extended Coverage - Industrial Market**
- ☐ **Encore - Used Engine Coverage**

- ☐ **Please forward the specified plans information.**
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Do not use this form to order additional literature. Refer to Section L - Service Literature for literature information.

Literature Survey Form

Bulletin No.: 3666134

We are always open to any suggestions or recommendations that will aid in improving our manuals. Use this postage paid survey form to evaluate this manual. Please check the appropriate response and use the space provided below to list any additional comments:

	Yes	No
Is the needed information easy to locate in the manual?		
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Is the information easy to understand?		
Does the information sufficiently cover the subject?		
Are subjects in the Index specific enough to locate in the manual?		
Are the important points sufficiently emphasized?		
Are the illustrations easy to understand?		
Does the text support the operation being illustrated?		
Do you use the Table of Contents and Section Contents?		
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Please provide comments on any response(s) marked "No" in this survey and on any suggestions you feel could improve our manuals. _____

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