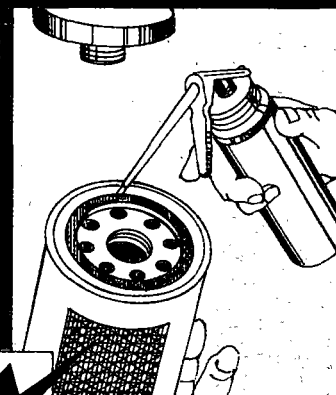
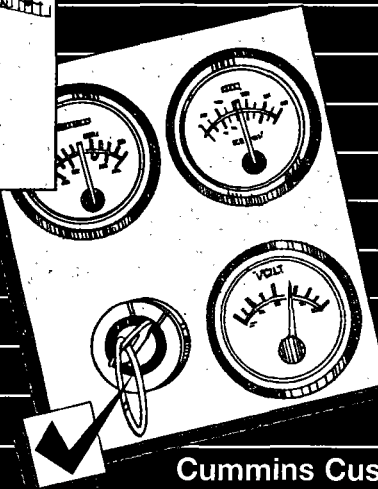
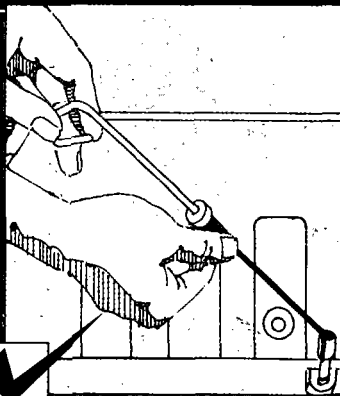
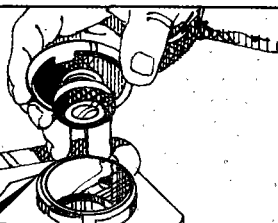
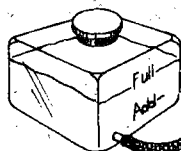




Operation and Maintenance Manual ISC Engine

U.S.A., Canada, Australia, New Zealand, and Puerto Rico



Cummins Customer Assistance Center

1-800-DIESELS (1-800-343-7357)

APPLICABLE ONLY IN U.S.A. AND CANADA

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Product Registration Dept. (CAC)
P O Box 3005 M/C 91200
Columbus, IN 47202-3005



In order to serve you better it is very important that you fill out and return this card **within** 30 days of purchase.

Customer Name _____

Address _____

City / State _____

Zip Code _____

Home Phone Number (____) _____

Truck Phone / Cell Phone (____) _____

E-mail Address _____

Engine Serial Number _____

Date Purchased ____/____/____ VIN # _____

THANK YOU!!

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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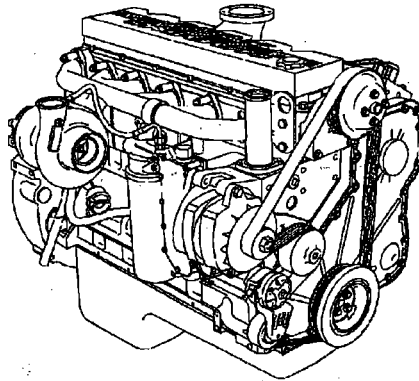
Signature _____

Engine Serial Number _____



Operation and Maintenance Manual ISC Engine

U.S.A., Canada, Australia, New Zealand, and Puerto Rico



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Bulletin No. 3666262-02
Printed 8/99

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) toll free in the U.S. and Canada.

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.

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Important Reference Numbers

Fill in the part name and number in the blank spaces provided below. This will give you a reference whenever service or maintenance is required.

Part Name	Part Number	Part Number
Engine Model		
Engine Serial Number (ESN)		
Control Parts List (CPL)		
Fuel Pump Part Number		
Electronic Control Module (ECM)		
Electronic Control Module Serial Numbers (ECM)		
Filter Part Numbers:		
• Air Cleaner Element		
• Lubricating Oil Filter		
• Fuel		
• Fuel-Water Separator		
• Coolant		
• Remote Gas		

Part Name	Part Number	Part Number
Governor Control Module (GCM) (if applicable)		
Belt Part Numbers:		
○		
○		
○		
Clutch or Marine Gear (if applicable):		
○ Model		
○ Serial Number		
○ Part Number		
○ Oil Type		
○ Sea Water Pump		
– Model		
– Part Number		

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 the Maintenance Guidelines (Section 2).

Keep records of regularly scheduled maintenance.

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

Cummins Engine Company, Inc. uses the latest technology and the highest quality components to produce its engines. Cummins recommends using only genuine Cummins parts and ReCon® exchange parts.

The personnel at Cummins Authorized Repair Facilities 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 Facility, follow the steps outlined in Service Assistance (Section S).

About the Manual

This manual contains information needed for correct operation and maintenance of the engine as recommended by Cummins Engine Company, Inc. Additional service literature can be ordered from the local Cummins Distributor, or by calling 1-800-DIESELS (1-800-343-7357) in the U.S.A. and Canada.

This manual does **not** cover vehicle manufacturer or equipment maintenance procedures. Consult the vehicle or original equipment manufacturer (OEM) 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 equivalent in brackets [].

Numerous illustrations and symbols are used to aid in understanding the text. Refer to Symbols (Section i) for a complete listing of the symbols and their definitions.

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

How to Use the Manual

This manual is organized according to the intervals that maintenance on the engine is to be performed. A maintenance chart (table) that lists the intervals and required maintenance procedures is in Section 2. Locate the interval of the maintenance to be performed; then follow the procedures in that section. In addition, the procedures listed under previous maintenance intervals **must** also be performed.

Keep a record of all the checks and inspections made. A form for recording the maintenance checks performed is in Section 2.

Refer to Section TS for a guide to troubleshooting the engine. Follow the directions to locate and repair engine problems.

Refer to Section V for the specifications recommended by Cummins Engine Company, Inc. for the engine. Refer to Section V for the specifications and torque values for each engine.

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.

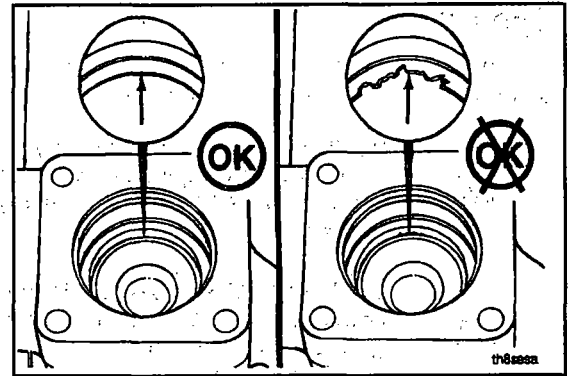


The component weighs 23 kg [50 lb] or more. To avoid personal injury, use a hoist or get assistance to lift the component.

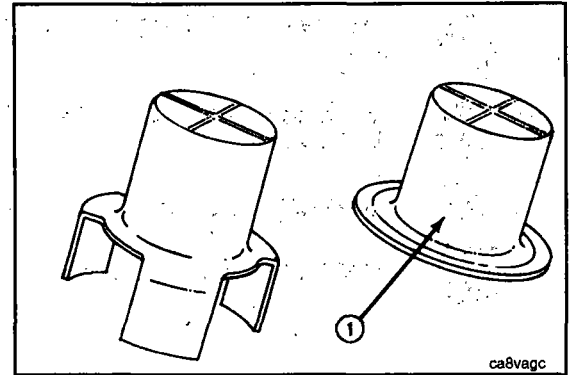
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Illustrations

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 lesser 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.
- Coolant is toxic. If **not** reused, dispose of in accordance with local environmental regulations.

Acronyms and Abbreviations

AFC	Air Fuel Control	kPa	Kilopascal
API	American Petroleum Institute	LNG	Liquid Natural Gas
ASA	Air Signal Attenuator	LTA	Low Temperature Aftercooling
ASTM	American Society of Testing and Materials	MIP	Mixer Inlet Pressure
°C	Celsius	MPa	Megapascal
CARB	California Air Resources Board	mph	Miles Per Hour
C.I.D.	Cubic Inch Displacement	mpq	Miles Per Quart
CNG	Compressed Natural Gas	N•m	Newton-meter
CPL	Control Parts List	NG	Natural Gas
cSt	Centistokes	OEM	Original Equipment Manufacturer
ECM	Electronic Control Module	ppm	Parts Per Million
ECS	Emission Control System	psi	Pounds Per Square Inch
EPA	Environmental Protection Agency	PTO	Power Takeoff
EPS	Engine Position Sensor	rpm	Revolutions Per Minute
°F	Fahrenheit	SAE	Society of Automotive Engineers
GVW	Gross Vehicle Weight	SCA	Supplemental Coolant Additive
Hg	Mercury	STC	Step Timing Control
hp	Horsepower	VS	Variable Speed
H₂O	Water	VSS	Vehicle Speed Sensor
ICM	Ignition Control Module		
km/l	Kilometers per Liter		

Section E - Engine Identification

Section Contents


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Cooling System	E-9
Electrical System	E-12
Exhaust System	E-11
Fuel System	E-7
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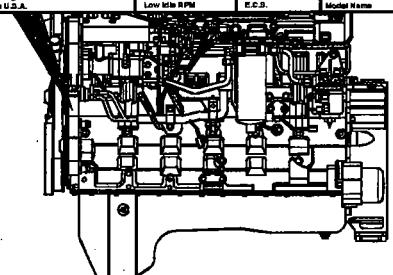
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Engine Identification

Engine Dataplate

The engine dataplate provides important facts about the engine. The engine serial number (ESN) and control parts list (CPL) provide information for service and ordering parts. The engine dataplate **must not** be changed unless approved by Cummins Engine Company, Inc.


 Cummins Engine Company, Inc. 261-2000 Columbus, Indiana 47301-9900 Warning: Never Use Grease/Jelly/Water on the valve lash or on the fuel system. Excess Fuel Shut-off Valve For This Block Not Approved. Date of Mfg. Made in U.S.A.	Engine Cyl. L.	Series	CPL	Engine Serial No.
	Timing TDC			Injection PPM
	Valve lash cold Int. Exh.			Crack 5 psi
	Porting Order			Rated HP at rpm
Low idle RPM		E.C.S.		Model Name



00d00001

The dataplate is located on the top side of the gear housing. Have the following engine data available when communicating with a Cummins Authorized Repair Facility. The information on the dataplate is mandatory for sourcing service parts.

1. Engine serial number (ESN)
2. Control parts list (CPL)
3. Model
4. Horsepower and rpm rating.


 Cummins Engine Company, Inc. Box 3005 Columbus, Indiana 47202-3005 <small>Warning Injury May Result And Warranty Is Voided If Fuel Rate RPM Or Altitude Exceed Published Maximum Values For This Model And Application.</small> Date of Mfg. Made in U.S.A.	Engine Cert. I.D.	C.I.D./ L	SERIES	CPL	Engine Serial No.
	Timing TDC				Injector P/N.
	Valve lash cold Int. Exh.				Cust Spec.
	Firing Order				Rated HP at rpm
	Low Idle RPM				Fuel rate at rated HP mm 3/stroke
	E.C.S.				Model Name

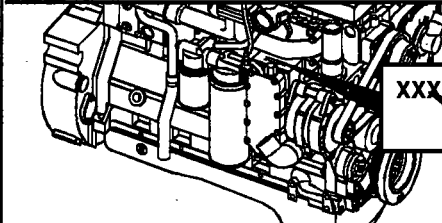
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ISC Section E - Engine Identification

NOTE: If the engine dataplate (1) is **not** readable, the engine serial number (ESN) (2) can be found on the engine block on top of the lubricating oil cooler housing. Additional engine information is on the electronic control module (ECM) dataplate.

Engine Identification Page E-3

 Cummins Engine Company, Inc. Box 208 Columbus, Indiana 47203-0208 <small>Warranty Information: Read and Understand the Terms and Conditions of the Cummins Limited Powertrain Warranty. Read the Cummins Limited Powertrain Warranty for full details and restrictions. Cummins is not responsible for modifications or alterations to the engine or its components. Cummins is not responsible for damage to the engine or its components caused by misuse, neglect, or improper maintenance. Cummins is not responsible for damage to the engine or its components caused by fire, flood, or other external causes. Cummins is not responsible for damage to the engine or its components caused by theft or loss. Cummins is not responsible for damage to the engine or its components caused by any other cause not mentioned herein.</small> Cummins is a registered trademark of Cummins Inc. Made in U.S.A.	Engine Cyl. / L	SERIES	CPL	Engine Serial No.
	Gen. Lg.			Engine P/N
Tuning YTD				Cost Desc.
Utility Inlet Size				Rated HP
Firing Order				at 2200 rpm
Low Idle RPM				Fuel rate at rated HP
				Model Name

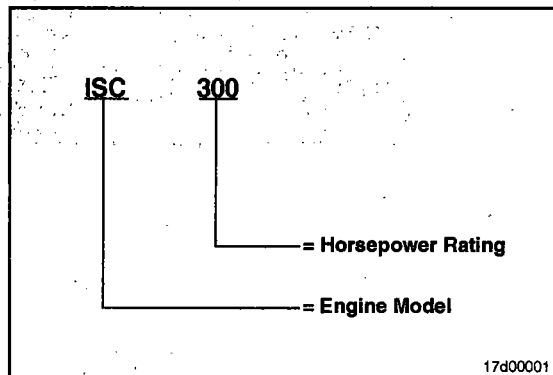


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Cummins Engine Nomenclature

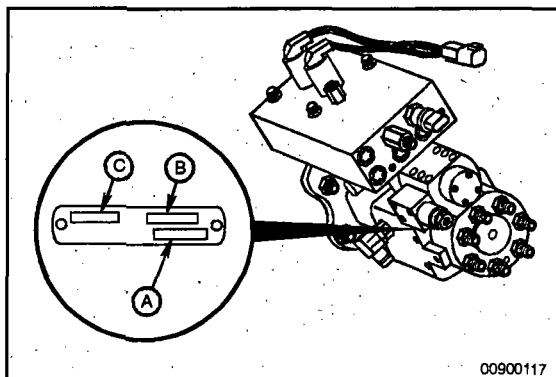
The Cummins engine nomenclature provides the engine model and horsepower rating.



Fuel Injection Pump Dataplate

The Cummins Accumulator Pump System (CAPS) fuel injection pump dataplate is located on the side of the injection pump. The dataplate contains the following information:

- A. Cummins part number
- B. Pump serial number
- C. Factory code.



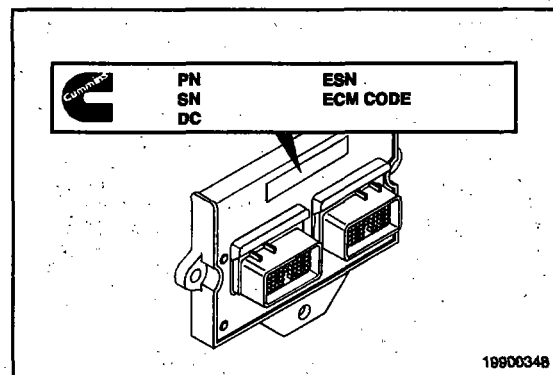
ECM Dataplate

The electronic control module (ECM) dataplate shows important facts about the ECM and how it is programmed. The dataplate is located on the ECM above the ECM connectors.

The following information is found on the ECM dataplate:

- ECM part number (PN)
- ECM serial number (SN)
- ECM date code (DC)
- Engine serial number (ESN)
- ECM Code identifying the software number that indicates how the ECM is programmed.

NOTE: When communicating with a Cummins Authorized Repair Facility, the ECM code is required.



Specifications

General Specifications

Horsepower (Refer to engine dataplate)

ISC Engine Speed @ Maximum Power Output:

Standard Rating (rpm) 2200

Bore and Stroke 114 mm [4.49 in] x 135 mm [5.32 in]

Displacement 8.3 liters [506 C.I.D.]

Compression Ratio 17:1

Firing Order 1-5-3-6-2-4

ISC Approximate Engine Weight (with standard accessories) 680 kg [1500 lb]

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

Valve Clearance:

Intake 0.3048 mm [0.012 in]

Exhaust 0.5588 mm [0.022 in]

NOTE: The ISC engine features a no-adjust overhead. The ISC valve train is designed such that adjustment of the valve lash is **not** required for normal service during the first 241,500 km [150,000 mi]. The valve train operates acceptably within the limits of 0.152 to 0.559 mm [0.006 to 0.022 in] intake valve lash and 0.381 to 0.813 mm [0.015 to 0.032 in] exhaust valve lash.

Fuel System

Engine Idle Speed	600 to 875 rpm
Maximum Lift Pump Inlet Restriction at Rated	102 mm Hg [4 in Hg]
Maximum Fuel Filter Outlet Restriction at Rated	254 mm Hg [10 in Hg]
Minimum Fuel Filter Inlet Pressure during Cranking	508 mm Hg [20 in Hg]
Maximum Fuel Drain Line Pressure	254 mm Hg [10 in Hg]
Maximum Fuel Inlet Temperature	71°C [160°F]
Minimum Engine Cranking Speed	150 rpm

Lubricating Oil System

Oil Pressure:	
At Low Idle (minimum allowable)	69 kPa [10 psig]
At Rated Speed (minimum allowable)	207 kPa [30 psig]
Regulated Pressure	517 kPa [75 psi]
Oil Capacity of Standard Engine:	
Standard Oil Pan	
Pan Only	18.9 liters [20 qt]
Total System Capacity	19.9 liters [21 qt]
Standard Oil Pan with Cylinder Block Stiffener Plate	
Pan Only	19.9 liters [21 qt]
Oil Pan Low to High:	
Standard Oil Pan	15.1 to 18.9 liters [16 to 20 qt]
Standard Oil Pan with Cylinder Block Stiffener Plate	16.1 to 19.9 liters [17 to 21 qt]

NOTE: Some applications have a slightly different oil pan capacity. Contact the local Cummins Distributor if there are any questions.

Cooling System

Coolant Capacity (engine only)	10.9 liters [11.5 qt]
Standard Modulating Thermostat - Range	84 to 91°C [184 to 195°F]
Maximum Allowable Operating Temperature	100°C [212°F]
Minimum Recommended Operating Temperature	70°C [158°F]
Minimum Recommended Pressure Cap	50 kPa [7 psi]

Air Intake System

Maximum Intake Restriction (clean air filter element)	254 mm H ₂ O [10.0 in H ₂ O]
Maximum Intake Restriction (dirty air filter element)	635 mm H ₂ O [25.0 in H ₂ O]

Exhaust System

Maximum Exhaust Back Pressure 76 mm Hg [3 in Hg]



Electrical System

Recommended Battery Capacity

System Voltage	Ambient Temperature			
	-18°C [0°F]		-29°C [-20°F]	
	Cold Cranking Amperes	Reserve Capacity (Minutes) ⁽¹⁾	Cold Cranking Amperes	Reserve Capacity (Minutes) ⁽¹⁾
12 VDC	1250	360	1875	360
24 VDC ⁽²⁾	625	180	900	180

1. The number of plates within a given battery size determines reserve capacity. Reserve capacity is the length of time for which a battery at 27°C [80°F] can supply 25 amperes at 10.5 volts or greater.
2. CCA ratings are based on two 12-VDC batteries in series.

Batteries (Specific Gravity)

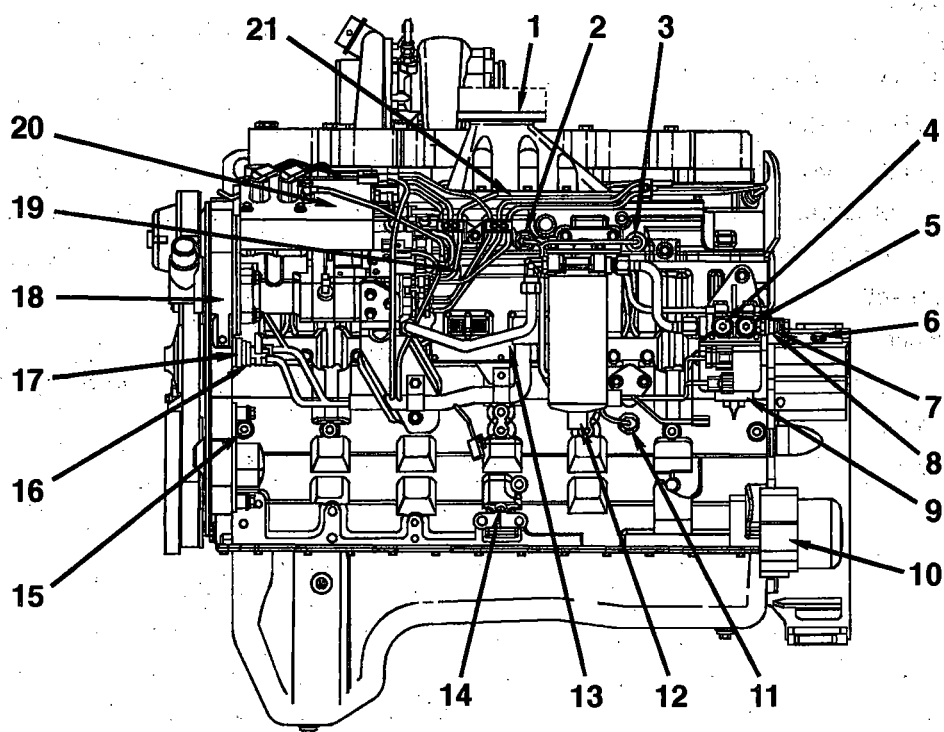
Specific Gravity at 27°C [80°F]	State of Charge
1.260 to 1.280	100%
1.230 to 1.250	75%
1.200 to 1.220	50%
1.170 to 1.190	25%
1.110 to 1.130	Discharged

Engine Diagrams

Engine Views

The following illustrations provide the locations of the major external engine components, filters, and other service and maintenance points. Some external components will be at different locations for different engine models.

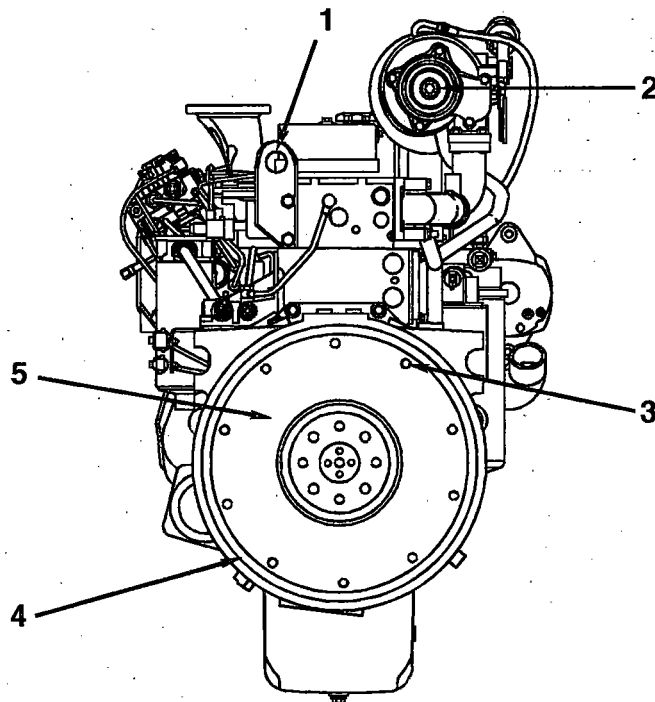
NOTE: The illustrations are **only** a reference to show a typical engine.



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Fuel Pump Side View

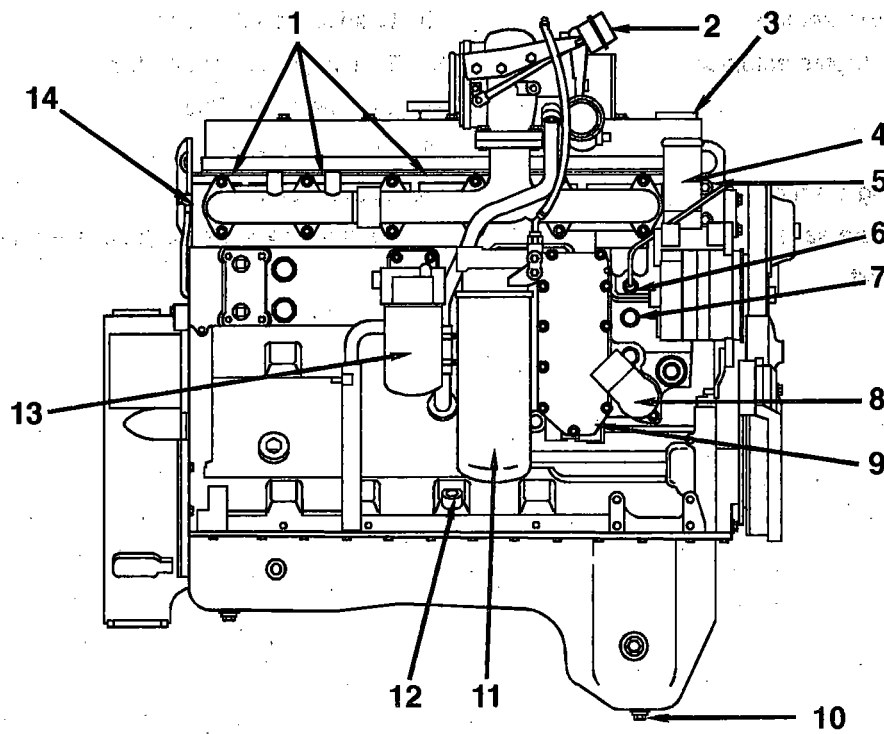
1. Engine air inlet
2. Intake manifold pressure sensor
3. Intake manifold temperature sensor
4. M10 (STOR) fuel pressure after-lift pump
5. M10 (STOR) fuel pressure before-lift pump
6. Magnetic pickup location 3/4-16 UNF
7. Fuel return connection
8. Fuel inlet connection
9. Fuel lift pump
10. Starter mounting flange
11. Oil pressure sensor
12. Fuel filter/water separator
13. Electronic control module (ECM)
14. Dipstick location
15. M10 (STOR) oil pressure port
16. Engine position sensor (EPS) - (inboard)
17. Engine speed sensor (ESS) - (outboard)
18. Engine dataplate
19. High-pressure fuel lines
20. Cummins Accumulator Pump System (CAPS) injection pump
21. Intake air heater.



00900119

Rear View

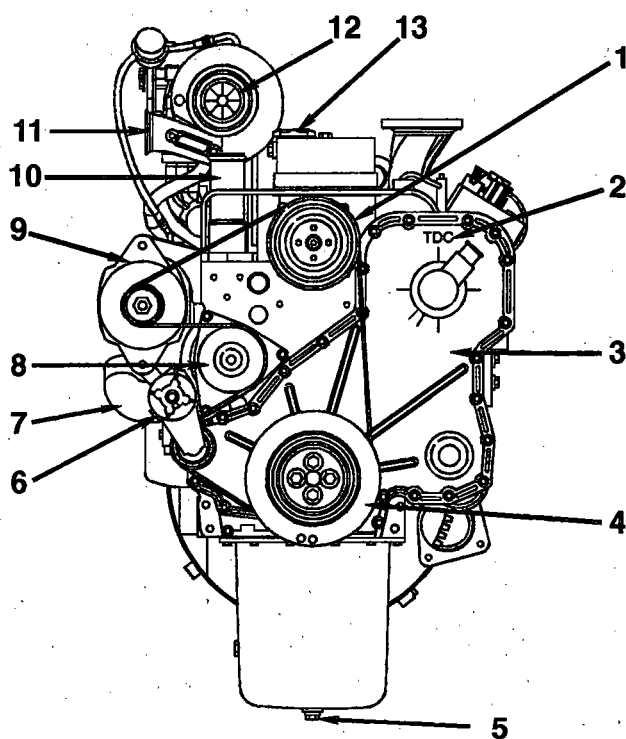
1. Rear engine lifting bracket
2. Turbocharger exhaust outlet
3. Clutch mounting holes
4. Flywheel housing
5. Flywheel.



00900120

Exhaust Side View

1. 1/2-inch (NPTF) coolant taps
2. Turbocharger wastegate actuator
3. Engine oil fill
4. Coolant outlet
5. Front engine lifting bracket
6. Coolant temperature sensor
7. Coolant heater port
8. Coolant inlet
9. Lubricating oil cooler
10. Engine oil pan drain plug
11. Lubricating oil filter
12. Dipstick location
13. Coolant filter
14. Injector drain fuel outlet connection.



00900121

Front View

- | | |
|-------------------------------|-----------------------------|
| 1. Fan pulley | 7. Water inlet |
| 2. Top dead center (TDC) mark | 8. Water pump |
| 3. Front gear cover | 9. Alternator |
| 4. Vibration damper | 10. Water outlet |
| 5. Engine oil pan drain plug | 11. Turbocharger air outlet |
| 6. Automatic belt tensioner | 12. Turbocharger air inlet |
| | 13. Engine oil fill. |

NOTES

Section 1 - Operating Instructions

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Operating Instructions - General Information



WARNING

Cummins Engine Company, Inc. has no way of knowing how the engine is used. The equipment owner and operator are responsible for safe operation in a hostile environment. Consult a Cummins Authorized Repair Facility for further information.

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

- Follow the daily maintenance checks listed in Maintenance Guidelines, Section 2.
- Avoid exposing the engine to corrosive chemicals.

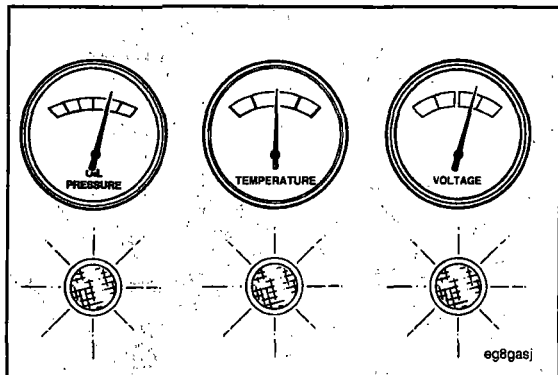


ISC Engine Maintenance Schedule: (1), (2), (4)

Daily or Refueling	Every 12,000 km (7,500 mi) 250 Hours or 3 Months	Every 24,000 km (15,000 mi) 500 Hours or 6 Months (1), (2), (4)	Every 48,000 km (30,000 mi) 1,000 Hours or 1 Year(1)	Every 96,000 km (60,000 mi) 2,000 Hours or 2 Years(2)	Every 240,000 km (150,000 mi) 6,000 Hours or 4 Years
Maintenance Check	Check/Inspect	Change/Replace/Inspect	Check/Inspect	Check/Inspect/Replace	Check/Inspect
<ul style="list-style-type: none"> Check and correct engine oil level Check belt level Drain air filter and reservoir Drain fuel-water separator Visually inspect cooling fan Visually check crankcase breather tube 	<ul style="list-style-type: none"> Monitor Hardware such as: Ignition Pump and Air Citypressor 	<ul style="list-style-type: none"> Fuel filter Lubricating oil(1) Lubricating oil filter Drive belt Oil level(1) Check engine(2) coolant level 	<ul style="list-style-type: none"> Fan Hub Belt Tensioner 	<ul style="list-style-type: none"> Replace anti-trust(2) Valve cover Camshaft Check engine and check valve system 	<ul style="list-style-type: none"> Overhaul valve lash

- The lubricating oil and lubricating oil filter interval can be adjusted based on application, fuel consumption, gross vehicle weight, and site time. Refer to Section V.
- Service interval is every oil change or 24,000 km (15,000 miles), 500 hours, or 6 months, whichever occurs first. Most cases a heavy duty year around engine is that results the physical compression of 0.000294. The change interval is 2 years or 384,000 km (240,000 miles), whichever occurs first. A 100-hour is required for future, overhaul and corrosion protection.
- Service interval is 2 years or 384,000 km (240,000 miles), whichever occurs first.
- Follow the manufacturer's recommended maintenance procedures for the starter, alternator, belt, fan, electrical components, engine, brake, exhaust, fuel, charge air cooler, radiator, air compressor, air cleaner, front compressor, and fan clutch. Refer to Component Maintenance (Section 10).
- Reset valve lash if needed to 0.1524 to 0.281 mm (0.007 to 0.022 in) for intake valve lash and 0.281 to 0.762 mm (0.011 to 0.030 in) for exhaust valve lash.

00d00014



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

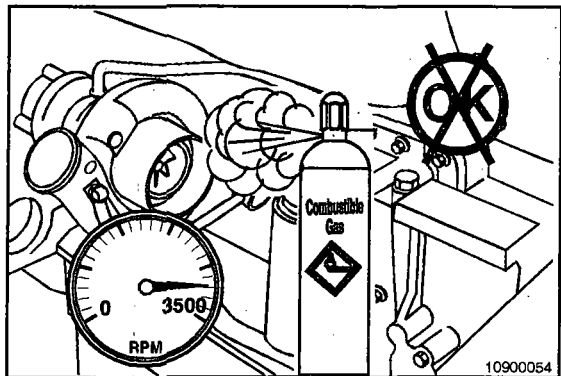


The Cummins engine associated with this manual does **not** require a "break-in" procedure. This manual provides all of the necessary information required for proper engine operation.

▲ WARNING ▲

Do not operate a diesel engine near combustible vapors.

These vapors can be drawn in through the air intake system and can cause engine acceleration and over-speeding that can result in a fire, explosion, and extensive personal injury and property damage.

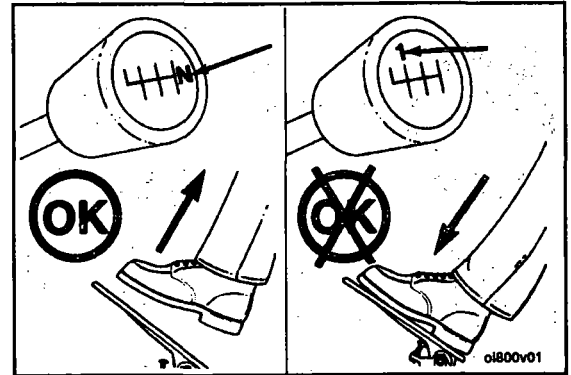


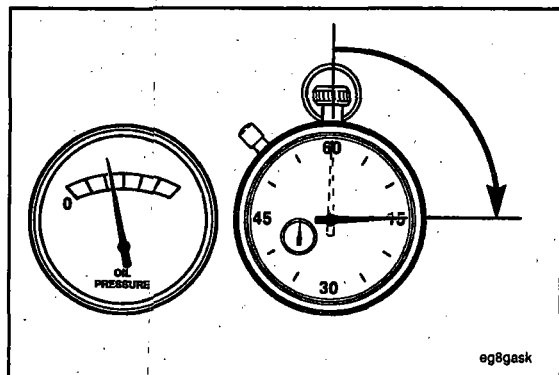
Normal Starting Procedure



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

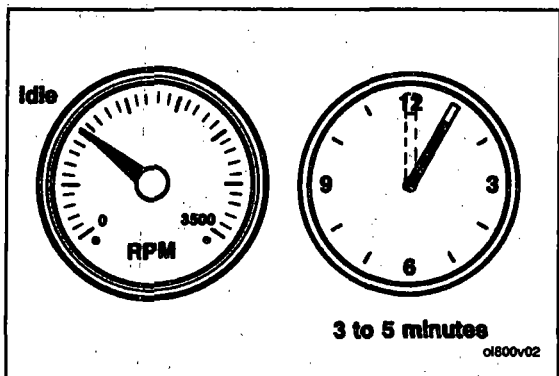
- Disengage the drive unit, or if equipped, put the transmission in neutral.
- With the throttle in the idle position, turn the key to the ON position, wait for the WAIT TO START lamp to go out, then turn the key to the START position.
- If the engine does **not** start after three attempts, check the fuel supply system. An absence of blue or white exhaust smoke during cranking indicates that no fuel is being delivered to the combustion chambers.





CAUTION

The engine must have adequate oil pressure within 15 seconds after starting. If the WARNING lamp indicating low oil pressure has not gone out or there is no oil pressure indicated on the gauge within 15 seconds, shut off the engine immediately to avoid engine damage. Confirm the correct oil level in the oil pan.

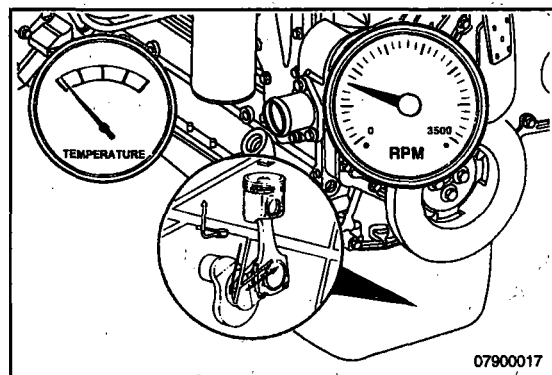


Idle the engine 3 to 5 minutes before operating with a load.

ISC
Section 1 - Operating Instructions

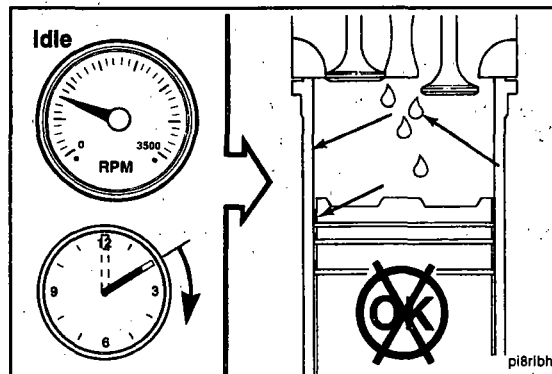
Increase the engine speed (rpm) slowly to provide adequate lubrication to the bearings and to allow the oil pressure to stabilize.

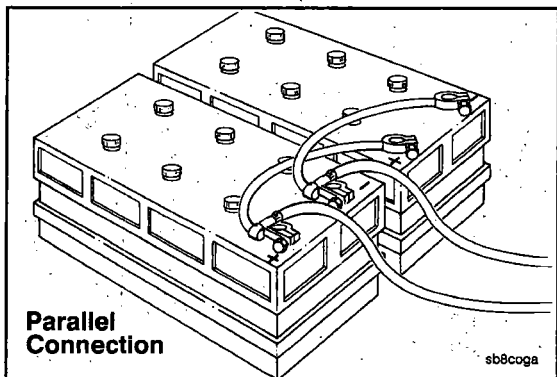
Normal Starting Procedure
Page 1-5



△ CAUTION △

Do not operate the engine at low idle for long periods. Long periods at low idle, more than 10 minutes, can damage an engine because combustion chamber temperatures will decrease and the fuel will not completely burn. This will cause carbon to build up around the injector spray holes and piston rings which can cause the valves to stick. To avoid damage operate the engine at higher idle.





CAUTION

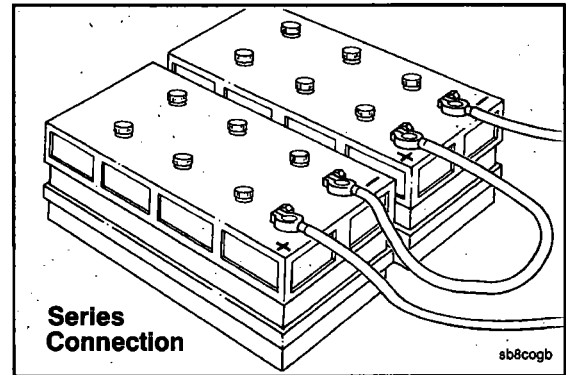
To avoid damage to the ISC engine parts, do not connect jumper starting or battery charging cables to any ISC parts. Always remove the ground or negative (-) battery cable before the positive (+) battery cable, and attach the positive (+) before the ground or negative (-) to avoid potentially damaging arcing. When using jumper cables to start the engine, make sure to connect the cables in parallel: Positive (+) to positive (+) and ground (-) to ground (-). When using an external electrical source to start the engine, turn the disconnect switch to the OFF position.

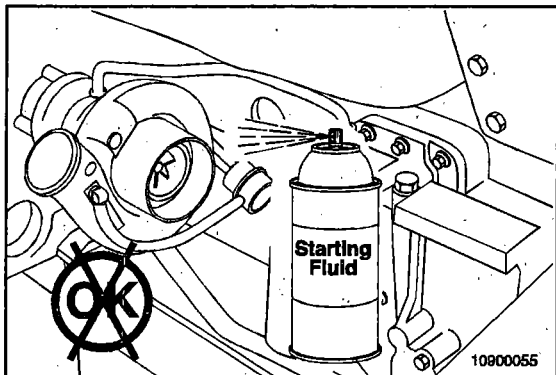
The accompanying illustration shows a typical parallel battery connection. This arrangement doubles the cranking amperage.

ISC
Section 1 - Operating Instructions

The accompanying illustration shows a typical series battery connection.

This arrangement, positive (+) to negative (-), doubles the voltage.





Cold Weather Starting Using Starting Fluid

Ether Starting Aids

⚠ WARNING ⚠

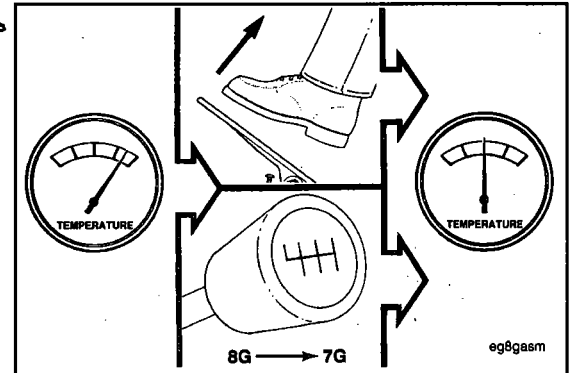
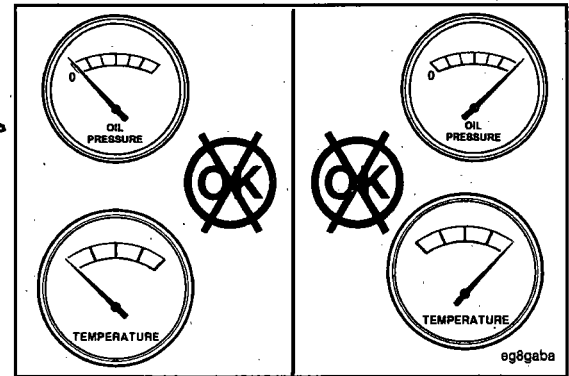
To avoid damage to the engine, and personal injury do not use starting fluids. This engine is equipped with an intake air heater with a grid element; using starting fluid can cause an explosion, personal injury and property damage.

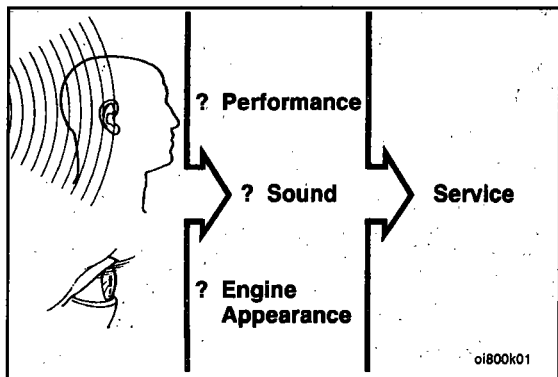
Operating the Engine

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

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

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





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 of these changes are

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

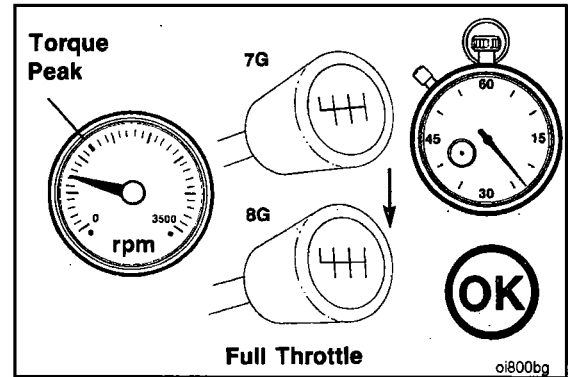
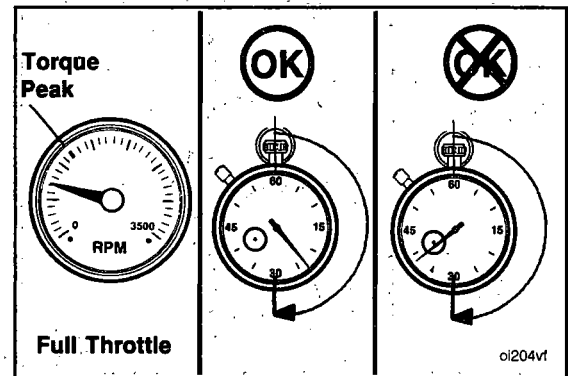
Engine Operating Range

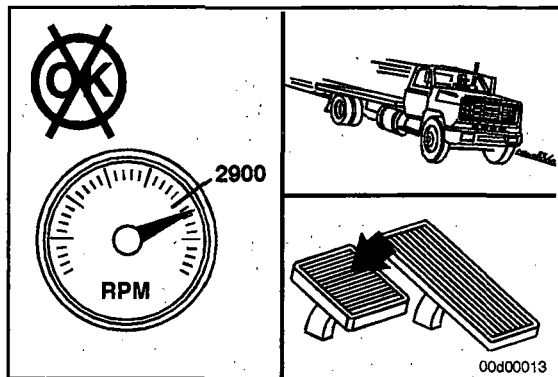


Do not operate the engine at full throttle below peak torque rpm for more than 30 seconds. Operating the engine below peak torque rpm will shorten engine life to overhaul, can cause serious engine damage, and is considered driver abuse.

Cummins engines are designed to operate successfully at full throttle under transient conditions down to peak torque engine speed. This is consistent with recommended operating practices.

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





⚠ CAUTION ⚠

Do not operate the engine beyond high-idle speed (2900 rpm) under any circumstances. Operating the engine beyond high-idle speed can cause severe engine damage. When descending a steep grade, use a combination of transmission gears and engine or service brakes to control the vehicle and engine speed.

Cold Weather Operation

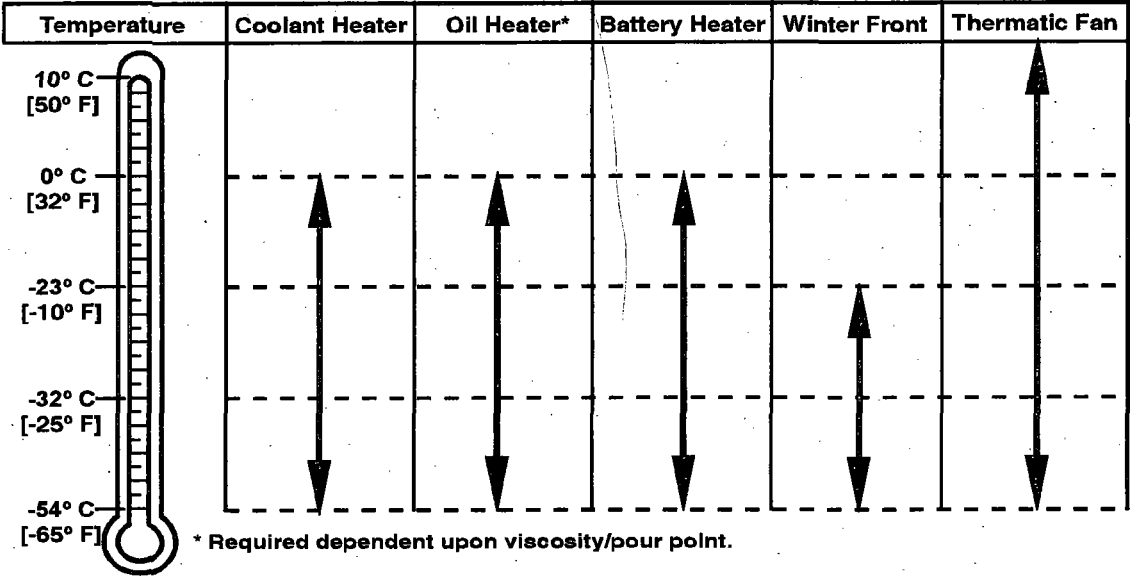
General Information

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

Winterize -32°C to 0°C [-25°F to 32°F]	Arctic Specification -54°C to -32°C [-65°F to -25°F]
Use 50 percent ethylene glycol or propylene glycol antifreeze and 50 percent water in your coolant mixture.	Use 60 percent ethylene glycol or propylene glycol antifreeze and 40 percent water in your coolant mixture.
Use multiviscosity oil meeting API CG-4 or CH-4 specifications.	Use arctic oil meeting API CG-4 or CH-4 specifications.
Fuel to have maximum cloud and pour points 6°C [43°F] lower than ambient temperature in which engine operates.	Fuel to have maximum cloud and pour points 6°C [43°F] lower than ambient temperature in which engine operates.

The following cold weather operating aids are suggested for cold weather situations:

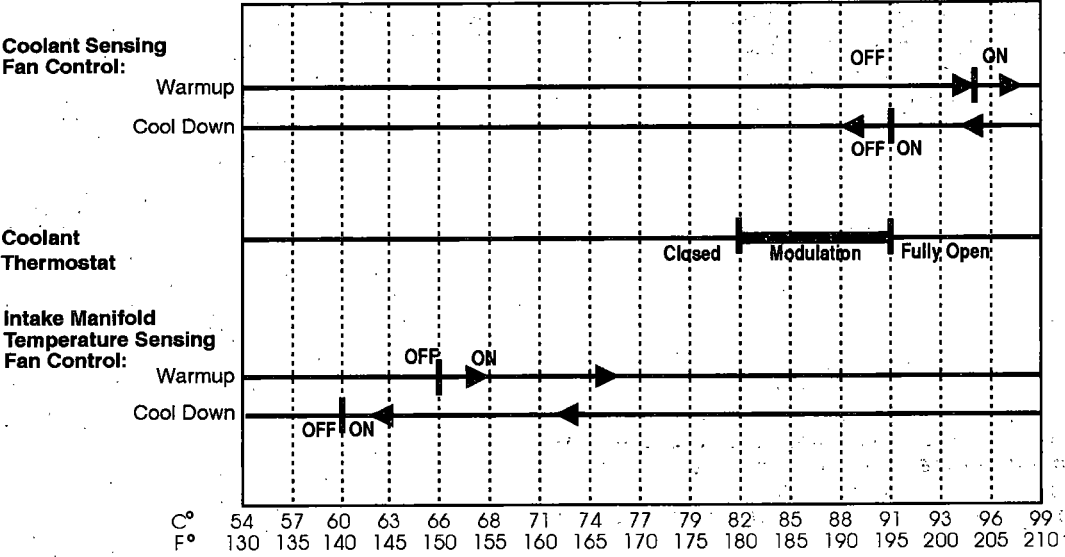
Cold Weather Operating Aids



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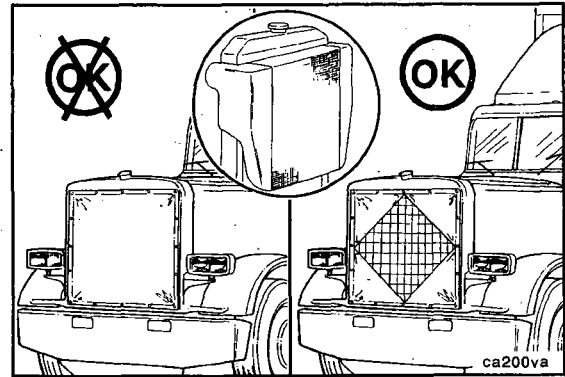
Thermo Control Settings

The temperatures listed in the following chart for coolant temperature sensing fan control and intake manifold temperature sensing fan control are correct for vehicles that allow the electronic control module (ECM) to control the on and off operation of the cooling fan. Consult the local original equipment manufacturer (OEM) for other types of controls.



Winterfronts

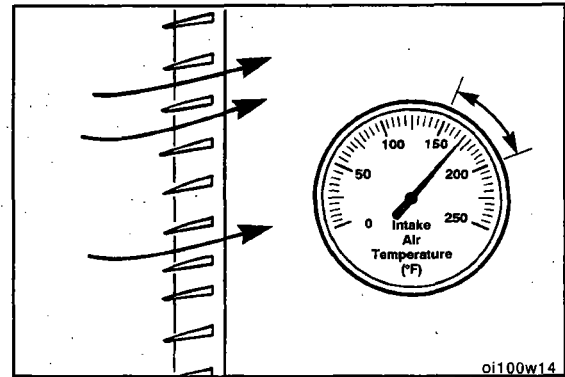
Winterfronts can be used on a vehicle equipped with charge-air cooling, but they **must** be designed to partially cover the frontal area of the cooling system **only**. An area of 784 sq cm [120 sq in], or approximately 28 x 28 cm [11-in x 11 in], **must** be left open to allow airflow for the charge-air cooler to function correctly.

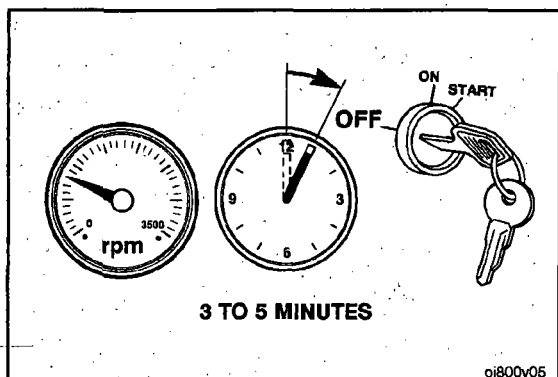


Shutters

⚠ CAUTION ⚠

A charge-air cooler engine with shutters also requires an intake manifold air temperature switch to open the shutters to prevent excessive intake manifold temperatures. This prevents engine damage from high intake manifold temperatures as a result of blocked airflow across the charge-air cooler.





Engine Shutdown

General Information

- Allow the engine to idle 3 to 5 minutes after a full-load operation before shutting it off. This allows the engine to cool gradually and uniformly.
- Turn the ignition keyswitch to the OFF position.

Electronic Controlled Fuel System

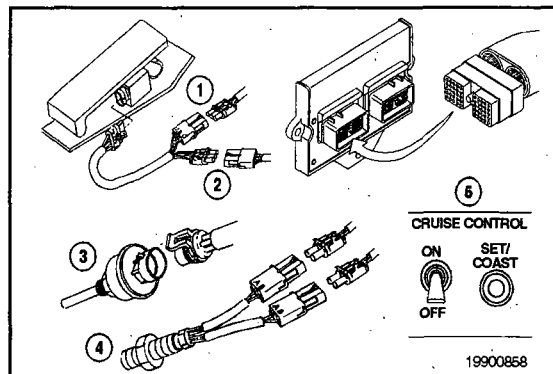
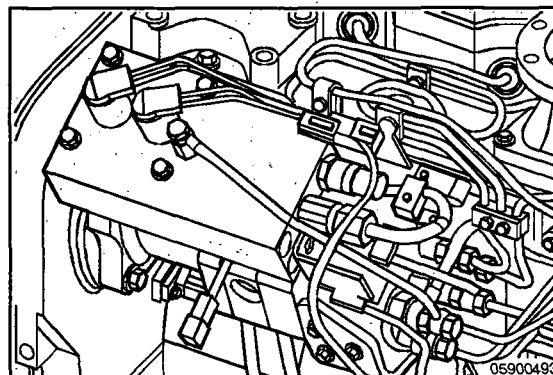
General Information

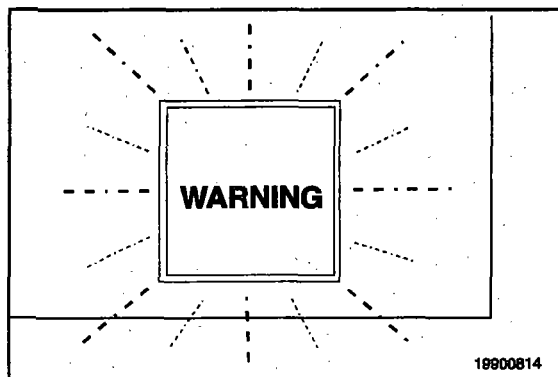
The ISC engine control system is electronically controlled and also provides many operator and vehicle or equipment features.

The base functions of the control system include fueling and timing control, limiting the engine speed operating range between the low- and high-idle set points, and reducing exhaust emissions while optimizing engine performance.

The control system uses inputs from the operator and engine sensors to determine the fueling and timing required to operate at the desired engine speed.

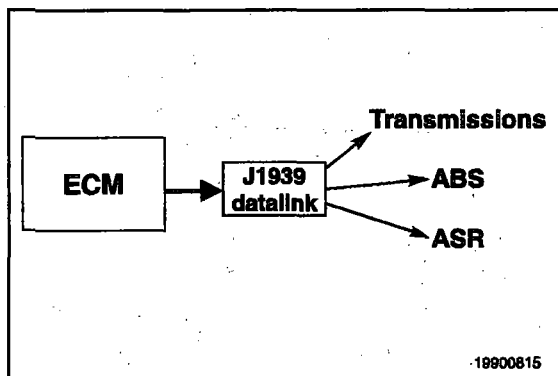
The electronic control module (ECM) is the control center of the system. It processes all of the inputs and sends commands to the fuel system, vehicle, and engine control devices.





The electronic control module (ECM) performs diagnostic tests on most of its circuits and will activate a fault code if a problem is detected in one of these circuits. Along with the fault code identifying the problem, a snapshot of engine operating parameters at the time of fault activation is stored in memory.

Most fault codes will activate a diagnostic lamp to signal the driver.



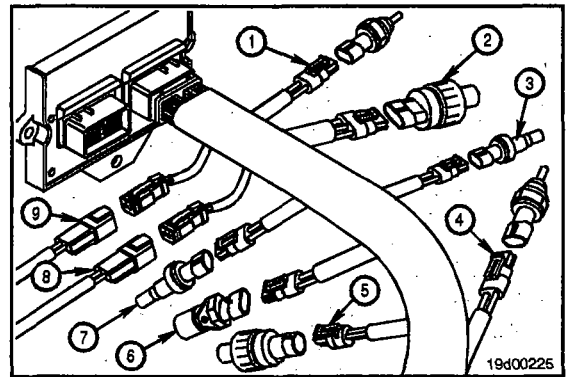
The ECM communicates with service tools and other vehicle controllers such as the transmission, antilock brake system (ABS), and antislip reduction (ASR) through an SAE J1939 datalink.

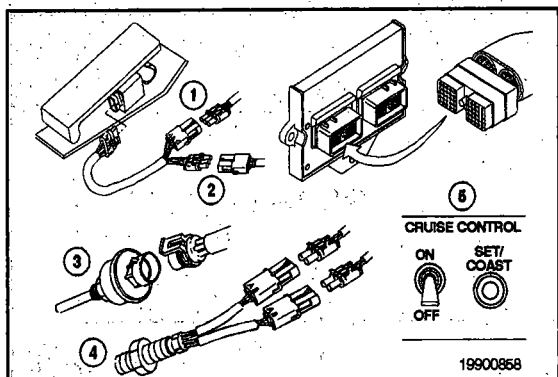
Some vehicles and equipment will have J1939 networks that link many of the "smart" controllers together. Vehicle control devices can temporarily command engine speed or torque to perform one of its functions such as transmission shifting or antilock braking.

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

1. Coolant temperature sensor
2. Oil pressure sensor
3. Water-in-fuel sensor
4. Intake air temperature sensor
5. Intake manifold pressure sensor
6. Engine speed and position sensors
7. CAPS fuel temperature sensor
8. Injection control valve
9. Pumping control valves
10. CAPS fuel pressure sensor (not shown).





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

1. Accelerator pedal position sensor
2. Idle validation switch
3. Coolant level sensor
4. Vehicle speed sensor (VSS)
5. Feature control switches such as cruise control, power take off (PTO), and fan clutch control
6. Accelerator interlock (**not shown**)
7. OEM pressure sensor (**not shown**)

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

Engine Protection System



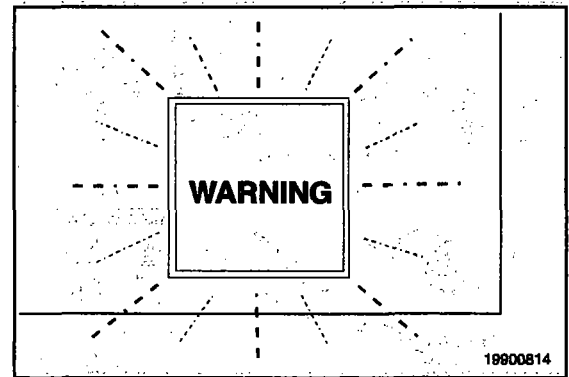
When the red STOP lamp is illuminated, the driver must pull to the side of the road, once it is safe to do so, to reduce the possibility of engine damage.

The ISC engine is equipped with an engine protection system. The system monitors critical engine temperatures and pressures, and it will log diagnostic faults if an over or under normal operation condition occurs. If an out-of-range condition exists, and an engine derate action is initiated, the operator will be alerted by an in-cab WARNING lamp. The WARNING lamp will blink or flash if out-of-range conditions worsen.

The engine protection system monitors the following data:

- Coolant temperature
- Coolant level (optional)
- Oil pressure
- Intake manifold temperature
- Engine overspeed
- Fuel temperature.

NOTE: Engine power and speed will gradually reduce depending on the severity of the observed condition. The engine protection system will **not** shut down the engine unless the engine protection shutdown feature has been enabled.

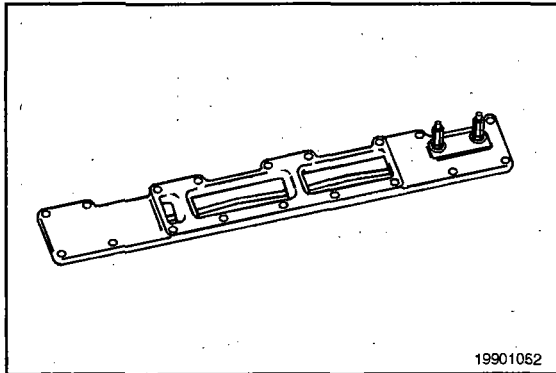
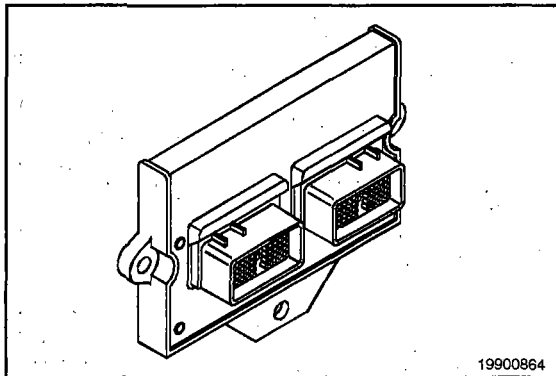


Basic Features

The electronic control module (ECM) for the ISC engine provides some basic electronic features that are calibration-dependent. The following section describes the function of each feature. Whether a feature is available in a given application is calibration-dependent.

Intake Air Heater

This feature controls the heating elements that are located in the engine's intake air stream. These elements heat the intake air when starting the engine in cold ambient conditions. Startability and white smoke control are enhanced by the use of an intake air heater. A WAIT TO START lamp is located on the operator controls to indicate when to crank the engine.

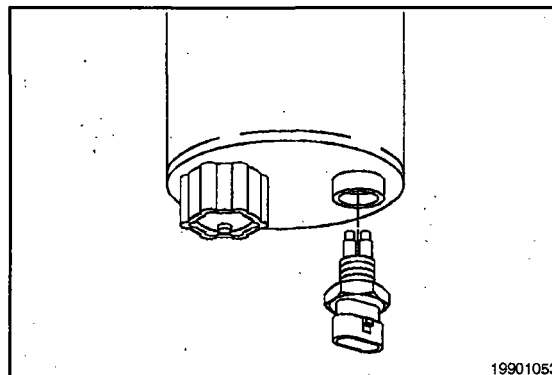
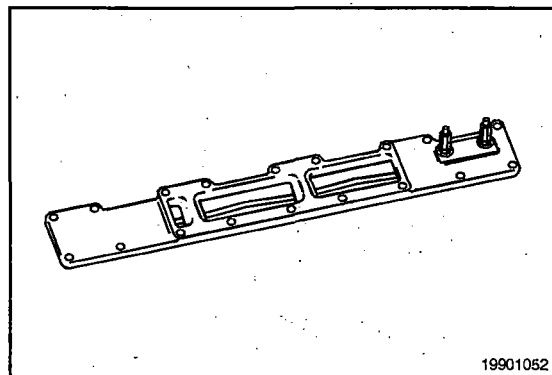


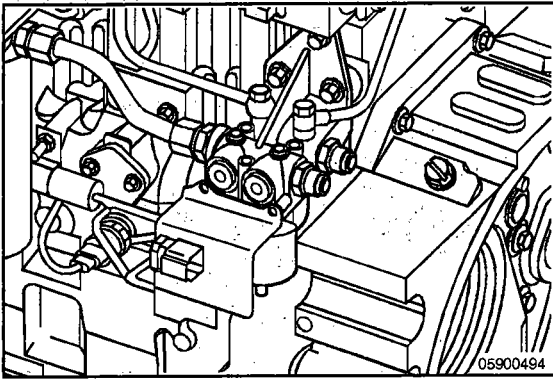
The ECM checks the intake manifold temperature to determine how long to energize the air heater before extinguishing the WAIT TO START lamp. (This is for the preheat phase.)

Once the engine is started, the heater will be energized again for a time period determined by intake air temperature and fuel temperature. (This is for the post-heat phase.) To minimize cranking time in cold weather, the engine should **not** be started until the WAIT TO START lamp is extinguished.

Water-in-Fuel Sensor

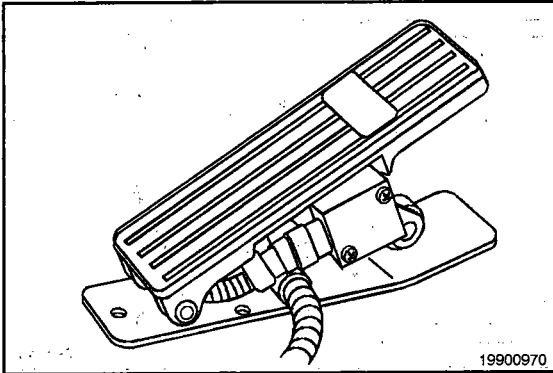
This sensor is located in the fuel filter housing. Once the storage space in the bottom of the filter housing fills with a certain amount of water, the sensor will signal the ECM. A WIF lamp will illuminate, at the operator controls, indicating that the water needs to be drained from the fuel filter assembly.





Electric Lift Pump

The ECM controls the electric lift pump located in between the fuel tank and the injection pump. When the key switch is turned ON, the lift pump will be energized for 30 seconds to make sure that the low-pressure fuel lines are fully primed. The electric lift pump does **not** start again unless the key switch is cycled.



Accelerator Interlock

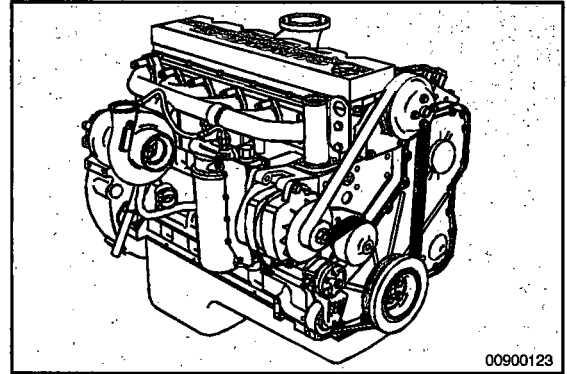
When both the accelerator interlock feature and the external accelerator inhibit switch are active, the accelerator action will be disregarded for fueling, and the engine shall run at low-idle speed or at the remote power take-off (PTO) speed, if the remote PTO switch is activated. Due to differing customer needs, each manufacturer will build the interaction with its brakes, transmission, and fast- and slow-idle selection capabilities.

Example: Most buses use this feature to disable the accelerator pedal and PTO operation when the bus door is open.

NOTE: This is **not** a customer-adjustable feature.

Engine Warm-up Protection

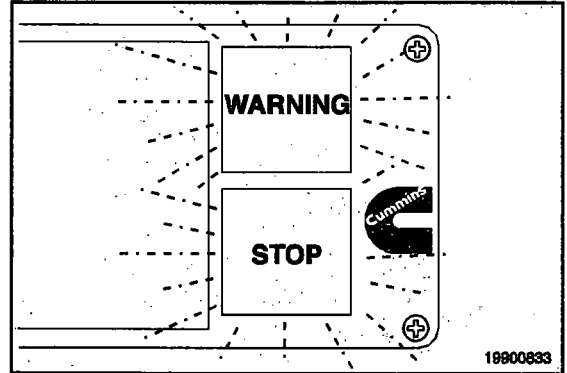
This feature inhibits the throttle to keep the engine at low idle for a brief time after the engine starts. This allows oil to reach all the critical engine components before engine speed is increased above low idle.

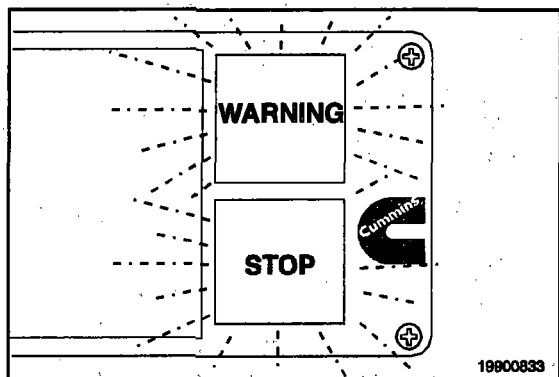


Engine Protection Shutdown

This feature automatically shuts off the engine when the temperature, pressure, or coolant level sensors indicate that the engine is operating over or under normal operating conditions.

The red STOP lamp in the cab will flash for 30 seconds prior to shutdown to alert the driver.





Engine Protection Shutdown Override

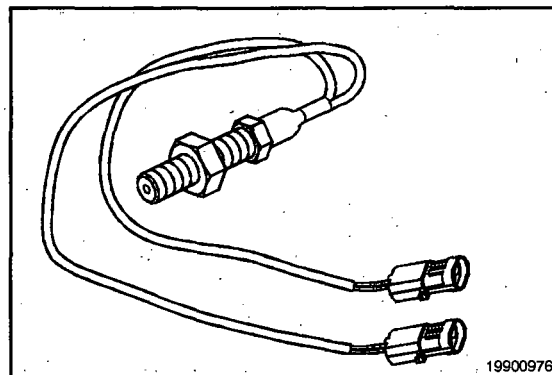
This feature, when enabled, allows the operator to override a pending engine shutdown. Prior to engine shutdown, the red STOP lamp will flash for 30 seconds to notify the operator that the engine is about to shut down. The operator can override the engine shutdown through the use of an OEM switch such as the clutch switch. If the vehicle is **not** equipped with a clutch switch, then the OEM will provide a dash-mounted switch marked as the Engine Protection Shutdown Override switch. When the operator triggers this switch, while the red lamp is flashing, a timer within the ECM will reset and allow the engine to run an additional 30 seconds before engine shutdown occurs. Each time the operator triggers the switch, the time within the ECM is reset, allowing the engine to run for an additional 30 seconds.

Vehicle Speed Sensor (VSS) Type

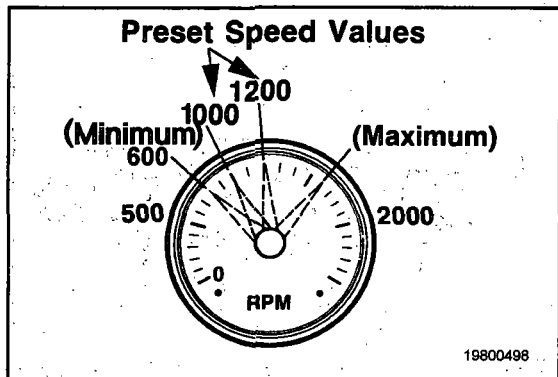
The sensor communicates the type of vehicle speed sensor being used in conjunction with the ECM.

The sensor can be one of the following:

- None - No vehicle speed sensor (VSS)
- Magnetic - Most typical, usually located on transmission
- Other - OEM device, also known as mechanical
- J1939 Datalink - Speed sensor connected to J1939 datalink
- Tachograph - Primarily used for European applications.

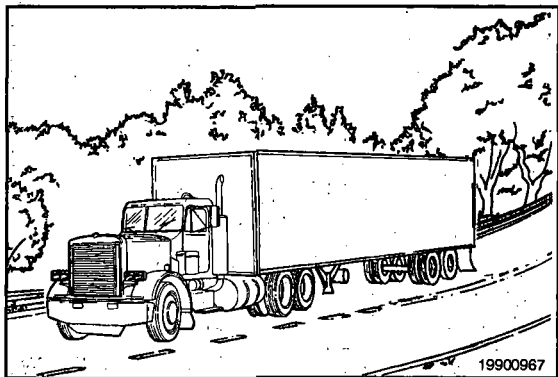


Section 1 - Operating Instructions



Maximum Engine Speed without Vehicle Speed Sensor (VSS)

This sets the maximum engine speed allowed when no vehicle speed is detected.

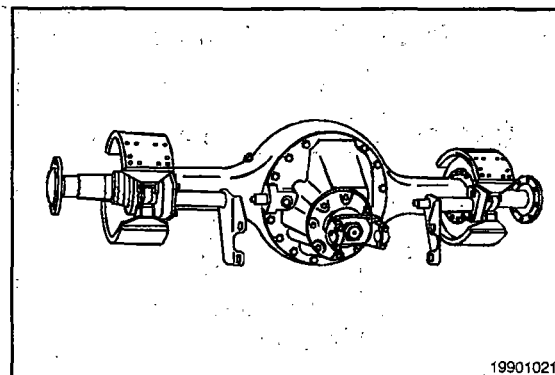


Tire Revolutions per Mile

This is used to tell the electronic control module (ECM) how many times the tire makes a complete revolution in 1 mile.

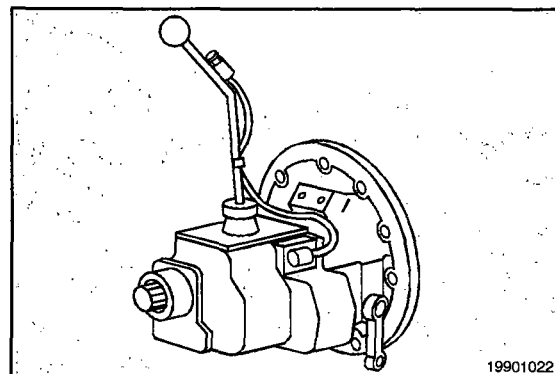
Rear Axle Ratio

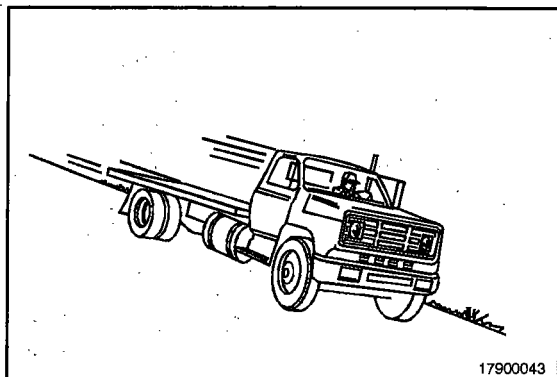
This feature tells the ECM the gear ratio of the rear axle.



Number of Transmission Tailshaft Gear Teeth

This feature tells the ECM the number of gear teeth on the transmission tailshaft.

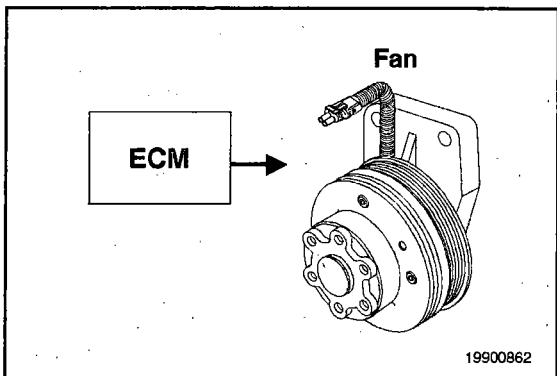




Vehicle Speed Sensor (VSS) Anti-Tampering (Fault Code 242)

This feature gives the customer the option of disabling Fault Code 242.

NOTE: Fault Code 242 is logged when an invalid or inappropriate vehicle speed signal is detected by the ECM indicating an intermittent connection or signal tampering. This fault code is **not** proof that vehicle speed sensor (VSS) tampering has occurred.



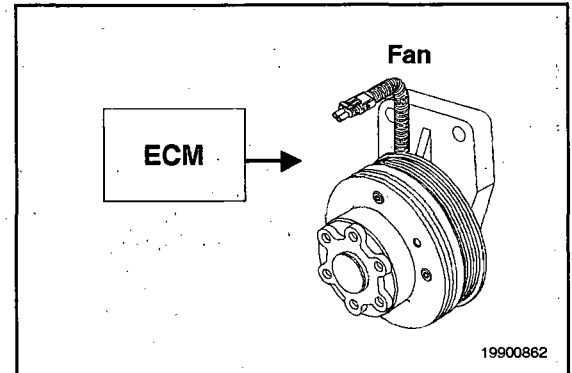
Fan Clutch Enable

The ECM can control the cooling fan based on inputs from the coolant temperature sensor and the intake manifold temperature sensor.

Some applications also provide inputs to the ECM for auxiliary device cooling such as air conditioner pressure and power steering temperature. An application can also include a manual switch for fan control.

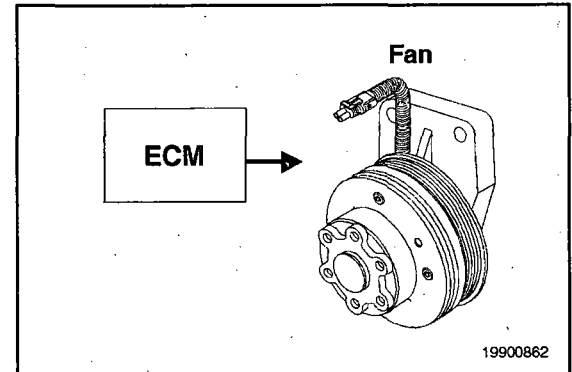
Fan Drive Selection

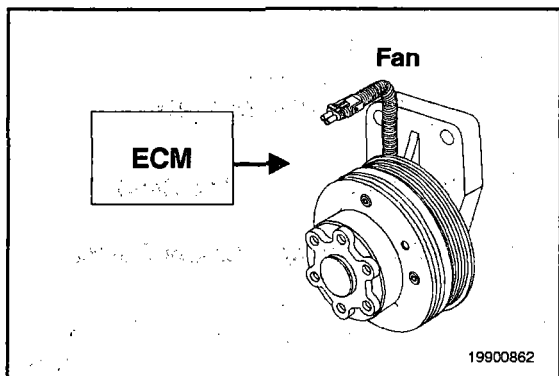
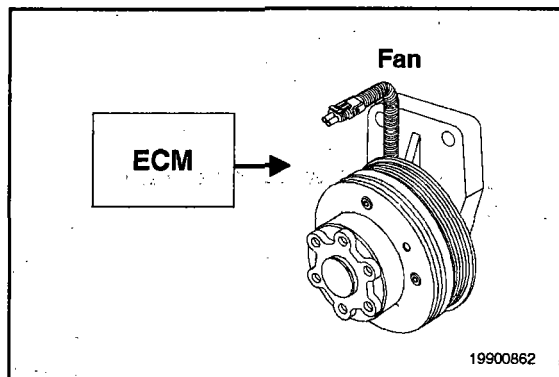
When enabled this feature controls the variable speed fan drive, if available, to help optimize fuel economy. The ECM varies fan speed according to the coolant temperature. This maintains the temperature in the optimum range while minimizing the amount of load put on the engine by the fan.



Fan On with Exhaust Brake

This feature enables an electric fan when the exhaust brake is engaged. This increases the total braking power by increasing the parasitic load on the engine.





Programmable Fan Logic

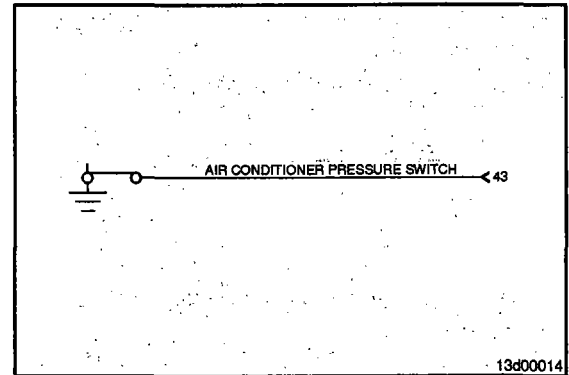
Select either 0 VDC = ON or 12 VDC = ON to match the fan clutch logic used in the application. A relay can be used for fans that draw more than 6 amps.

Minimum Fan On Time with Air Conditioner Pressure Switch

This feature controls the minimum amount of time that the fan will stay on when activated by the air conditioner pressure switch. This reduces excessive fan cycling.

Air Conditioner Pressure Switch Input

This allows the air conditioner pressure switch input to be disabled if that input into the ECM is **not** being used. Enable this feature if the air conditioner pressure switch input into the ECM is used to control the fan.

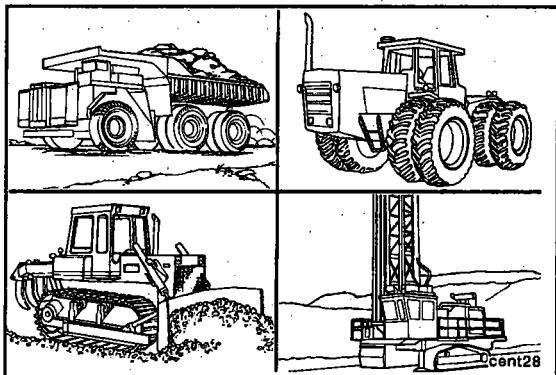


Application Type

This feature informs the ECM about type of application for this vehicle. Choose between On-Highway or On/Off-Highway. On-Highway applications use the top gear for the majority of operations. On/Off-Highway applications use gears lower than the top gear for extended periods.

Application Type	
On-Highway	(Top Gear)
On/Off Highway	(Lower Gears)

19200047



Programmable Features

The electronic control system provides many features that are integrated into the vehicle operation. Some of these features can be adjusted, enabled, or disabled with a service tool, but some are set at the factory and can **not** be changed.

The following section describes the functions of each feature. Whether a feature is available in a given application is OEM-dependent.

Smart Road Speed Governor

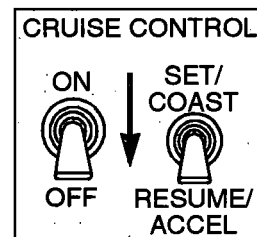
The smart road speed governor feature, when enabled, allows the operator to adjust the maximum vehicle speed limit by using an OEM switch, typically the cruise accel/resume switch.

This feature can be used for city driving if reducing the maximum vehicle speed will help prevent speeding tickets.

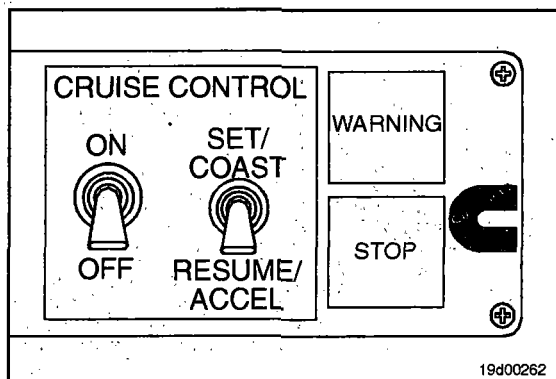
To adjust the maximum vehicle speed limit, the cruise control on/off switch **must** be OFF; then the coast/accel switch can be used to raise or lower the preset limit.

NOTE: The maximum speed limit can **not** be adjusted above the predefined maximum vehicle speed in top gear limit.

Smart Road Speed Governor

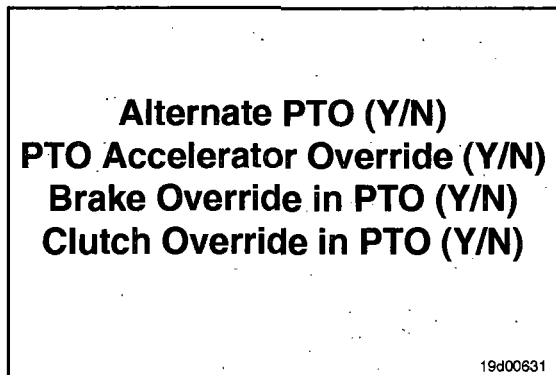


19d00626



Cruise Control Set Speed Save

This feature permits the adjustable cruise control set speed to be saved through an engine shutdown and restart. This feature can be programmed using the INSITE™ service tool. When this feature is enabled, the adjustable cruise control set speed established prior to shutdown can be resumed after the next restart using the RESUME function of the cruise control set/resume switch.



Alternate PTO

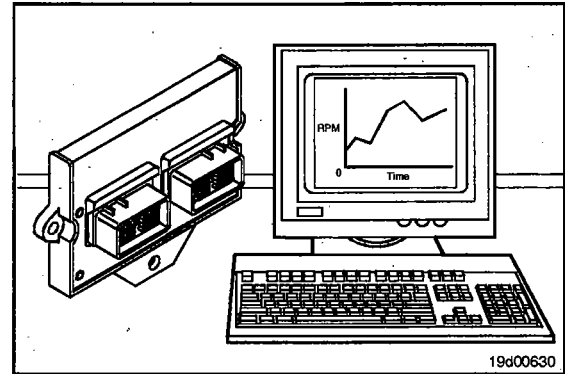
The alternate PTO feature allows new set/resume PTO speeds to be established **only** when PTO is inactive. This is designed to protect pumping applications when high engine speed variations, while in the PTO mode, can cause pump damage.

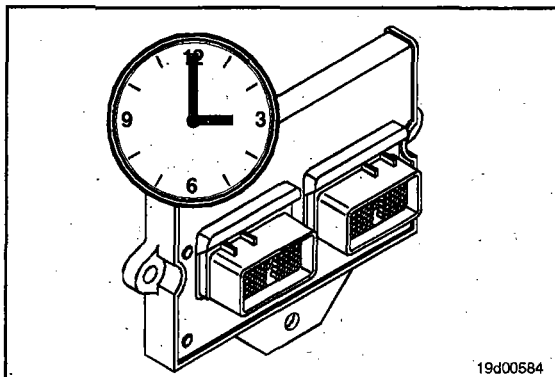
The INSITE™ service tool can enable or disable this feature.

User-Activated Datalogger

The user-activated datalogger feature improves troubleshooting capabilities and provides assistance in troubleshooting intermittent problems. This is accomplished through the use of an internal ECM datalogger to capture data while the problem is occurring. The INSITE™ service tool is used to configure the feature for the specific type of problem that exists. The feature can be activated automatically by the ECM or manually by the operator using the diagnostic switch.

When the problem occurs, the ECM datalogger is activated and stores the data in the ECM. This data can be analyzed using the INSITE™ service tool. Once the problem has been resolved, the ECM can be reset using INSITE™, and the data will be cleared.





Real-Time Clock

The real-time clock feature provides time/date stamping of operational events such as fault codes, audit trails, and engine protection data.

The real-time clock is contained within the ECM and stamps events in units of year, month, day of month, hour, minute, and second. If the clock loses power, a diagnostic fault code is triggered. Upon loss of power, the real-time clock will be initialized with the last known real time.

The INSITE™ service tool can be used to enable the real-time clock feature and to set the ECM clock. The auto-set feature can be selected, which will automatically set the ECM clock to the present time/date of the PC.

NOTE: Once the real-time clock feature is enabled in the ECM, it can **not** be disabled.

Vehicle Antitheft Protection

The antitheft feature prevents the engine from starting until a password is entered into the ECM using Cummins RoadRelay™ or the INSITE™ service tool. Once deactivated, the engine can be started.

The antitheft feature prevents the engine from starting **only** if the feature is enabled, and the feature is activated. The feature can **only** be activated when the engine is idling or keyed ON and **not** running. This feature has three separate functions:

- Antilock
- Throttle lock
- Hijack.

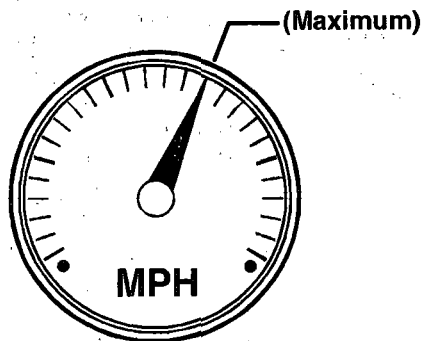
Vehicle Anti-Theft

19d00627

Automatic Transmission (Y/N)

Factory Setting = N

19200046



15d00001

Transmission Type

This feature informs the ECM about the type of transmission used in the vehicle.

- Manual
- Automatic
- Fully Automated.

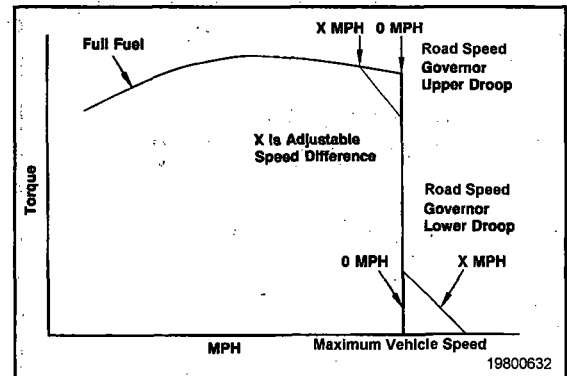
Road Speed Governor

The road speed governor limits the maximum road speed of the vehicle.

The maximum vehicle speed in top gear is the maximum road speed for the vehicle. This speed **must** be greater than or equal to the gear-down maximum vehicle speed if the gear-down protection is enabled (refer to the gear-down protection feature description) and the maximum cruise speed if the cruise control feature is enabled.

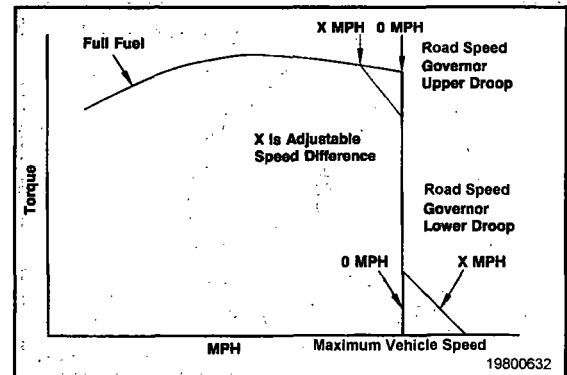
Road Speed Governor Upper Droop

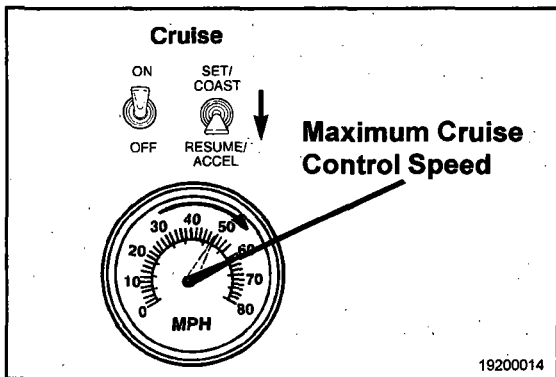
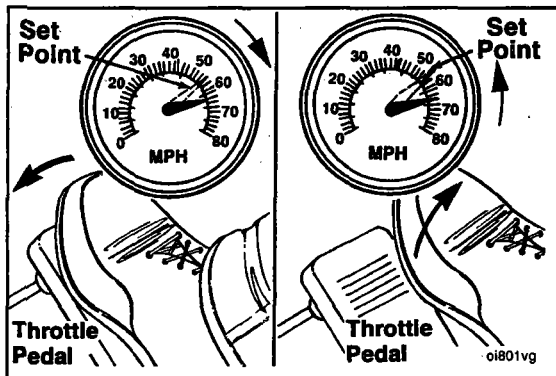
While operating on the road speed governor, the road speed governor upper droop allows tailoring of the torque curve before the maximum vehicle speed is reached. Increasing the droop can improve fuel economy in hilly terrain. The setting can be between 0 and 3 mph.



Road Speed Governor Lower Droop

The road speed governor lower droop allows tailoring of the torque curve in a downhill or no-load condition while operating on the road speed governor before fueling is completely cut off. Faster downhill speed increases the momentum going up the next hill and can improve fuel economy in rolling terrain. The setting can be between 0 and 3 mph.





Cruise Control



WARNING

Do not use cruise control when the road is slippery, in heavy traffic, or when the weather is inclement. Loss of vehicle control can result.

The cruise control feature gives the driver the capability of a "foot-off" accelerator cruise operation. It is similar to an automobile cruise control.

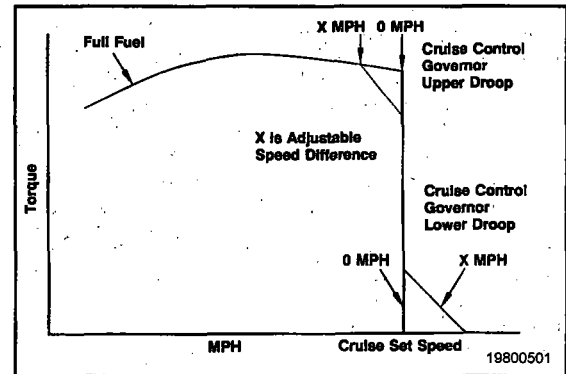
Maximum Cruise Control Speed

This speed is the maximum allowable cruise control set speed.

NOTE: The maximum cruise control speed can **not** exceed the maximum vehicle speed in top gear setting.

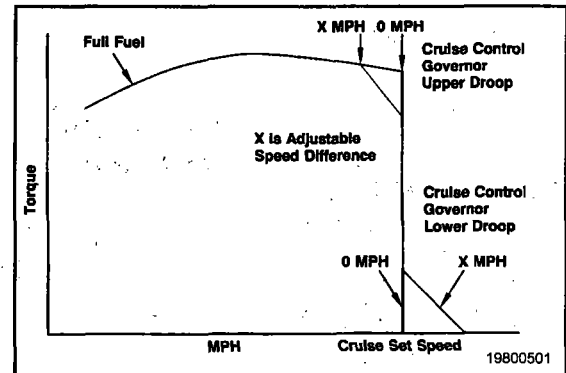
Cruise Control Governor Upper Droop

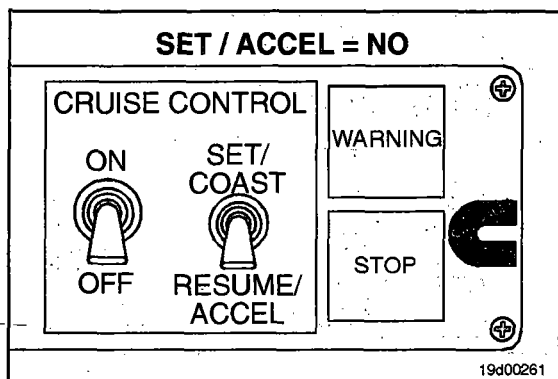
This feature allows tailoring of the torque curve before the set vehicle speed is reached while operating in cruise control. Increasing the droop can improve fuel economy in hilly terrain. The setting can be between 0 and 3 mph.



Cruise Control Governor Lower Droop

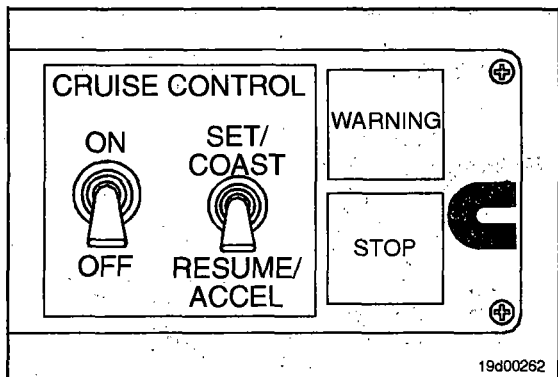
This feature allows tailoring of the torque curve in a downhill or no-load condition while operating in cruise control before fueling is completely cut off. Faster downhill speed increases the momentum going up the next hill and can improve fuel economy in rolling terrain. The setting can be between 0 and 3 mph.





SET/ACCEL

The SET/ACCEL feature informs the ECM how the cab switch is configured. If it is set to YES, then the cab switch will be SET/ACCEL in one position and RESUME/COAST in the other position. If it is set to NO, then SET/COAST will be in one position while RESUME/ACCEL will be in the other position.



Cruise Control Auto Resume

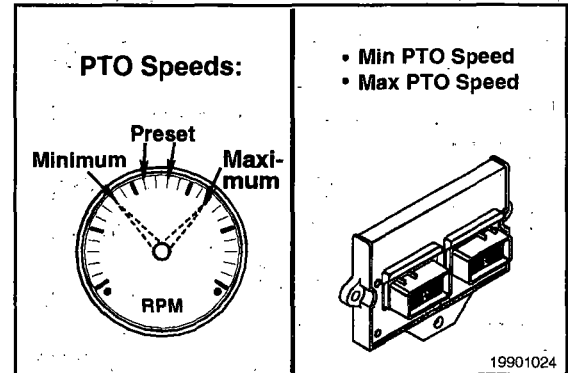
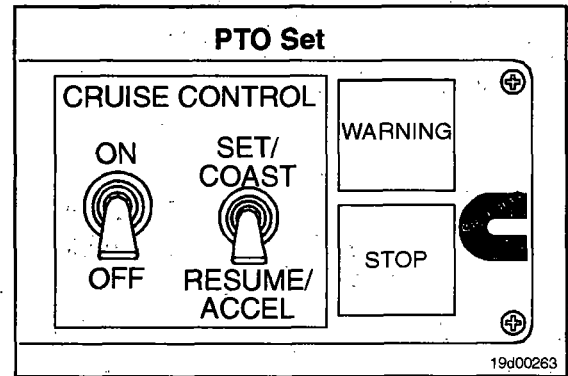
This feature will automatically resume the cruise control set speed, after a brief clutch engagement, while cruise control is actively controlling the engine speed. This allows the operator to shift gears in cruise control without having to bump the RESUME switch.

Power Take-off (PTO)

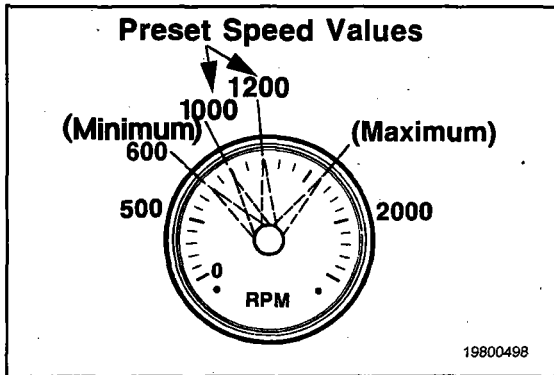
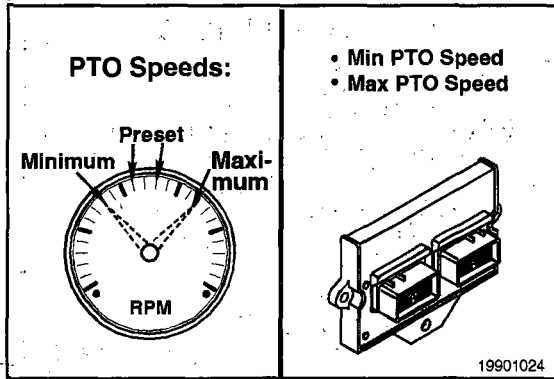
The power take-off (PTO) feature controls the engine at a constant rpm selected by the operator. For applications requiring the PTO mode, a remote-mounted switch can be used if a cab switch is **not** desirable. The cruise control switches are also used for the PTO features.

PTO Maximum Speed

The PTO maximum speed is the maximum engine speed that can be reached while in the PTO mode.



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PTO Minimum Speed

The PTO minimum speed is the minimum engine speed that can be reached while in the PTO mode.

PTO Set Point

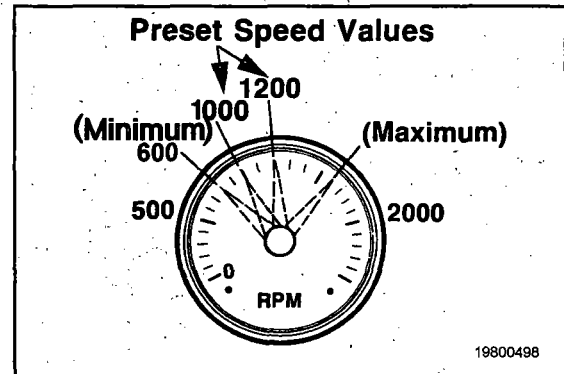
The set point is for the PTO engine speed. This speed is reached when the PTO on/off switch is in the ON position, and the set switch is used.

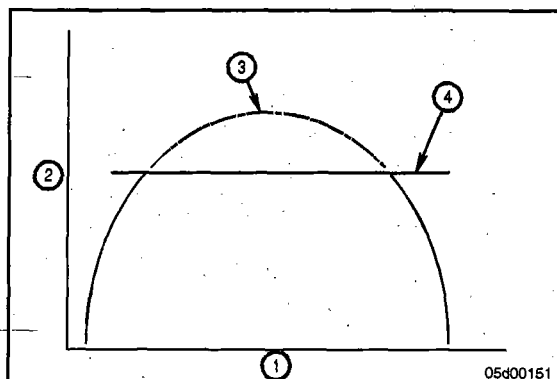
NOTE: PTO set speed can **not** be less than the minimum PTO speed or greater than the maximum PTO speed.

PTO Resume Speed

This is the engine speed that is reached when the RESUME switch is used.

NOTE: PTO resume speed can **not** be less than the minimum PTO speed or greater than the maximum PTO speed.





Maximum Engine Load In PTO

- (1) Engine rpm
- (2) Engine output torque
- (3) Standard engine torque curve
- (4) Maximum engine load in PTO.

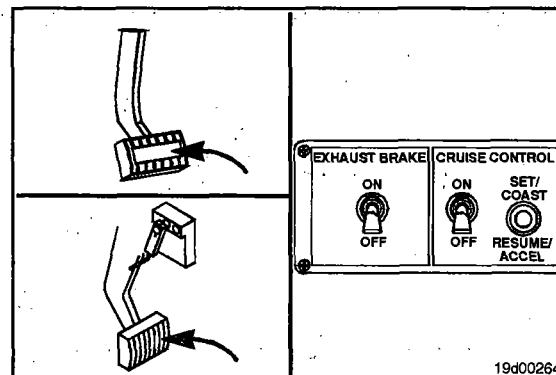
Some devices that are driven by the engine during PTO operation are sensitive to input torque. The maximum engine torque that can be output by the engine during PTO operation (4) can be adjusted using INSITE™ to protect these devices.

NOTE: This torque limit is also in effect during accelerator override of the PTO function.

Brake and Clutch Override in PTO

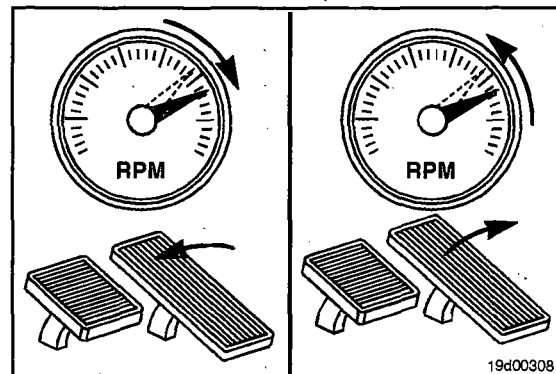
The brake override in PTO allows the operator to exit PTO operation if the brake is depressed.

The clutch override in PTO allows the operator to exit PTO operation if the clutch pedal is depressed.



Accelerator Override in PTO

Some applications require the ability to override the PTO set speed with the accelerator to increase engine speed without disengaging the PTO function. When the accelerator override in the PTO feature is enabled, the engine speed can be increased above the current PTO operating speed by depressing the accelerator. Engine speed can **only** be overridden up to the maximum accelerator override in PTO. Once the accelerator is released, the engine speed will return to the PTO operating speed in effect before the accelerator override event.



Remote PTO



gp8awks

Remote PTO

The remote PTO allows the PTO mode to be activated from a separate remote switch. Remote PTO can have up to five different set speeds depending on how many times the switch is toggled from OFF to ON before being left in the ON position.

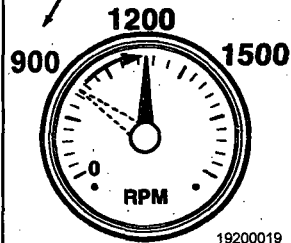
Example: To obtain the remote PTO set speed 3, rapidly toggle the remote PTO on/off switch from OFF to ON three times, and then leave it in the ON position on the last cycle.

Up to five remote PTO speeds are available when the remote PTO is enabled. The remote PTO has higher priority than the cab PTO, so it will control the engine speed in cases where both the cab and remote PTO are enabled.

Remote PTO

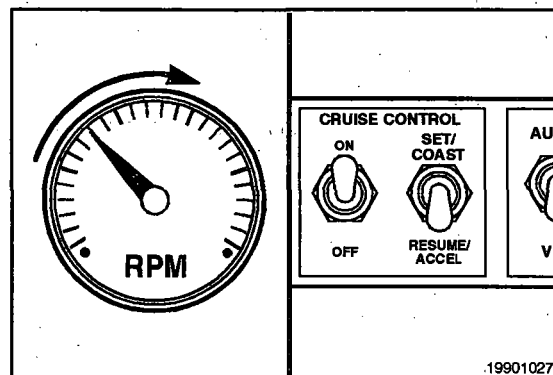


Remote PTO Speed



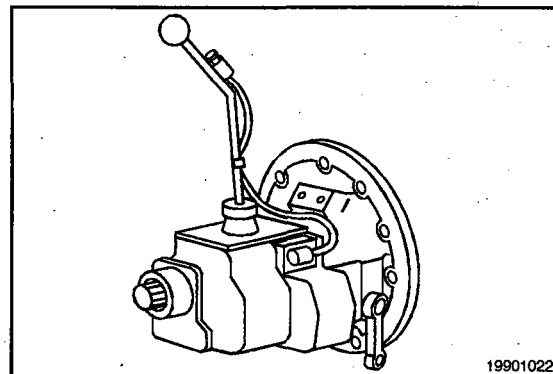
PTO Ramp Rate

This programmable feature sets the rate that the PTO speed will ramp up or down when operating in PTO, and when the ACCEL or COAST switch is held down.



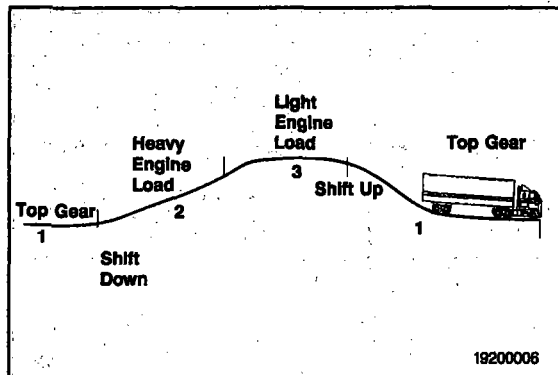
Gear-Down Protection

This feature limits the vehicle speed in the lower gears. The maximum vehicle speed in the lower gears is set at a lower mph than the maximum vehicle speed in the top gear. This encourages driving in the top gear for better fuel economy. Gear-down maximum vehicle speed, light-engine load, and heavy-engine load are parameters associated with this feature.



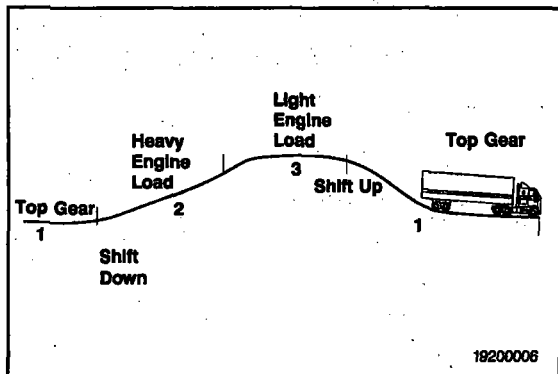
Heavy- and Light-Engine Loads

This feature allows the operator to downshift from top gear to the next-lower gear under heavy load and maintain a speed higher than the gear-down speed. This allows the operator to keep the vehicle momentum up by using a lower gear to maintain a high engine speed when going uphill. Once the engine load drops off such as when going downhill, then the vehicle speed limit will ramp back down to the light-load gear-down speed limit. The driver will then have to upshift back into top gear to reach the maximum vehicle speed limit.



Gear-Down Maximum Vehicle Speed for Light-Engine Loads

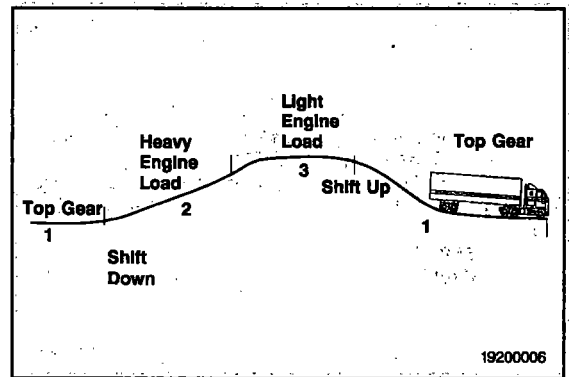
This is a maximum vehicle speed (3) for operating one gear below top gear during light-engine load operations. This value can **not** exceed gear-down maximum vehicle speed for heavy-engine load (2).

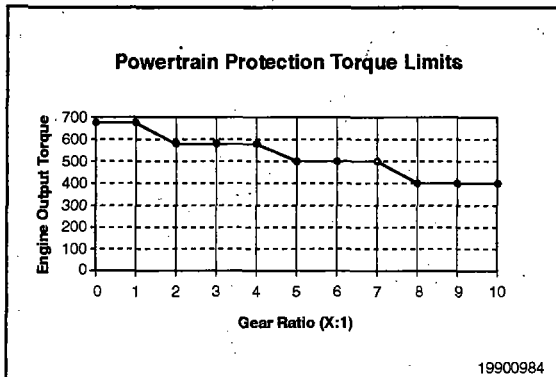


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Gear-Down Maximum Vehicle Speed for Heavy-Engine Load

This is a maximum vehicle speed (2) for operating one gear below top gear during heavy-engine load operations.



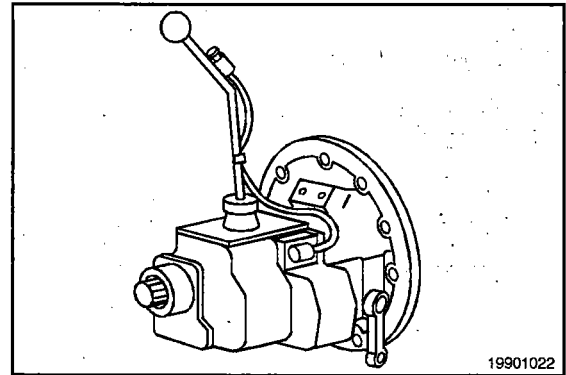


Powertrain Protection

This feature can limit engine output torque depending on the transmission gear ratio. This feature helps protect the drivetrain when lower gears are engaged. Engine torque limits based on transmission gear ratio can be adjusted using the INSITE™ service tool. This feature can also limit the maximum engine torque when a switched input to the ECM is enabled. This allows the operator, or an automatic switching device, to limit engine torque under certain operating conditions such as operation of an auxiliary device. This feature can also be configured to limit torque during heavy-load conditions **only**. This allows full torque output at light-load conditions and limits output torque when the engine is heavily loaded. An example of a torque limit table is illustrated.

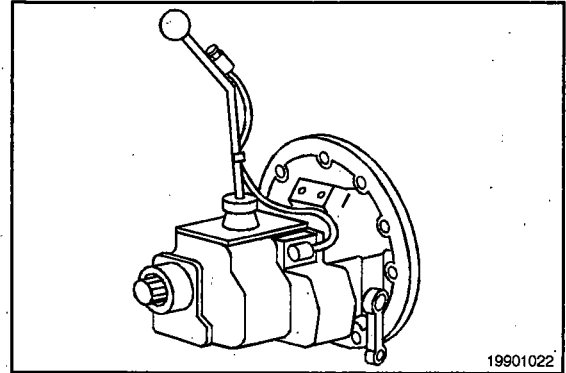
Top Transmission Gear Ratio

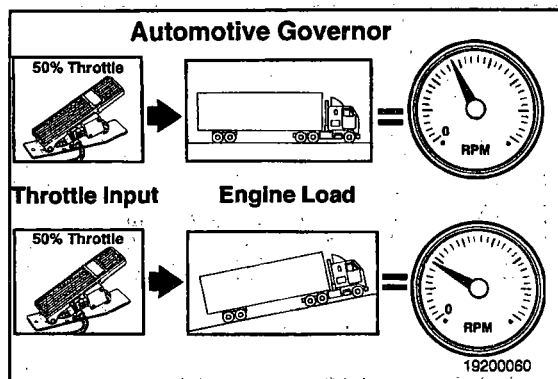
This feature is required for gear-down protection to work properly with double-overdrive transmissions. This parameter will also be used by the Trip Information System to record the percentage of distance traveled in top gear.



One Gear-Down Gear Ratio

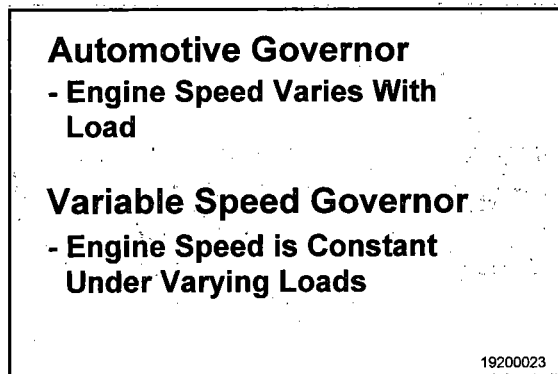
This parameter is used to tell the ECM the first gear-down gear ratio of the transmission.





Automotive and Variable Speed (VS) Governor

This feature gives the owner a choice of engine governors. The variable speed (VS) governor maintains a constant engine speed for a given accelerator position under varying load conditions. The automotive governor allows a longer speed variation under varying load conditions for a given accelerator position.



Cab Switchable Governor

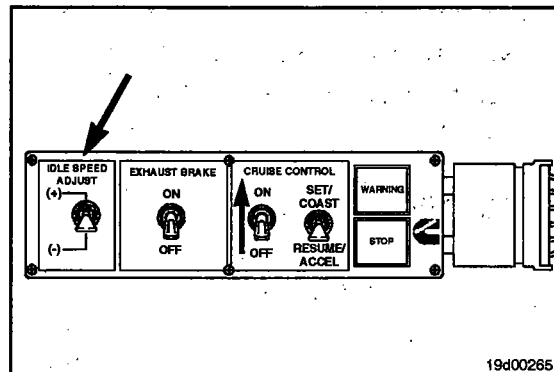
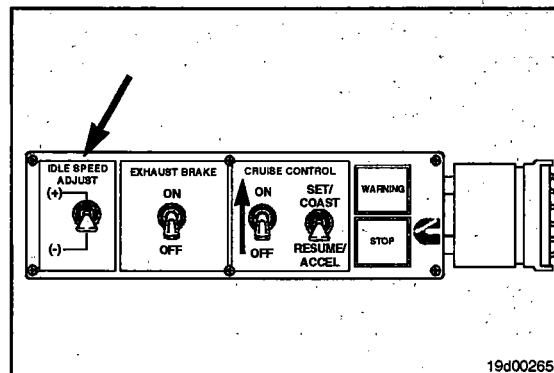
This feature allows the operator to use a cab switch to toggle between the automotive and variable speed governor.

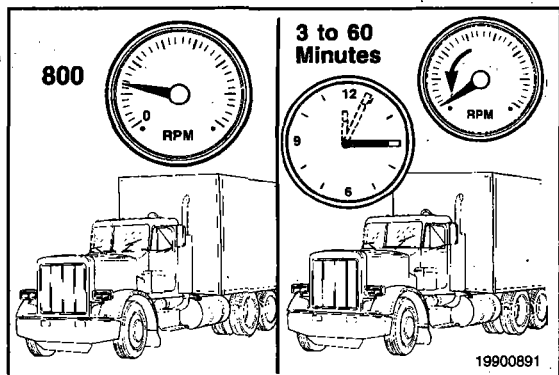
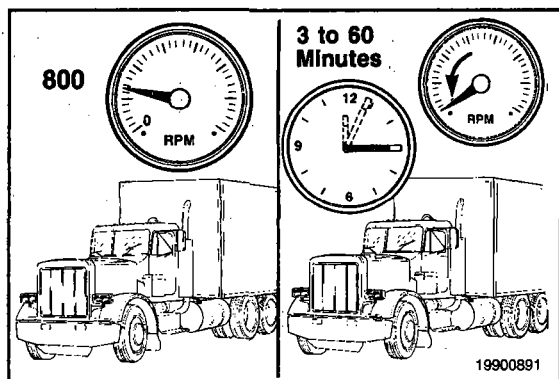
Low-Idle Speed

This feature selects the speed at which the engine will idle. This speed can be adjusted by a cab switch, if installed, and the low-idle adjustment feature is enabled.

Low-Idle Adjustment

This feature allows the idle-speed range to be increased or decreased, in 25 rpm increments, with the in-cab increment/decrement switch. There are limits on how high or low the low-idle speed can be adjusted. The adjustment range for an ISC engine is 600 to 800 rpm.





Idle Shutdown

This feature automatically shuts off the engine after a period of engine idling when there is no activity from the driver such as clutch, brake, or accelerator actuation.

The idle shutdown system will **not** be active at coolant temperatures below 37.8°C [100°F].

After the engine has been automatically shut off, the keyswitch **must** be turned OFF for 15 to 20 seconds before attempting a restart.

NOTE: This feature will shut off the engine **only**. It will **not** remove the power from other accessories powered by the keyswitch, and these can cause a drain on the battery.

Idle Shutdown Time

This is the period of engine idling time, when there is no activity from the driver such as clutch, brake, or accelerator actuation, before the engine automatically shuts off.

NOTE: This feature can **not** be used if the idle shutdown feature is turned off.

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Idle Shutdown in PTO

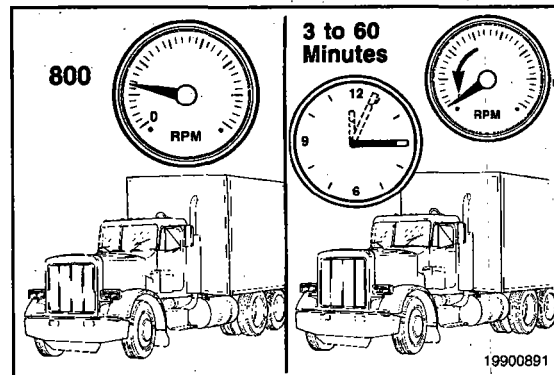
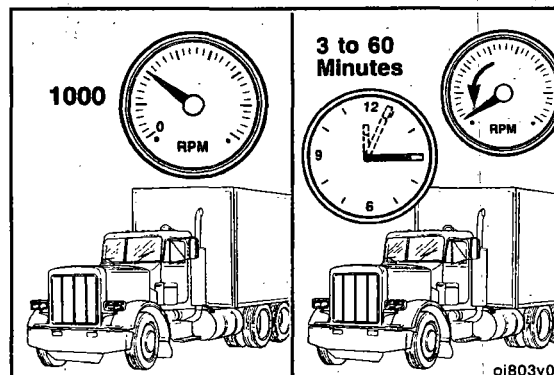
This feature automatically shuts off the engine after a period of PTO or remote-PTO operation during which there is no activity from the driver such as clutch, brake, or accelerator actuation.

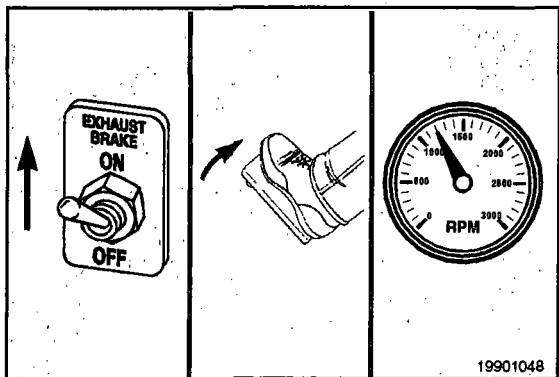
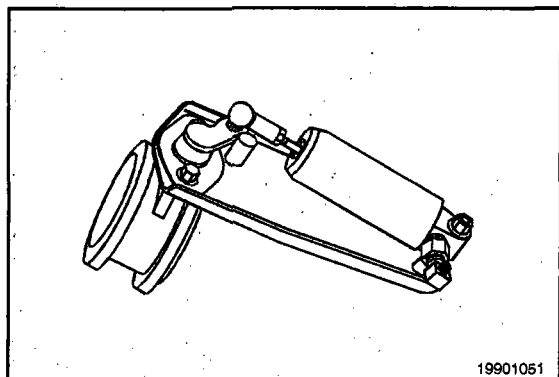
Idle Shutdown Override

This feature allows the driver to override the idle shutdown by changing the position of the brake, clutch, or accelerator at any time during the idle shutdown warning period.

The idle shutdown warning period lasts for 30 seconds prior to engine shutdown. The yellow WARNING lamp on the dash will flash during the idle shutdown warning period.

After the idle shutdown feature has been overridden, this feature will **not** shut off the engine again until after the vehicle has moved.





Exhaust Brake

Some vehicles are equipped with an ECM-controlled exhaust brake. This exhaust brake can be used to slow down the vehicle. The brake accomplishes this by restricting the exhaust gas flow out of the engine. Using the exhaust brake in hilly terrain or during heavily loaded decelerations helps reduce wear on the service brakes.

The ECM will activate the exhaust brake when conditions require its operation.

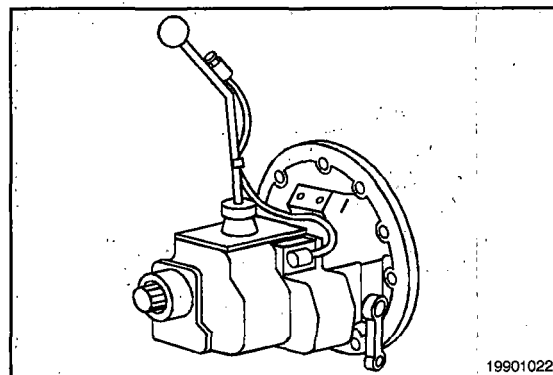
Several operating conditions **must** be true to activate the exhaust brake:

1. The exhaust brake switch **must** be in the ON position.
2. The operator's foot **must** be off the accelerator pedal (pedal at low-idle speed position).
3. The engine speed **must** be above 1000 rpm.

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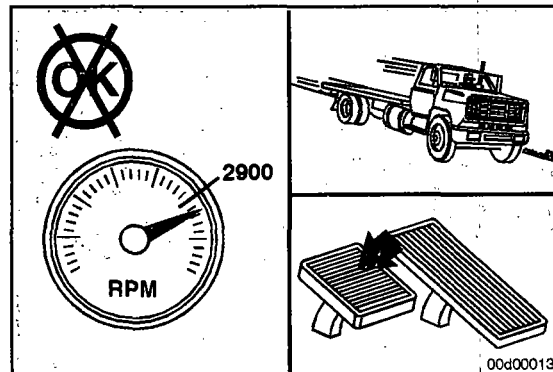
If the previous conditions are present, in addition to several ECM interval fueling command checks, then the exhaust brake will engage and begin applying a braking effect to the engine. The exhaust brake will remain on until one of the conditions is no longer in effect.

NOTE: Some electronically controlled automatic transmissions will begin downshifting during exhaust brake operation. This keeps the engine speed up near rated speed where the braking effect is greatest.



△ CAUTION △

The engine speed must not exceed 2900 rpm under any circumstances. When descending a steep grade, use a combination of transmission gears and engine or service brakes to control the vehicle and engine speed. If the engine speed exceeds 2900 rpm engine damage can result.

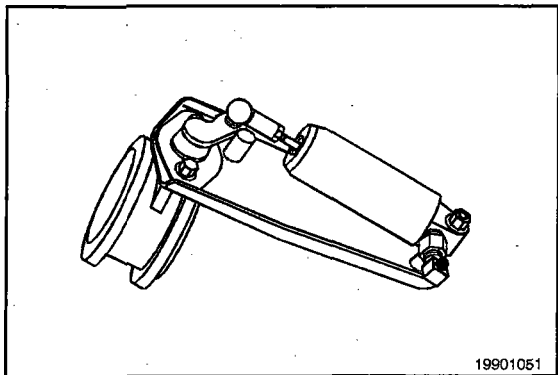
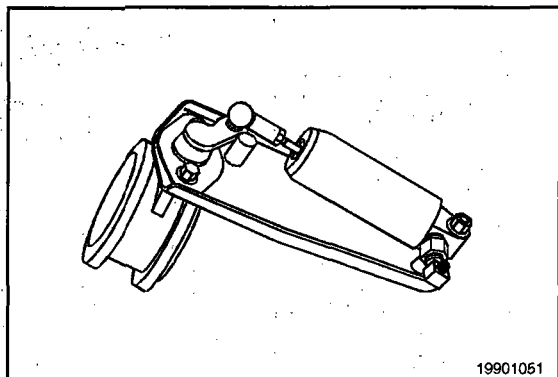


Exhaust Brake or Driveline Retarder Control

This feature notifies the ECM if either an exhaust brake or a driveline retarder is being used on the vehicle. It allows the driveline retarder to operate below 1000 rpm down to idle speed.

Automatic Exhaust Brake Activation in Cruise Control

This feature allows the ECM to use the exhaust brake to maintain set cruise control speed in downhill motoring conditions. If this feature is enabled, the exhaust brake automatically engages any time the cruise control is active and the vehicle speed exceeds the set cruise control speed by more than a programmed amount. The exhaust brake will disengage when the vehicle speed decreases back to the set cruise control speed.



Maintenance Monitor

⚠ CAUTION ⚠

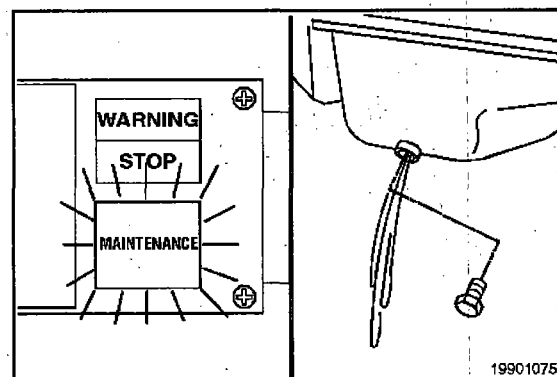
The maintenance monitor is designed to alert the operator of the need for a routine maintenance stop. Maintenance records must still be maintained for historical purposes.

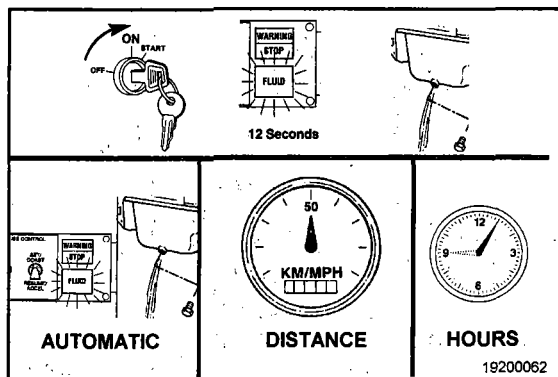
⚠ CAUTION ⚠

The maintenance monitor uses data received from the vehicle speed sensor (VSS) to determine distance and data from the ECM to determine the amount of fuel burned. Whenever a VSS or battery voltage fault has occurred, the maintenance monitor data can be inaccurate.

The maintenance monitor is an optional feature that will alert the operator when it is time to change the oil and perform any other simultaneous maintenance tasks. This feature continuously monitors the distance the vehicle has traveled, the time the engine has been operating, and the amount of fuel burned to determine when it is time to change the oil.

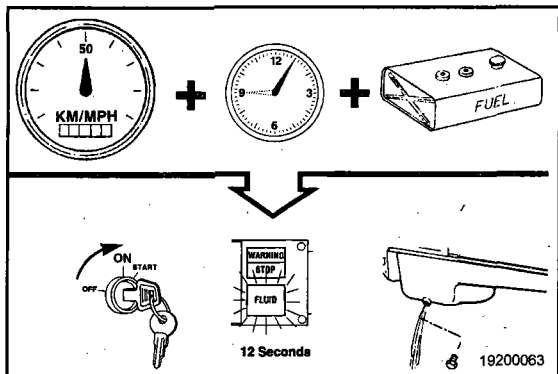
NOTE: The operator **must** still remain alert for any indications that the engine needs other service.





The maintenance monitor has three modes of operation:

- Automatic mode
- Distance mode
- Time mode.



CAUTION

The use of synthetic-base oil does not justify extended oil change intervals. Extended oil change intervals will decrease engine life due to factors such as corrosion, deposits, and wear.

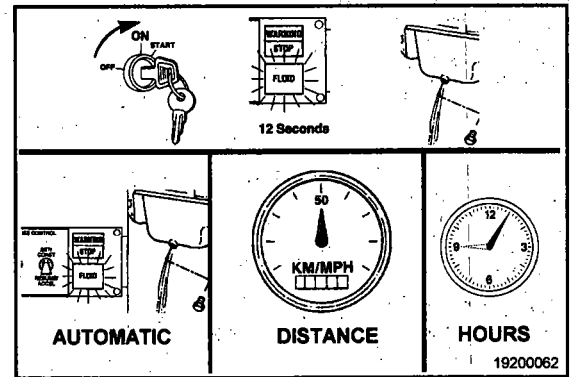
The automatic mode alerts the operator when it is time to change the oil based on Cummins' recommended interval. It determines the maintenance interval based on distance traveled, engine operating time, and fuel burned.

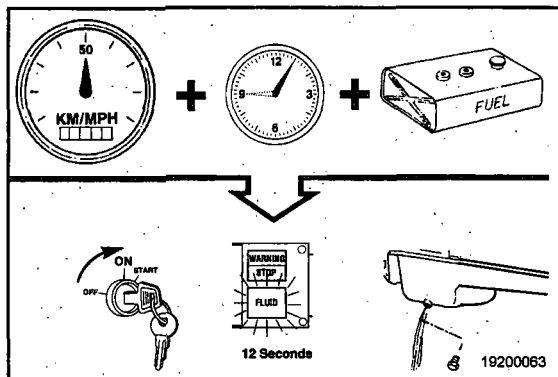
When the automatic mode is selected, the SEVERE oil drain interval duty cycle is the default.

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The interval factor is used **only** in the maintenance monitor automatic mode. It is used to adjust the maintenance interval for SEVERE-, NORMAL-, or LIGHT-duty applications.

The original factory-programmed value is SEVERE.





CAUTION

Refer to Lubricating Oil Drain Intervals in Section 2 of the Operation and Maintenance Manual, ISC Engine, Bulletin 3666262, for selecting the correct oil change interval for an application. Cummins Engine Company does not recommend exceeding these published intervals and is not responsible for damage sustained due to overextended drain intervals.

The distance mode allows the customer to enter a desired distance interval. The maintenance monitor tracks the distance the engine has traveled and alerts the operator when the interval has been reached.

NOTE: This mode of the maintenance monitor requires the use of the vehicle speed sensor (VSS). This mode **must not** be selected for applications that do **not** have this sensor.

⚠ CAUTION ⚠

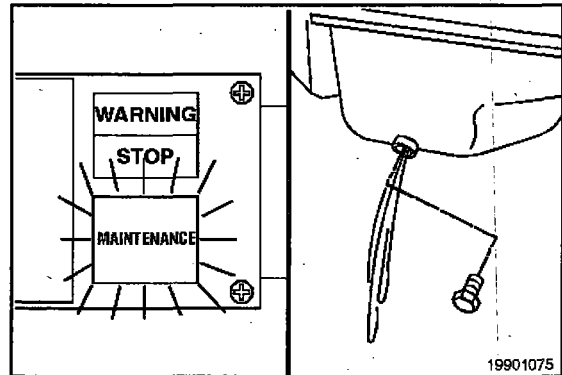
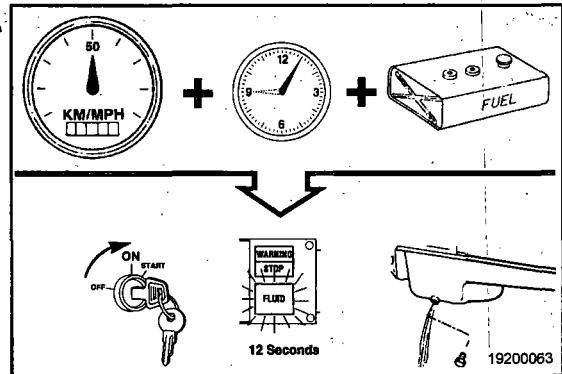
Refer to Lubricating Oil Drain Intervals in Section 2 of the Operation and Maintenance Manual, ISC Engine, Bulletin No. 3666262, for selecting the correct oil change interval for an application. Cummins Engine Company, Inc. does not recommend exceeding these published intervals and is not responsible for damage sustained due to overextended drain intervals.

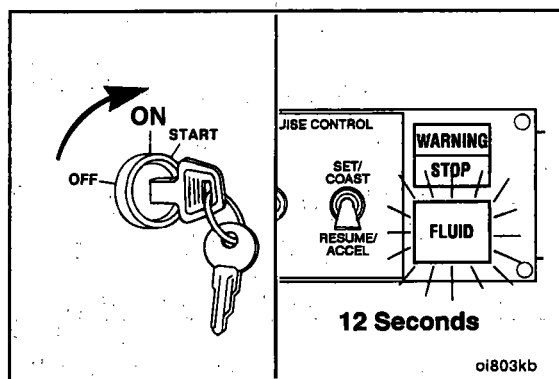
The time mode allows the customer to enter a desired time interval. The maintenance monitor tracks the time the engine has ran and alerts the operator when the interval has been reached.

Maintenance Monitor Interval Alert Percentage

This feature allows the user to enter the percentage of the current interval at which the light should illuminate indicating the need for an oil change. This allows the user to obtain an early warning of the need for a maintenance stop.

Example: If the distance mode is set to 24,194 km [15,000 mi] and the Interval alert percentage is set to 90 percent, the MAINTENANCE lamp will illuminate at 21,774 km [13,500 mi].





Alerting the Operator

The maintenance monitor will alert the operator of the need to change the oil by flashing the FLUID lamp for approximately 12 seconds after key-on. The flashing sequence will be three quick flashes followed by a pause. This flash sequence will cycle five times in the 12-second period. This sequence will occur at every key-on until the maintenance monitor has been reset.

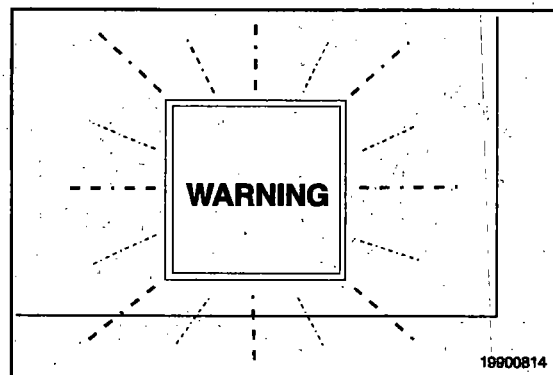
NOTE: The diagnostic switch **must** be in the OFF position for the flashing sequence to occur.

Maintenance Monitor Reset

To reset the maintenance monitor, click the reset button on the maintenance monitor screen using the INSITE™ service tool, or follow these steps:

1. Hold the throttle down at 100 percent.
2. Tap the brake three times.
3. Release the throttle and brake.
4. Hold the throttle down at 100 percent.
5. Tap the brake three times.
6. Release the throttle and brake.
7. Hold the throttle down at 100 percent.
8. Tap the brake three times.
9. Release the throttle and brake.

NOTE: The WARNING lamp will flash three quick flashes signifying that the reset has been made.



Maintenance Monitor Data

Percent of Current Maintenance Interval	XXX.X %
Distance Since Last MM Reset	XXXXXX Mi
Time Since Last MM Reset	XXXXX Hrs
Gallon Burned Since Last MM Reset	XXXX Gal.
Current MM Mode	XXXX

19800755

Maintenance Monitor Reset Log 1

	Maximum Threshold	Adjusted Threshold	Interval Reset
Distance:	XXXX	XXXX	XXXX
Fuel:	XXXX	XXXX	XXXX
Time:	XXXX	XXXX	XXXX

19800756

Viewing Maintenance Monitor Data

Using the INSITE™ service tool, the following maintenance data can be viewed or printed from the ECM:

- Percent of Current Maintenance Interval reached (by either distance, time, or fuel burned)
- Distance Since Last MM Reset
- Time Since Last MM Reset
- Fuel Burned Since Last MM Reset
- Current MM Mode.

Reset Log

The Maximum Threshold is entered by the user either directly using the manual distance or time mode, or by entering the interval factor in the automatic mode.

The Adjusted Threshold is the new threshold set automatically by the maintenance monitor when automatic mode is selected and automatically reduces the maintenance intervals.

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The Cumulative Reset @ is the total distance, time, and fuel recorded by the ECM at the time the maintenance monitor was reset.

The Possible Error will contain an "X" next to a row of data that can be inaccurate due to a system fault. The "X" will be triggered when a vehicle speed sensor (VSS) fault, or power-down fault occurs. These faults can cause data to either **not** accumulate or accumulate inaccurately.

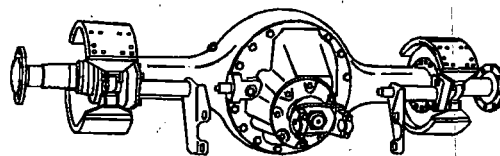
Two-Speed Axle

When enabled this feature allows the ECM to monitor a switched input to signal which axle ratio is being used in a two-speed axle system. This allows the ECM to correctly calculate the vehicle speed for both axle ratios.

Maintenance Monitor Reset Log 2

	Cumulative Reset @	Possible Error
Distance:	XXXX	XXXX
Fuel:	XXXX	XXXX
Time:	XXXX	XXXX

19800757

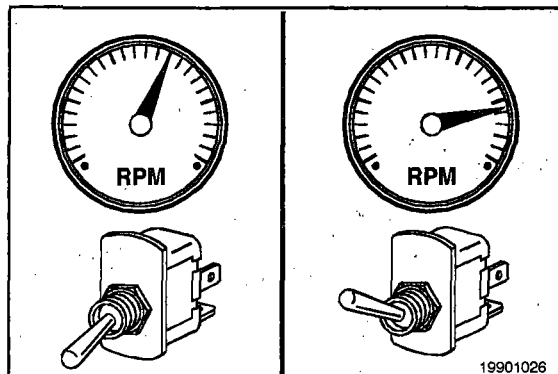


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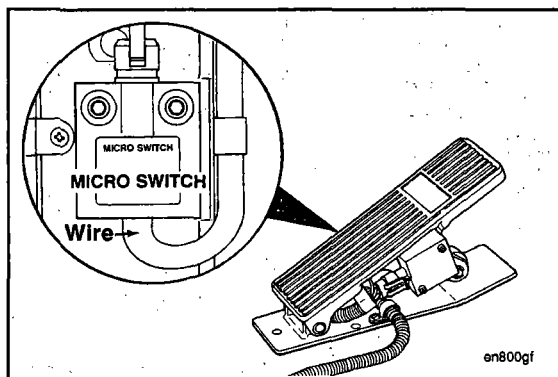
Maximum Switched Operation Speed

This feature changes the governed speed of the engine, depending on the position of the switched input.



Remote Throttle

Enabling this feature activates the remote-throttle capabilities of the ECM. When activated by a switched input into the ECM, the remote throttle will take precedence over the cab throttle.



Diagnostic Fault Codes

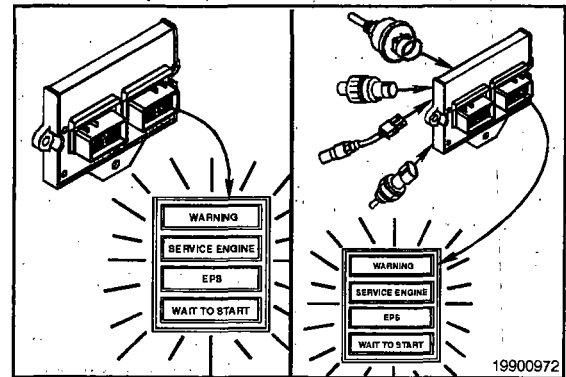
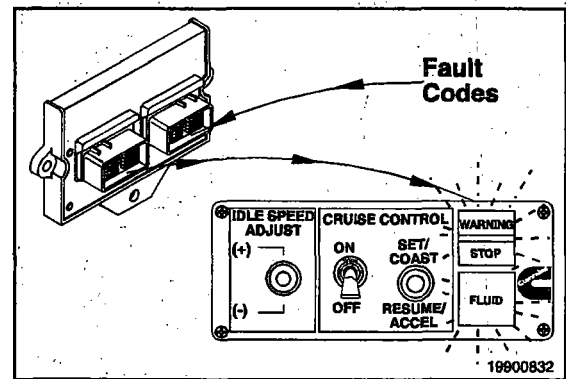
The ISC control system can show and record operation anomalies that present themselves as fault codes. These codes make troubleshooting easier. The fault codes are recorded in the ECM. They can be read using the fault lamps in the dash or with the INSITE™ service tool.

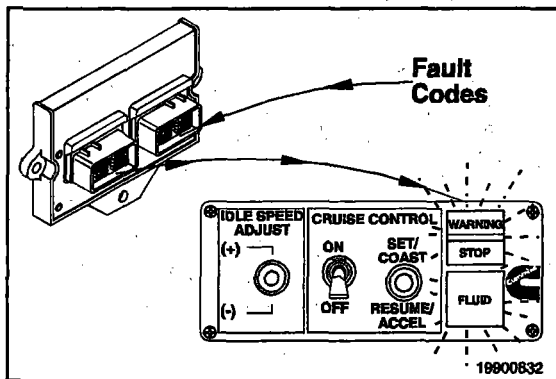
NOTE: Not all engine or ISC control system anomalies are shown as fault codes.

There are three types of system codes:

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

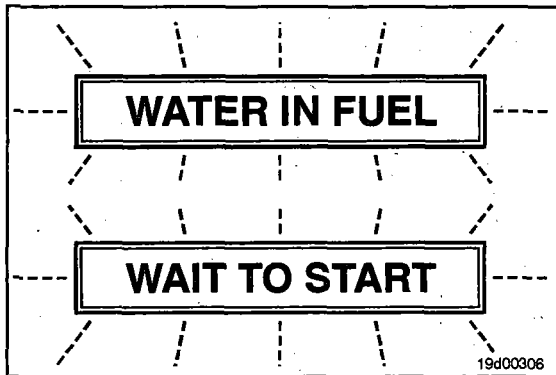
All fault codes recorded will be either active (fault code is currently active on the engine) or inactive (fault code was active at some time, but at the moment is **not** active).





Most, but **not** all, of the electronic fault codes will light a lamp when they are active. There are three possible lamps that can be illuminated when a fault code is active:

- The WARNING or CHECK ENGINE lamp is yellow and indicates the need to repair the fault at the first available opportunity.
- The STOP or STOP ENGINE lamp is red and indicates the need to stop the engine as soon as it can be safely done. The engine should remain shut down until the fault can be repaired.
- The MAINTENANCE lamp will illuminate when an engine maintenance function needs to be performed.

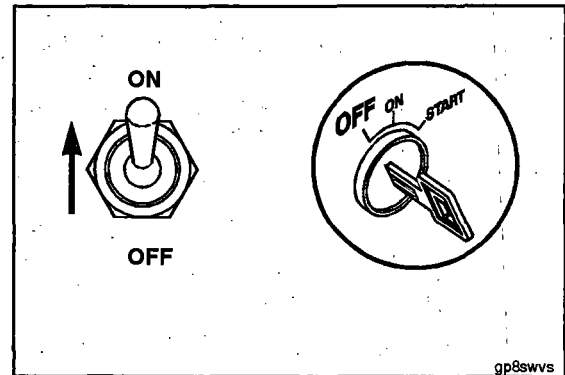
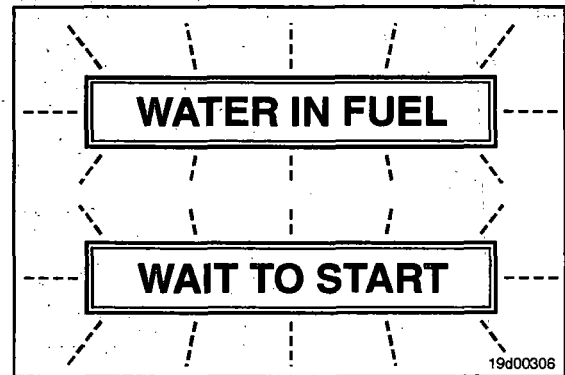


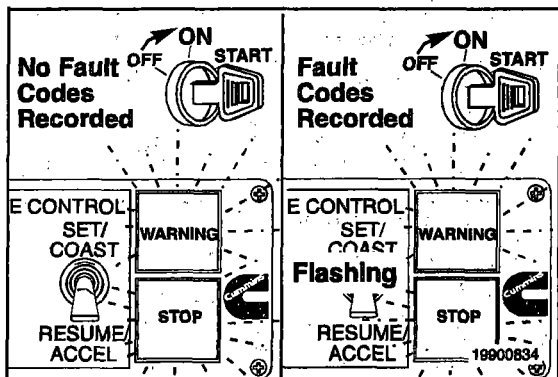
Some vehicles will also have a WAIT TO START lamp and a WATER IN FUEL lamp. The WAIT TO START lamp is illuminated during the preheat time that takes place at key-on during cold-weather starting. To minimize cranking time during cold-weather starting, the engine can **not** be cranked until the WAIT TO START lamp has been extinguished.

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The WATER IN FUEL lamp indicates that the engine's fuel-water separator needs to be drained. This task should be performed, as soon as possible, whenever this lamp is illuminated. Some vehicle OEMs will combine the functions of the MAINTENANCE and WATER IN FUEL lamps. In these cases, the MAINTENANCE lamp indicates a WATER IN FUEL warning, in addition to other maintenance indicators.

To check for active engine electronic system fault codes and maintenance indicator codes, turn the keyswitch to the OFF position, and move the diagnostic switch to the ON position, or connect the shorting plug into the diagnostic connector.

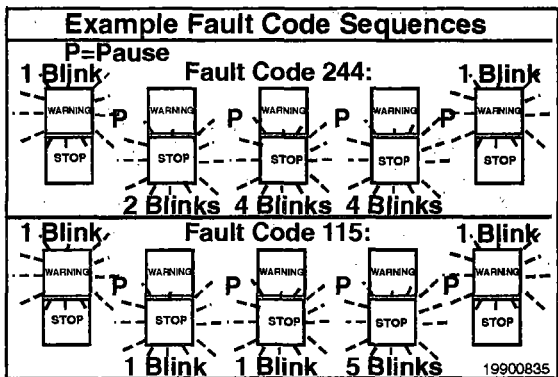




Turn the vehicle keyswitch to the ON position.

If no active fault codes are recorded, both WARNING and STOP lamps will illuminate and stay on.

If active fault codes are recorded, both WARNING and STOP lamps will illuminate momentarily, then begin to flash the codes of the recorded faults.



The fault code will flash in the following sequence:

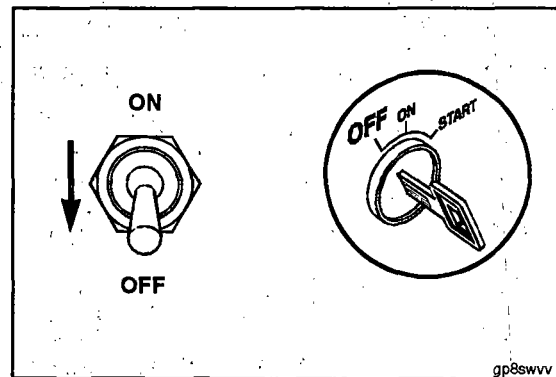
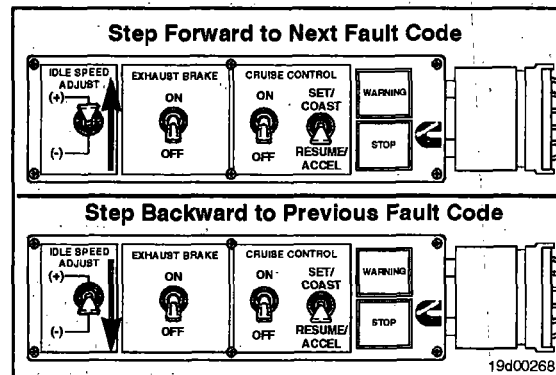
1. A yellow WARNING lamp will flash.
2. There is a short 1- or 2-second pause.
3. The fault code will flash on the red STOP lamp.
4. There is a short 1- or 2-second pause between each number.

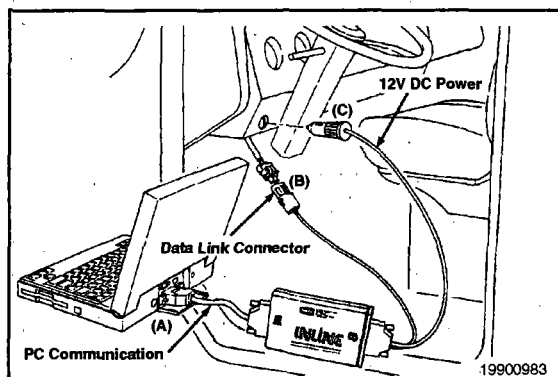
When the number has finished flashing in red, a yellow WARNING lamp will appear again. The fault code will repeat the same sequence.

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Each fault code will flash two times before advancing to the next code. To skip to the next fault code, move the IDLE SPEED ADJUST switch (if equipped) momentarily to the (+) position. You can go back to the previous fault code by momentarily moving the IDLE SPEED ADJUST switch (if equipped) to the (-) position. If **only** one active fault code is recorded, the ISC control system will continuously display the same fault code, even with either the (+) or (-) selected.

When **not** using the diagnostic system, turn OFF the Diagnostic Switch, or remove the Shorting Plug. If the Diagnostic Switch is left ON or the Shorting Plug left in, the electronic control module (ECM) will **not** log some fault codes.





Fault Code Snapshot Data

This additional fault code information can be obtained by using the INSITE™ service tool. The snapshot data records the value or state of the control system sensors and switches at the time a fault code occurred. Either set of data is stored for the first occurrence of the fault, since it was last cleared, and for the most recent occurrence. This data can be very valuable when trying to recreate or determine engine operating conditions at the time of a fault.

Trip Information

The trip information system records fuel consumption, distance, and time information for the engine during normal operation and in certain operating modes such as PTO and idle. This data can be displayed using the INSITE™ service tool. Some data can **not** be reset and reflects the performance of the engine over its lifetime. Other data, such as trip data, can be reset using the INSITE™ service tool.

Trip Information System

19900838

Engine Time Offset

This feature is part of the Trip Information System. The value entered here will be added to the total ECM time to get total engine time. This allows the time on the engine to be entered when the ECM is replaced.

Engine Distance Offset

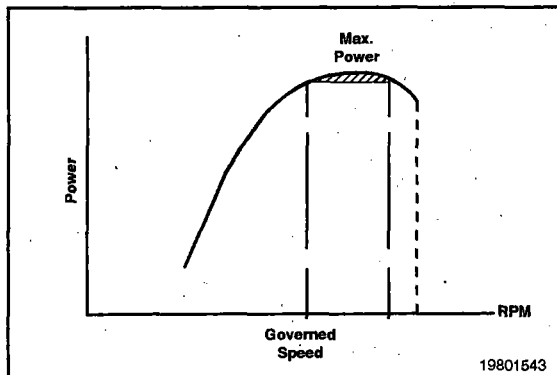
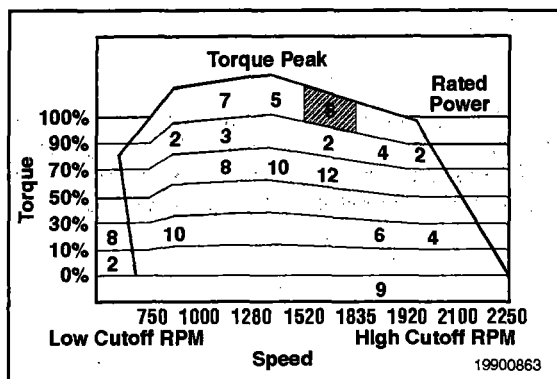
This feature is part of the Trip Information System. The value entered here will be added to the total ECM distance to equal the total engine distance. This allows the distance on the engine to be entered when the ECM is replaced.

Engine Time Offset

19800508

Engine Distance Offset

19800509



Duty Cycle Monitor

With this feature, the ECM tracks engine load and speed. This data is stored in the ECM until the INSITE™ service tool is used to display it. The INSITE™ service tool display shows a duty cycle "map" that shows the whole engine operating range in terms of speed and load. This "map" is divided into 50 regions. The percent of engine operating time spent in each region is shown on the display.

The ECM contains duty cycle data for the whole life of the engine and for two 500-hour operating periods. The two 500-hour maps can be reset with the INSITE™ service tool.

Driving Techniques

The ISC engine produces maximum power at an rpm less than governed engine speed. Placement of maximum power has been changed on ISC engines to encourage operation in the most fuel efficient engine speed range.

To obtain optimum engine performance on a grade, allow the engine speed to load down to near torque peak before shifting. This technique will result in an engine operating speed in the maximum power zone after the shift is completed.

Electromagnetic Interference (EMI)

General Information

Some diesel engine applications utilize accessories (such as CB radios and mobile transmitters) that generate and use radio frequency energy that, if not installed and used properly, can cause electromagnetic interference (EMI) conditions to exist between the accessory and Cummins ISC electronically controlled fuel system. Cummins is **not** liable for any performance problems with either the ISC fuel system or the accessory due to EMI. EMI is **not** considered by Cummins to be an engine failure and, therefore, is **not** warrantable.

System EMI Susceptibility

Cummins products have been designed and tested for minimum sensitivity to incoming electromagnetic energy. Testing has shown that there is no engine performance degradation at relatively high energy levels; however, if very high energy levels are encountered, then some noncritical diagnostic fault code logging can occur. The ISC fuel system EMI susceptibility level will protect the engine from most, if **not** all, electromagnetic energy-emitting devices that meet the FCC legal requirements.

System EMI Radiation Levels

Cummins products have also been designed and tested to emit minimum electromagnetic energy. Testing has shown that the ISC fuel system, when properly installed in a vehicle, meets or exceeds by a wide margin Part 15 of the FCC Rules and SAE J1551 specifications. Other accessories can be designed with proper filtering to reject electromagnetic noise emission from their system. Experience has shown that the ISC control system on a vehicle will **not** interfere with on-board communication equipment for urban and suburban background electromagnetic noise levels; however, the system, if used with accessories which are **not** installed properly or do **not** utilize adequate filtering designs, can interfere with on-board communications equipment in rural applications where background radio frequency noise levels are very low.

If an interference condition is observed, follow the suggestions below to reduce the amount of interference:

1. Locate the receiving antenna as far away from the engine and as high as possible.
2. Locate the receiving antenna as far away as possible from all metal obstructions such as exhaust stacks.
3. Consult a representative of the accessory supplier in your area to
 - Accurately calibrate the device for proper frequency, power output, and sensitivity (both base- and remote-site devices **must** be properly calibrated)
 - Obtain antenna reflective energy data measurements to determine the optimum antenna location
 - Obtain optimum antenna-type and mounting arrangement for an application
 - Make sure the accessory equipment model is built for maximum filtering to reject incoming electromagnetic noise.

Welding on a Vehicle with Electronic Components is Not Recommended

Disconnect both the positive (+) and ground, or negative (-), battery cables from the battery before welding on the vehicle. Attach the welder ground (-) cable no more than 0.61 m [2 ft] from the part being welded. Do **not** connect the ground (-) cable of the welder to any electronic component or component-mounting location. Welding on the engine or engine-mounted components is **not** recommended because engine mounted components can be damaged.

NOTES

Section 2 - Maintenance Guidelines

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Maintenance Schedule	2-4
Page References for Maintenance Instructions	2-9
Tool Requirements	2-2

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Maintenance Guidelines - General Information

Cummins Engine Company, Inc. recommends that the engine be maintained according to the Maintenance Schedule in this section.

If the engine is operating in ambient temperatures consistently below -18°C [0°F] or above 38°C [100°F], perform 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. See a Cummins Authorized Repair Facility for recommended intervals.

If the 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 at the end of this section as a convenient way to keep a record of maintenance performed.

NOTE: The ISC engine features a no-adjust overhead. The ISC valve train is designed such that adjustment of the valve lash is **not** required for normal service within the first 241,500 km [150,000 mi]. The valve train operates acceptably within the limits of 0.152 to 0.559 mm [0.006 to 0.022 in] intake valve lash and 0.381 to 0.813 mm [0.015 to 0.032 in] exhaust valve lash. It is recommended that the valve lash be checked around 241,500 km [150,000 mi].

Tool Requirements

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

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

Tool Part No.	Description
ST-1273	Pressure Gauge
3375045	Torque Wrench (0 to 175 ft-lb)
3375049	Oil Filter Wrench
3376807	Engine Coolant and Fuel Filter Wrench
3822524	Belt Tension Gauge, Click-Type (v-belts and v-ribbed with 4 or 5 ribs)
3822525	Belt Tension Gauge, Click-Type (v-ribbed with 6 to 12 ribs)
3824556	Charge-Air Cooler (CAC) Pressure Kit
3824591	Engine Barring Gear
3824783	Torque Wrench (0 to 300 in-lb)
CC-2800	Refractometer
CC-2802	Coolant Test Kit

Tool Part No.	Description
3824842	Compucheck® Fitting

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

A computer is required to run the OEM software. Contact a Cummins Authorized Repair Facility for information on hardware requirements.

Maintenance Schedule

ISC Engine Maintenance Schedule:					
Daily or Refueling	Every 12,000 km [7500 mi], 250 Hours, or 3 Months	Every 24,000 km [15,000 mi], 500 Hours, or 6 Months (1), (2), (4)	Every 48,000 km [30,000 mi], 1,000 Hours, or 1 Year (4)	Every 96,000 km [60,000 mi], 2,000 Hours, or 2 Years (3)	Every 241,500 km [150,000 mi], 5000 Hours, or 4 Years (4)
Maintenance Check	Check/Inspect	Change/Replace/Inspect	Check/Inspect	Check/Inspect/Replace	Check/Inspect
<ul style="list-style-type: none"> • Check and correct <ul style="list-style-type: none"> – Engine oil level – Coolant level • Drain air tanks and reservoirs • Drain fuel-water separator • Inspect cooling fan • Check crankcase breather tube • Check air intake piping 	<ul style="list-style-type: none"> • Mounting hardware such as injection pump and air compressor • Operate engine and check air intake system • Charge-air piping • Charge-air cooler 	<ul style="list-style-type: none"> • Fuel filter • Lubricating oil (1) • Lubricating oil filter (1) • Coolant filter • Check engine (2) coolant SCA concentration level 	<ul style="list-style-type: none"> • Fan hub • Belt tensioner • Drive belts 	<ul style="list-style-type: none"> • Replace antifreeze (2) • Vibration damper 	<ul style="list-style-type: none"> • Overhead valve lash (5)
<ol style="list-style-type: none"> 1. The lubricating oil and lubricating oil filter interval can be adjusted based on application, fuel consumption, gross vehicle weight, and idle time. Refer to Section 2. 2. Service interval is every oil change or 24,000 km [15,000 mi], 500 hours, or 6 months, whichever occurs first. A heavy-duty year-round antifreeze that meets the chemical composition of GM6038M must be used. The change interval is 2 years or 385,000 km [240,000 mi], whichever occurs first. Antifreeze is essential for freeze, overheat, and corrosion protection. 3. Service interval is 2 years or 385,000 km [240,000 mi], whichever occurs first. 4. Follow the manufacturers' recommended maintenance procedures for the starter, alternator, batteries, electrical components, engine brake, exhaust brake, charge-air cooler, radiator, air compressor, air cleaner, freon compressor, and fan clutch. Refer to Component Manufacturers (Section M). 5. Reset valve lash, if needed, to nominal specification 0.305 mm [0.012 in] for intake valve lash and 0.559 mm [0.022 in] for exhaust valve lash. 					

Section 2 - Maintenance Guidelines**Oil Drain Interval**

Refer to the following flowchart to determine the maximum recommended oil change and filter change intervals in kilometers, miles, hours, or months, whichever comes first.

Is the vehicle one of those listed below?

- Delivery truck
- School bus
- Fire truck/emergency vehicle.

If Yes -

Select the correct oil drain interval from Table 1.

If No -

Is the vehicle one of those listed below?

- Refuse truck
- Mixer/dumper

(Continued on next page)

If Yes -

Select the correct oil drain interval from Table 2.

If No -

If the vehicle is a shuttle or transit bus, select the oil drain interval from Table 3.

If the vehicle is a recreational vehicle, or a vehicle that has not been listed, select the correct oil drain interval from Table 4.

Table 1, Maximum Oil Drain Intervals

(A) Severe-Duty (If the Vehicle Meets Any of These Conditions)	(B) Normal-Duty (If the Vehicle Meets Both of These Conditions)
Average fuel economy is less than 2.98 km/liter [7.0 mpg], or idle time is 40 percent or greater, or vehicle operates in dusty areas, or gross vehicle weight is greater than 27,215 kg [60,000 lbs].	Average fuel economy is greater than 2.98 km/liter [7.0 mpg], and gross vehicle weight is less than 27,215 kg [60,000 lbs].
Vehicle uses the severe-duty oil drain interval (A).	Vehicle uses the normal-duty oil drain interval (B).
(A) Severe-Duty	(B) Normal-Duty
14,500 km [9000 mi], 500 hours, 6 months, or 7571 liters [2000 gal] of fuel, whichever occurs first	24,000 km [15,000 mi], 500 hours, 6 months, or 7571 liters [2000 gal] of fuel, whichever occurs first.

Table 2, Oil Drain Intervals

Refuse Truck, Mixer, or Dump Truck	Kilometers	Miles	Hours	Months
Below 10 mph Average	4850	3000	500	6
10 to 15 mph Average	9650	6000	500	6
15 to 20 mph Average	13,700	8500	500	6
20 to 25 mph Average	14,500	9000	500	6
Higher than 25 mph Average	19,000	12,000	500	6

Table 3, Oil Drain Intervals

Shuttle or Transit Bus	Kilometers	Miles	Hours	Months
10 to 15 mph Average	9650	6000	500	6
8 to 10 mph Average	8050	5000	500	6
6 to 8 mph Average	6450	4000	500	6
4 to 6 mph Average	4850	3000	500	6
2 to 4 mph Average	2400	1500	500	6

Table 4, Oil Drain Intervals

Vehicle/Equipment	Kilometers	Miles	Hours	Months
Recreational Vehicle	24,000	15,000	400	12
Truck Crane	14,500	9000	500	6
Yard Spotter	14,500	9000	500	6
All Others	14,500	9000	500	6

Page References for Maintenance Instructions

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

Daily or Refueling - Maintenance Check

• Air Intake Piping - Inspect	3-9
• Cooling Fan - Inspect	3-7
• Crankcase Breather Tube - Check	3-10
• Engine Coolant Level - Check/Correct	3-4
• Engine Lubricating Oil Level - Check/Correct	3-3
• Fuel-Water Separator - Drain	3-2

Every 12,000 km [7500 mi], 250 Hours, or 3 Months - Maintenance Check

• Charge-Air Piping - Check/Correct	4-2
• Charge-Air Cooler (CAC) - Check/Correct	4-3
• Air Cleaner Restriction - Check/Correct	4-4
• Fuel Injection Pump Mounting - Check/Correct	4-6
• Air Compressor Mounting - Check/Correct	4-7

Every 24,000 km [15,000 mi], 500 Hours, or 6 Months - Maintenance Check

- Lubricating Oil - Change 5-2
- Lubricating Oil Filters - Replace 5-2
- Fuel Filter, (Spin-On Type) - Replace 5-11
- Cooling System - Antifreeze Check 5-17

Every 48,000 km [30,000 mi], 1000 Hours, or 1 Year - Maintenance Check

- Drive Belts - Check/Correct 6-2
- Fan Hub, Belt-Driven - Check/Correct 6-3
- Belt Tensioner, Automatic - Check/Correct 6-4

Every 96,000 km [60,000 mi], 2000 Hours, or 2 Years - Maintenance Check

- Cooling System - Clean 7-2
- Vibration Damper, Rubber - Check/Correct 7-9
- Vibration Damper - Check/Correct 7-10

Every 241,500 km [150,000 mi] 5000 Hours, or 4 Years - Maintenance Check

- Overhead Set - Measure/Reset 8-2

Maintenance Record Form

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

Key to table headings:

- A = Date
- B = km [Miles], Hours or Time Interval
- C = Actual km [Miles] or Hours
- D = Maintenance Check Performed
- E = Check Performed By
- F = Comments

A	B	C	D	E	F

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Section 3 - Maintenance Procedures at Daily Interval

Section Contents

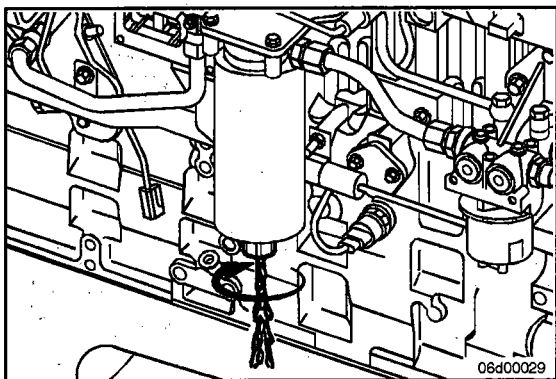
	Page
Air Intake Piping	3-9
Maintenance Check	3-9
Coolant Level	3-4
Maintenance Check	3-4
Crankcase Breather Tube	3-10
Maintenance Check	3-10
Daily Maintenance Procedures - General Information	3-1
Fan, Cooling	3-7
Inspect for Reuse	3-7
Fuel-Water Separator	3-2
Drain	3-2
Lubricating Oil Level	3-3
Maintenance Check	3-3

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Daily Maintenance Procedures - General Information

Preventative 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 the following:

- Leaks
- Loose or damaged parts, especially in fuel or exhaust systems
- Worn or damaged belts
- Any change in engine appearance
- Odor of fuel.



Fuel-Water Separator

Drain

⚠ WARNING ⚠

Water can contain toxic and carcinogenic material. Avoid ingestion or prolonged contact with this water

⚠ CAUTION ⚠

Drain the water/fuel into a container and dispose of in accordance with local environmental regulations.

NOTE: The water and sediment can contain petroleum products. Please consult the local environmental agency for recommended disposal guidelines.

Cummins Engine Company, Inc. requires a fuel-water separator be installed in the fuel supply system. Drain the water and sediment from the separator daily.

Shut off the engine. Open the drain valve by hand.

Open the drain valve until fluid drains out of the drain tube.

Drain the filter sump until clear fuel is visible.

Lubricating Oil Level

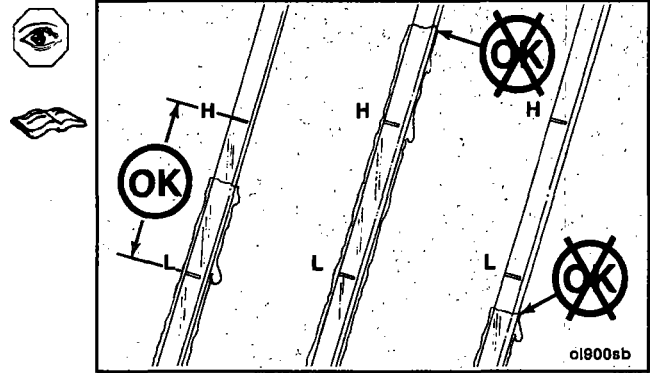
Maintenance Check

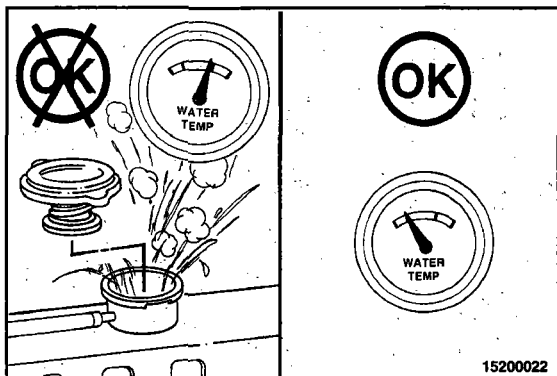
The vehicle **must** be level when checking the oil level to make sure the measurement is correct.

Shut off the engine for an accurate reading.

Never operate the engine with the oil level below the "L" (low) mark or above the "H" (high) mark. Wait at least 10 minutes after shutting off the engine to check the oil. This allows time for the oil to drain into the oil pan.

For additional oil recommendations, refer to Lubricating Oil Recommendations and Specifications in Section V.





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 pressure cap slowly to relieve coolant system pressure.

⚠ CAUTION ⚠

Never use a sealing additive to stop leaks in the cooling system. This can result in cooling system plugging and inadequate coolant flow, causing the engine to overheat and the cooling system to fail.

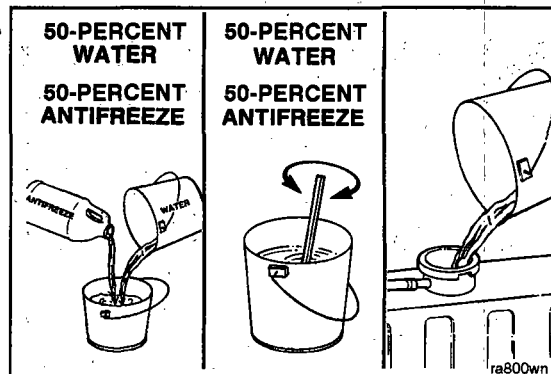
The coolant level must be checked daily.



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.

If additional coolant is added to the cooling system, a 50-percent mixture of water and antifreeze **must** be premixed before being added to the system. Since the ability of antifreeze to remove heat from the engine is **not** as good as water, pouring antifreeze into the engine first could contribute to an overheated condition before the liquids are completely mixed. Refer to Coolant Recommendations and Specifications (Section V).

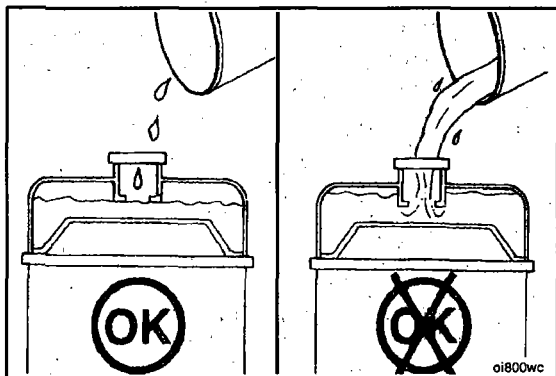
NOTE: On applications that use a coolant recovery system, check to make sure that the coolant is at the appropriate level in the coolant recovery tank, depending on the engine temperature.



Section 3 - Maintenance Procedures at Daily Interval

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 **must** be filled when the cooling system is drained.



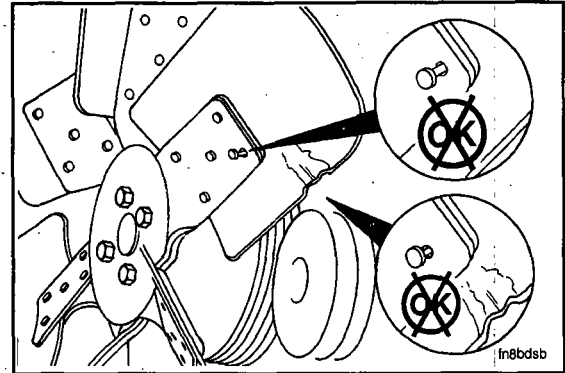
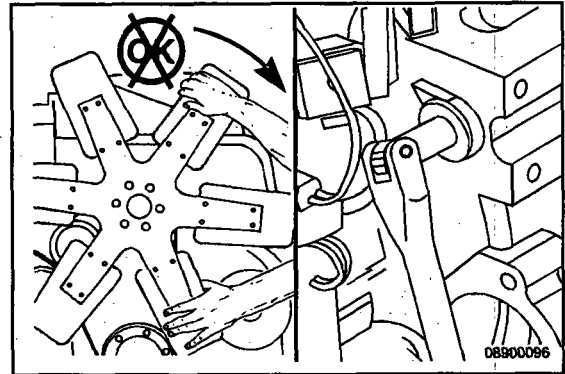
Fan, Cooling

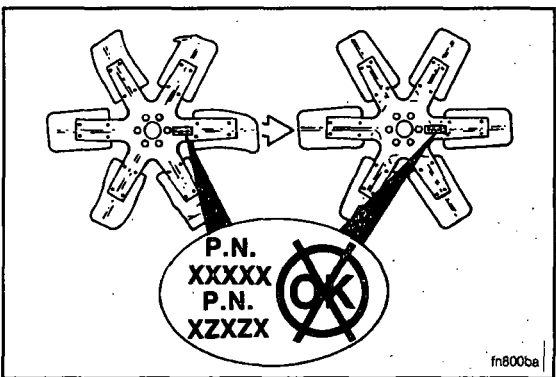
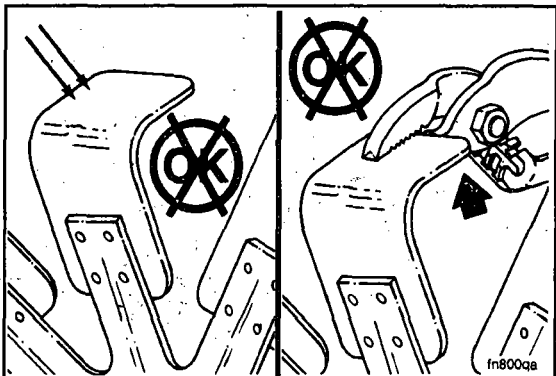
Inspect for Reuse

▲ WARNING ▲

Do not rotate the engine by pulling or prying on the fan. The fan blade(s) can be damaged and cause the fan to fail and cause serious personal injury or property damage. Use the engine barring gear to rotate the crankshaft.

Inspect the cooling fan daily. Check for cracks, loose rivets, and bent or loose blades. Check the fan to make sure that it is securely mounted. Tighten the capscrews, if necessary.





▲ WARNING ▲

Do not straighten a bent fan blade or continue to use a damaged fan. A bent or damaged fan blade can fail during operation and cause serious personal injury or property damage.

Replace any original equipment fan that is damaged with a fan of the identical part number. Cummins Engine Company, Inc. must approve any other fan changes.

Air Intake Piping

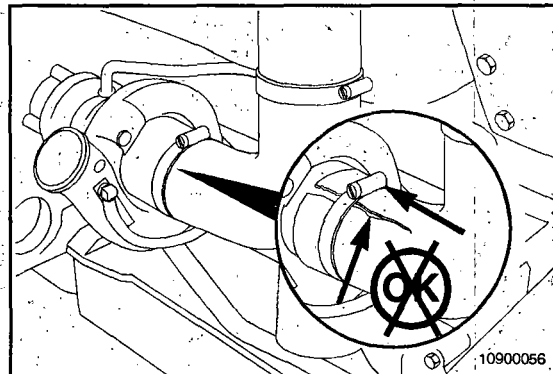
Maintenance Check

Inspect the intake piping daily for wear points and damage to piping, loose clamps, or punctures that can damage the engine.

Replace damaged pipes, and tighten loose clamps, as necessary, to prevent the air system from leaking.

Torque Value: 8 N•m [71 in-lb]

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



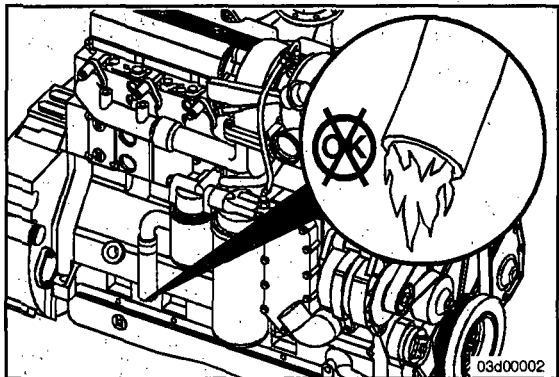
Crankcase Breather Tube

Maintenance Check

Check the crankcase breather tube daily during cold weather operations for ice buildup, which can obstruct the tube.

If an ice buildup is present, remove the breather tube, if necessary, and clear the obstruction.

The ISC engine is equipped with a block-mounted breather tube.



Maintenance Procedures at 12,000 Kilometers [7500 Miles], 250 Hours, or 3 Months

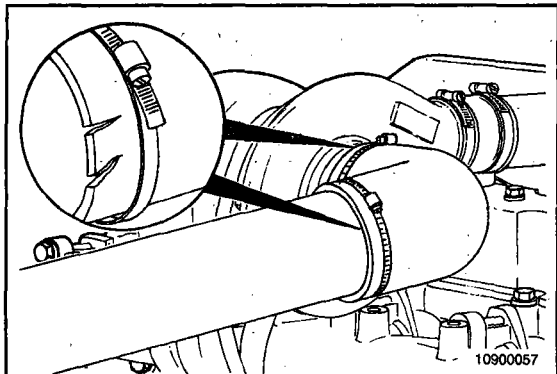
Section Contents

	Page
Air Compressor	4-4
Maintenance Check	4-4
Air Intake Restriction	4-3
Maintenance Check	4-3
Charge-Air Cooler (CAC)	4-2
Maintenance Check	4-2
Charge-Air Piping	4-2
Maintenance Check	4-2
Fuel Pump	4-4
Maintenance Check	4-4
Maintenance Procedures - General Information	4-1

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Maintenance Procedures - General Information

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



Charge-Air Piping

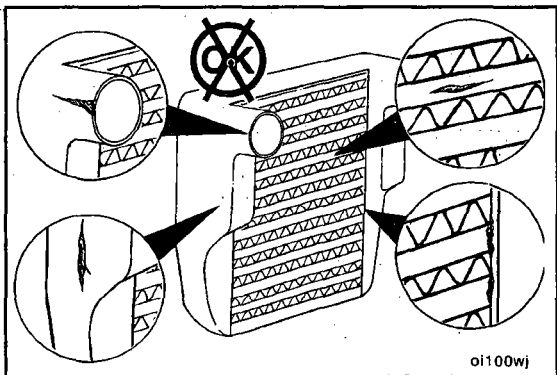
Maintenance Check



Inspect the charge-air piping and hoses for holes, cracks, and loose connections.

Tighten the hose clamps, if necessary.

Torque Value: 8 N•m [71 in-lb]



Charge-Air Cooler (CAC)

Maintenance Check



Inspect the charge-air cooler for dirt and debris blocking the fins. Check for cracks, holes, and other damage. If damage is found, refer to the original equipment manufacturer (OEM) dealer.

Air Intake Restriction

Maintenance Check

The maximum intake air restriction is 635 mm [25 in] of water for turbocharged engines.

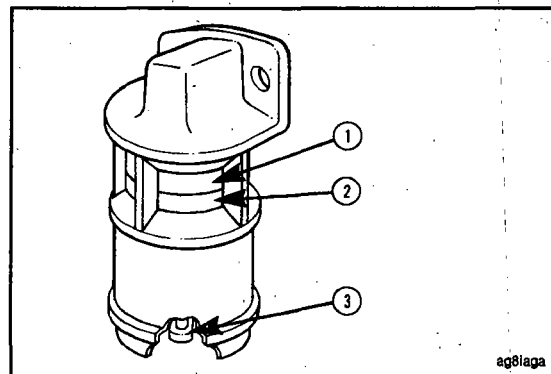
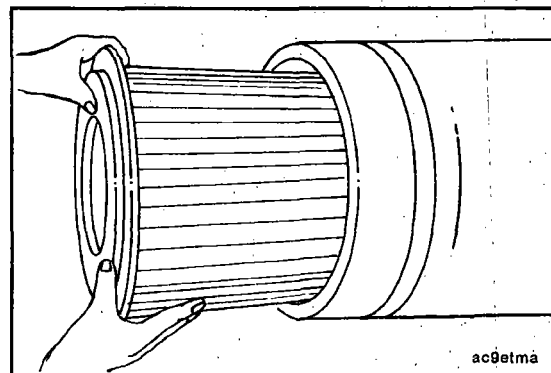
Turbocharged engines **must** be operated at rated rpm and full load to check maximum intake air restriction. Replace the air cleaner element when the restriction reaches the maximum allowable limit, or clean according to the manufacturer's recommendations.

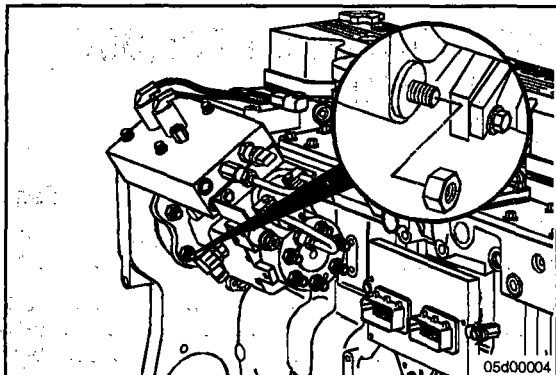
NOTE: Follow the manufacturer's instructions when cleaning or replacing the air cleaner element.

Check the air cleaner service indicator, if equipped. Change the filter element when the red indicator flag (2) is at the raised position in the window (1).

After the air cleaner has been serviced, push the button (3) to reset the service indicator.

NOTE: **Never** operate the engine without an air cleaner. Intake air **must** be filtered to prevent dirt and debris from entering the engine and causing premature wear.

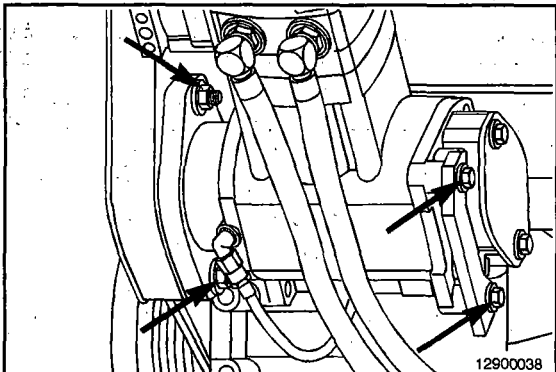




Fuel Pump

Maintenance Check

Inspect the fuel injection pump mounting nuts, including the tail support bracket and the top support bracket, for loose and damaged hardware.



Air Compressor

Maintenance Check

Inspect the air compressor mounting nuts, including the tail support bracket, for loose and damaged hardware.

Maintenance Procedures at 24,000 Kilometers [15,000 Miles], 500 Hours, or 6 Months

Section Contents

	Page
Cooling System	5-14
Maintenance Check	5-14
Fuel Filter (Spin-On Type)	5-8
Inspect for Reuse	5-10
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Lubricating Oil and Filters	5-2
Oil Drain Intervals	5-2
Maintenance Procedures - General Information	5-1
General Information	5-1

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Maintenance Procedures - General Information

General Information

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

Fleetguard® is a subsidiary of Cummins Engine Company, Inc. Fleetguard® filters are developed through joint testing at Cummins and Fleetguard®. Fleetguard® filters are standard on new Cummins engines. Cummins Engine Company, Inc. recommends their use.

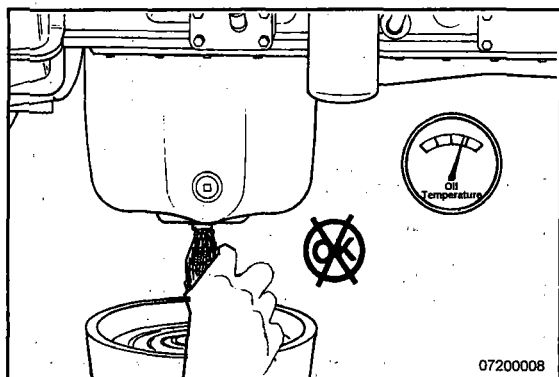
Fleetguard® products meet all Cummins Source Approval Test standards to provide the quality filtration necessary to achieve the engine's design life. If other brands are substituted, insist on products that the supplier has tested to meet Cummins high-quality standards.

Cummins can **not** be responsible for problems caused by nongenuine filters that do **not** meet Cummins performance or durability requirements.

Welding on a Vehicle with an Electronic Controlled System

CAUTION

Disconnect both the positive (+) and ground (-) negative battery cables from the battery before welding on the vehicle. Attach the welder ground (-) cable no more than 0.61 m [2 ft] from the part being welded. Do not connect the ground (-) cable of the welder to the electronic control module (ECM) cooling plate or the ECM. Welding on the engine or engine-mounted components is not recommended because engine component damage can result.



Lubricating Oil and Filters

Oil Drain Intervals

▲ 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.

▲ WARNING ▲

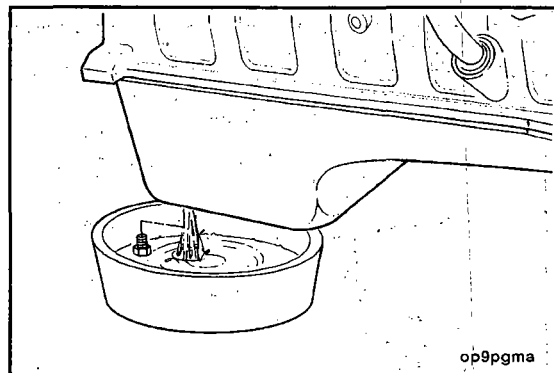
Avoid direct contact of hot oil with your skin. Hot oil can cause personal injury.

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

Operate the engine until the water temperature reaches 60°C [140°F]. Shut off the engine.

NOTE: Use a container that can hold at least 19 liters [20 qt] of lubricating oil.

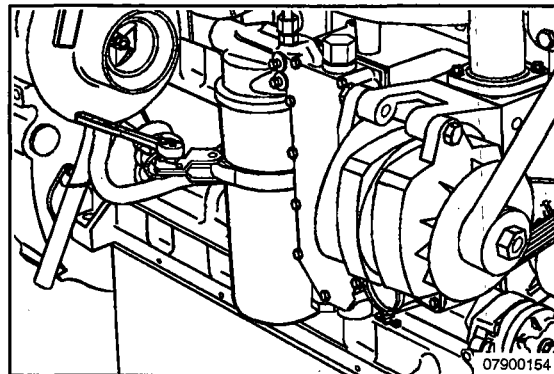
Remove the oil drain plug from the bottom of the lubricating oil pan.

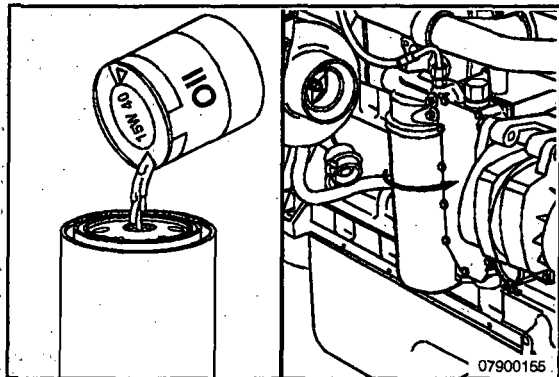


Remove the Oil Filter

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

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

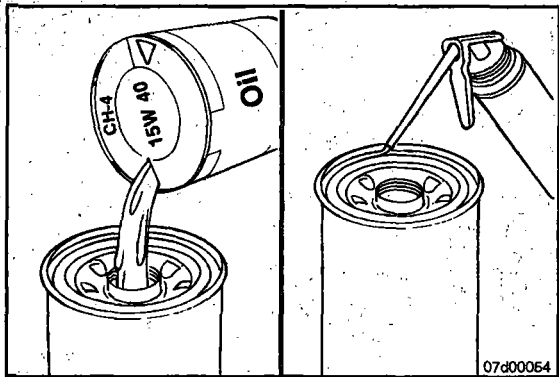




Use the correct oil filter:

Fleetguard® Part No. LF9009 or

Cummins Part No. 3401544.



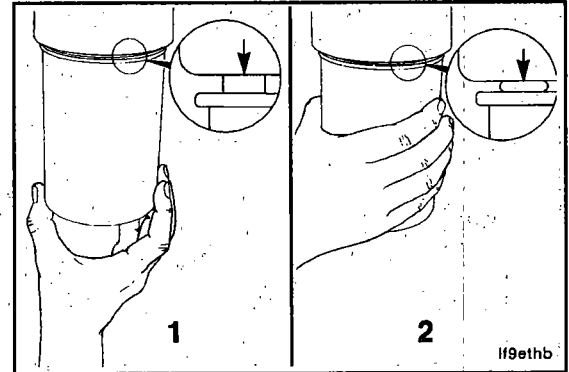
NOTE: Fill the filter with clean lubricating oil before installation.

Apply a light film of lubricating oil to the gasket sealing surface before installing the filter.

⚠ CAUTION ⚠

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

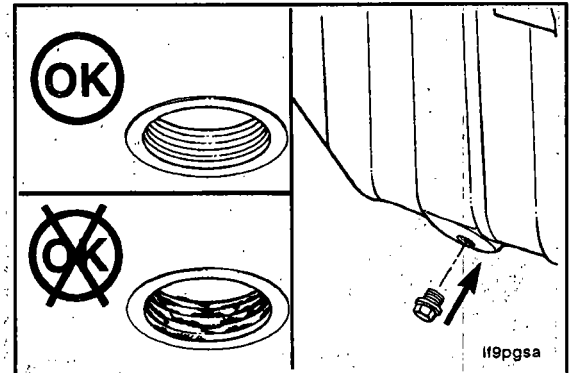
Install the filter as specified by the filter manufacturer.



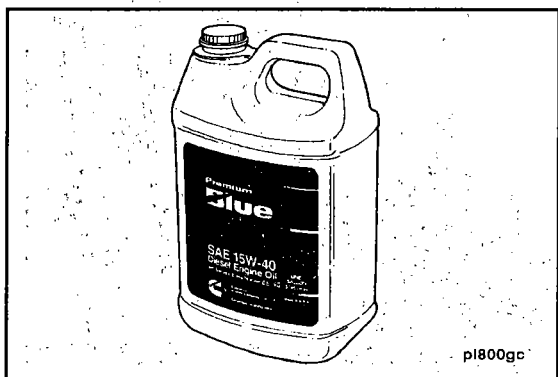
Check and clean the oil drain plug threads and sealing surface.

Install the drain plug.

Torque Value: 80 N•m [59 ft-lb]



NOTE: Use a high-quality 15W-40 multiviscosity lubricating oil such as Valvoline® Premium Blue®, or its equivalent, in Cummins engines. Choose the correct lubricating oil for the operating climate as outlined in Section V.



**ISC
Maintenance Procedures at 24,000 km [15,000 mi]**

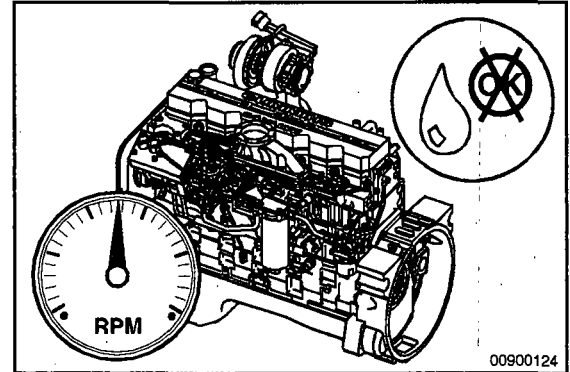
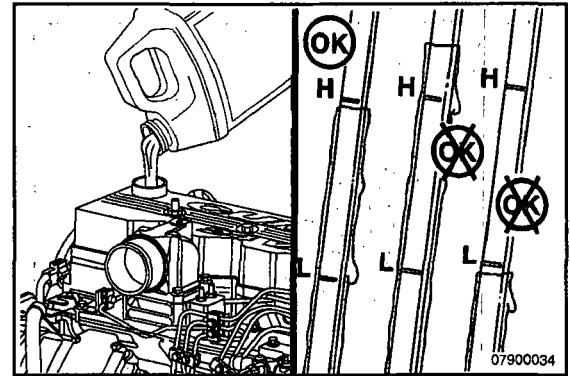
Fill the engine with clean lubricating oil to the proper level.

NOTE: Total system capacity assumes lubricating oil pan plus lubricating oil filter.

Some applications use a slightly different lubricating oil pan capacity, and all lubricating oil quantities **must** be adjusted accordingly. Contact the local Cummins Distributor if there are any questions.

	Lubricating Oil Capacity		
	liters		U.S.qt
Standard Pan	19.9	MAX	21
Standard Oil Pan with Cylinder Block Stiffener Plate	20.8	MAX	22

Operate the engine, and check for leaks at the filters and the oil drain plug.



Fuel Filter (Spin-On Type)

Preparatory

⚠ WARNING ⚠

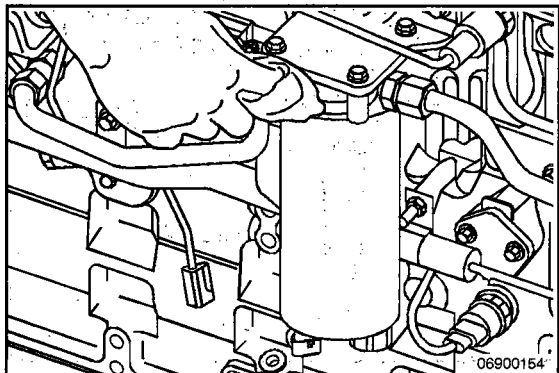
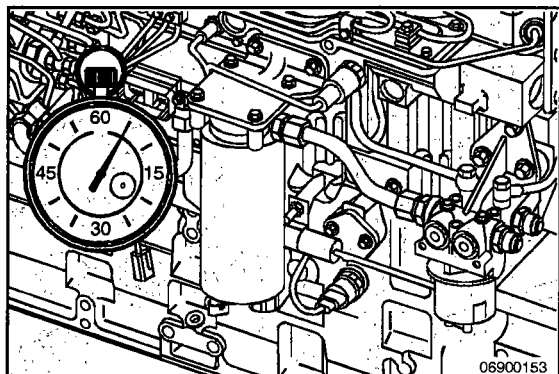
Water can contain toxic and carcinogenic material. Avoid ingestion or prolonged contact with this water.

⚠ CAUTION ⚠

Drain the fuel filter into a container and dispose of in accordance with local environmental regulations.

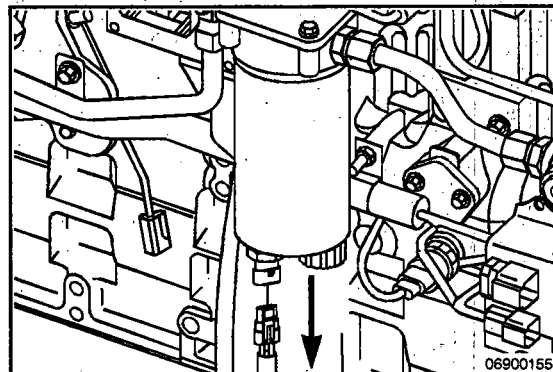
Use the filter drain valve to drain fuel out of the filter for approximately 5 seconds. This will eliminate fuel from running over the top of the filter upon removal.

Clean all debris from around the fuel filter head.

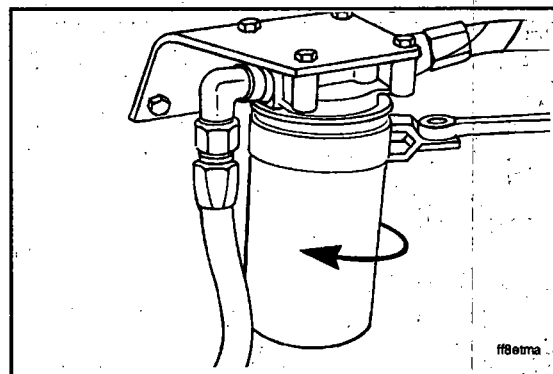


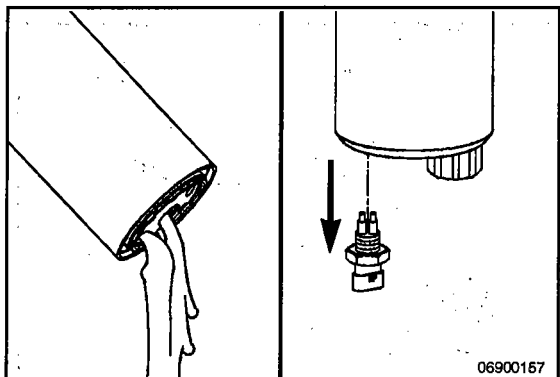
Remove

Disconnect the water-in-fuel sensor from the wiring harness.



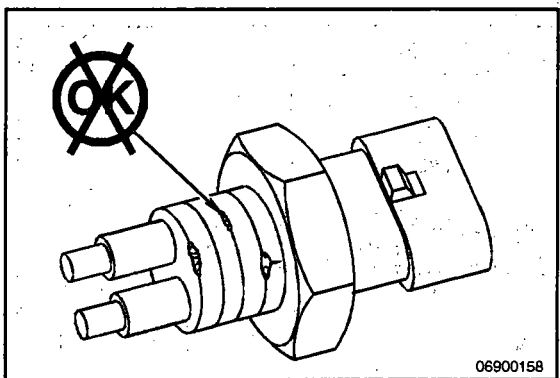
Unscrew and remove the fuel filter.





Drain the fuel filter.

Remove the water-in-fuel sensor from the fuel filter.



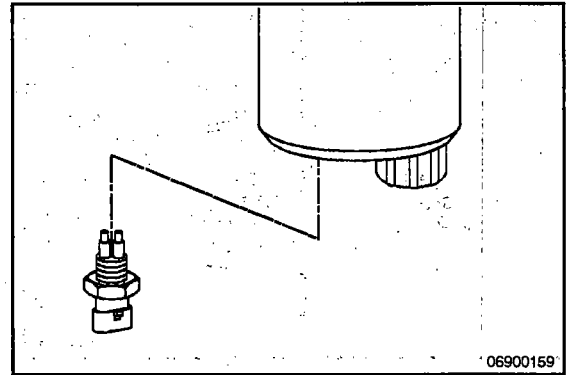
Inspect for Reuse

Inspect the water-in-fuel sensor for cracks or damage.

Install

Install the water-in-fuel sensor into the new fuel filter, Cummins Part No. 3944269 (Fleetguard® Part No. FS1022), if necessary.

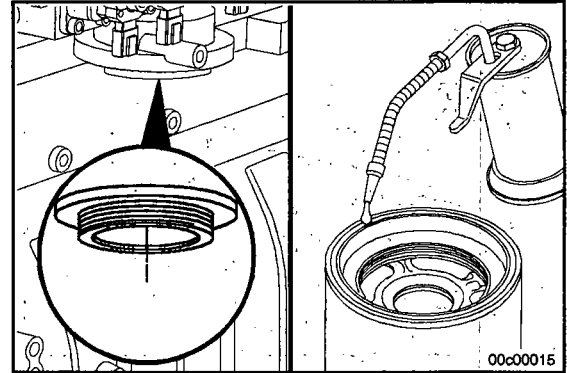
The reusable water-in-fuel assembly is Cummins Part No. 3944270.

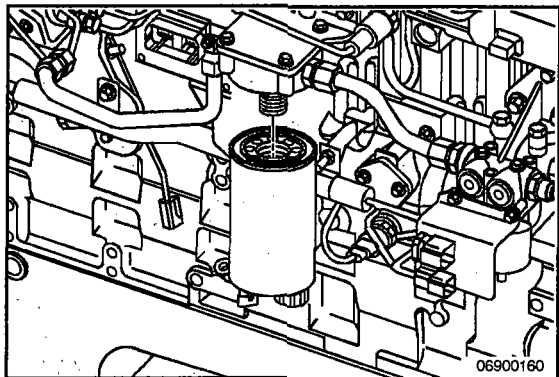


⚠ CAUTION ⚠

The ISC engine has a self-priming, low-pressure system that purges the air from the fuel system. Do not prefill the fuel filter. Prefilling the fuel filter can cause fuel pump damage.

Lubricate the o-ring with clean lubricating oil.

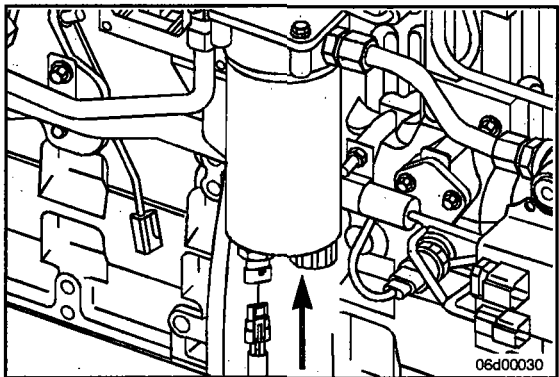




CAUTION

Mechanical overtightening can distort the threads as well as damage the filter element seal or filter canister.

Install the filter as specified by the filter manufacturer.



Connect the water-in-fuel sensor to the wiring harness.

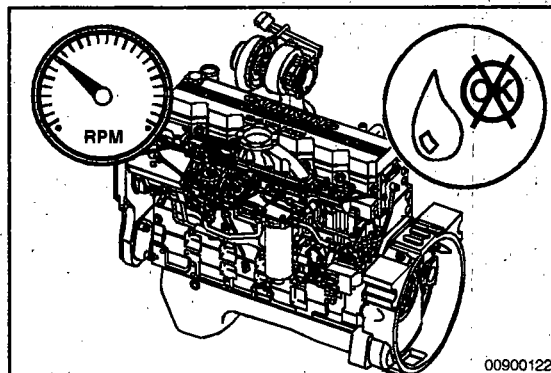
Connect the wiring harness to the heater (if equipped).

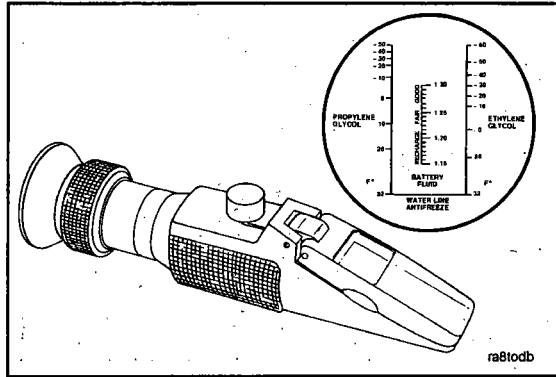
Turn the key to the RUN position but do **not** attempt to start the engine for 30 seconds. The electric fuel transfer pump will run and purge air from the system for about 30 seconds. After 30 seconds attempt to start the engine. If the engine does **not** start turn the key to the OFF position for approximately 30 seconds allowing the electronic control module to power down. Turn the key to the ON position allowing the electric fuel transfer pump to cycle again. After 30 seconds attempt to start the engine again.

If the engine cranks for 30 seconds without starting, vent the fuel supply lines.

To vent the fuel supply lines, loosen the banjo fitting on the fuel pump inlet. Run the electric fuel transfer pump until the air has been bled from the system, tighten the fitting.

Operate the engine, and check for leaks.





Cooling System

Maintenance Check



Overconcentration of antifreeze or use of high-silicate antifreeze can damage the engine.

Check the antifreeze concentration. Use a mixture of 50-percent water and 50-percent ethylene glycol or propylene glycol-based/antifreeze to protect the engine to -32°C [-26°F] year-around.

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

NOTE: Antifreeze is essential in every climate.

Antifreeze broadens the operating temperature range by lowering the coolant freezing point and by raising its boiling point.

The corrosion inhibitors also protect the cooling system components from corrosion and prolong component life.

Coolant Additive Concentration Checking

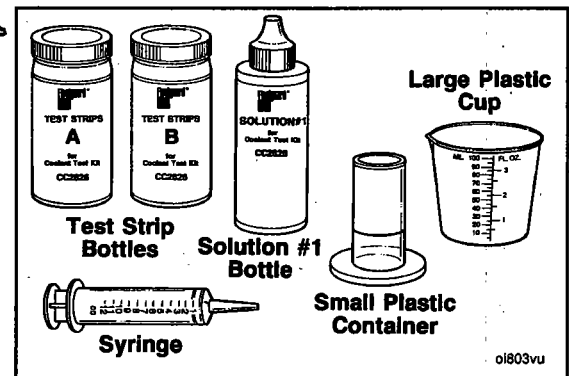
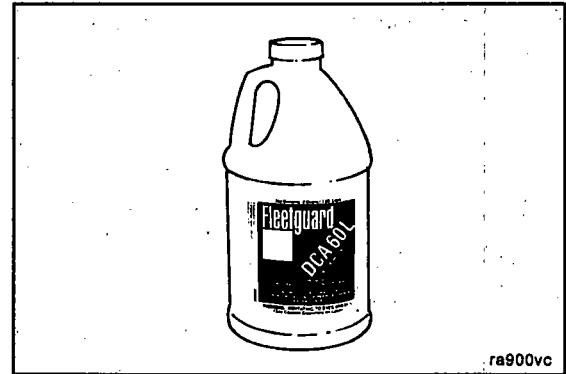


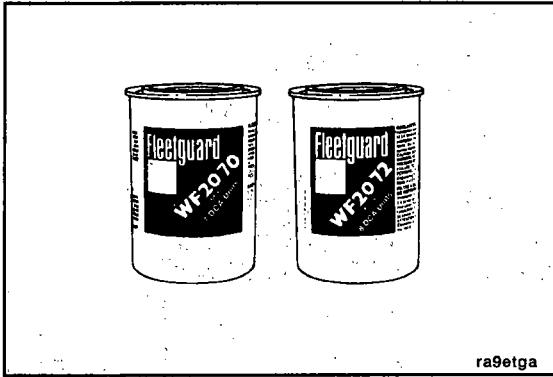
Inadequate concentration of the coolant additive can result in major corrosive damage to the cooling system components. Overconcentration can cause formation of a "gel" that can cause restriction, plugging of coolant passages, and overheating.

NOTE: If the engine coolant is changed, the coolant filters **must** also be changed.

The cooling system **must** contain the proper coolant additive units to provide the best chemical protection. Refer to Maintenance Specifications (Section V).

NOTE: Use **only** the DCA4 Coolant Test Kit, Fleetguard® Part No. CC-2626, to check the coolant additive concentration in the cooling system.

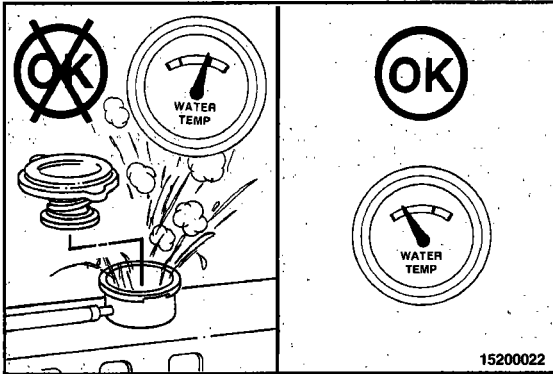




Coolant Filter/DCA4 Corrosion Resistor Cartridge

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

Refer to the DCA4 Maintenance Guide in Maintenance Specifications (Section V) for the correct selection of the filter.



Coolant Filter Replacement



WARNING



Do not remove the radiator cap from a hot engine. Hot steam will cause serious injury.

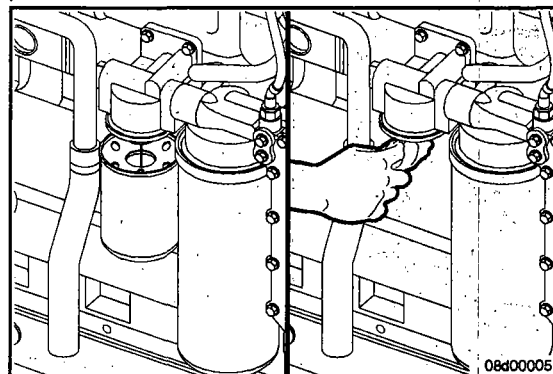
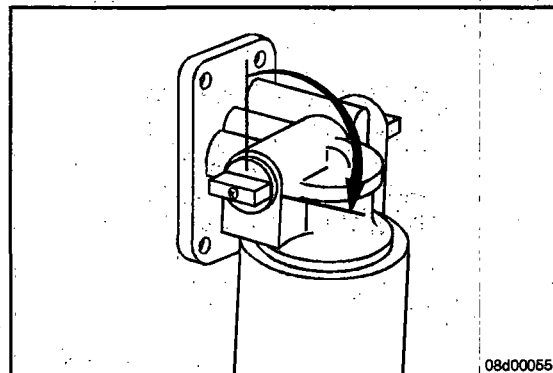
Coolant Filter Removal

▲ WARNING ▲

Wait until the coolant temperature is below 50°C [122°F] before removing the pressure cap. Remove the coolant system pressure cap and close the shutoff valve before removing the coolant filter. Failure to do so can result in personal injury from heated coolant spray.

Turn the shutoff valve to the OFF position by rotating the knob from vertical to horizontal in the direction shown in the illustration.

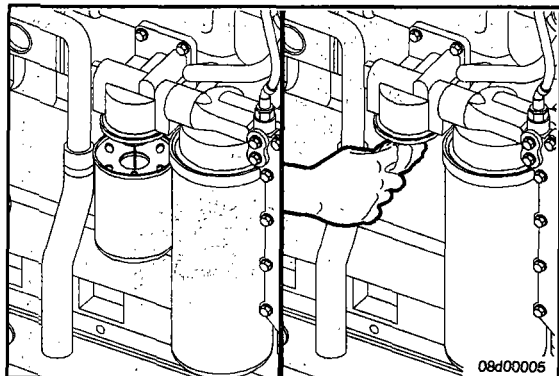
Remove and discard the coolant filter.





Clean

Clean the gasket surface.



Install



Do not allow oil to get into the filter. Oil will damage the DCA.

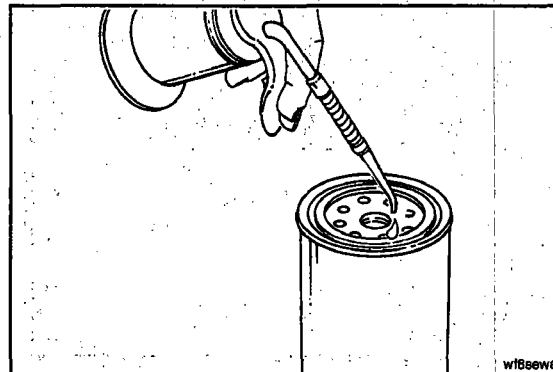


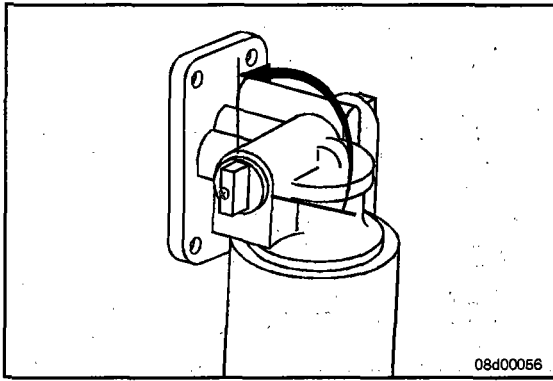
Mechanical overtightening can distort the threads or damage the filter head.

Apply a thin film of lubricating oil to the gasket sealing surface before installing the new coolant filter.

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

Tighten the coolant filter an additional 1/2 to 3/4 of a turn, or as specified by the manufacturer.

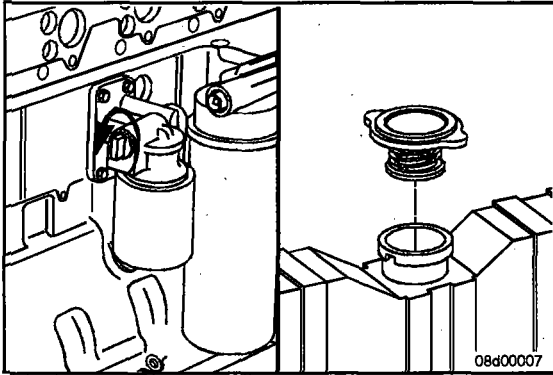




⚠ CAUTION ⚠

The valve must be in the ON position to prevent engine damage.

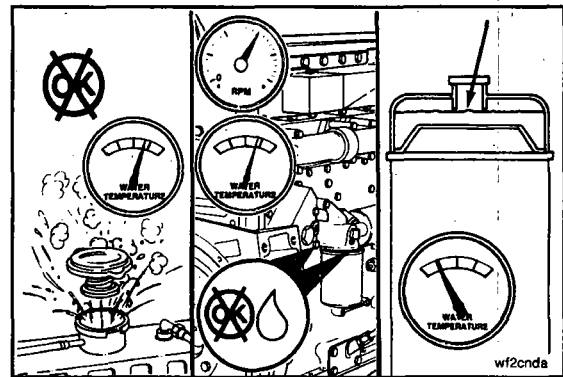
Turn the shutoff to the ON position by rotating the knob from horizontal to vertical in the direction shown in the illustration.



Install the coolant system pressure cap.

Operate the engine, and check for coolant leaks.

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



NOTES

Maintenance Procedures at 48,000 Kilometers [30,000 Miles], 1000 Hours, or 1 Year

Section Contents

	Page
Belt Tensioner, Automatic	6-4
Maintenance Check	6-4
Drive Belts	6-2
Maintenance Check	6-2
Fan Hub, Belt Driven	6-3
Maintenance Check	6-3
Maintenance Procedures - General Information	6-1

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ISC:

Maintenance Procedures at 48,000 km [30,000 mi]

Maintenance Procedures - General Information

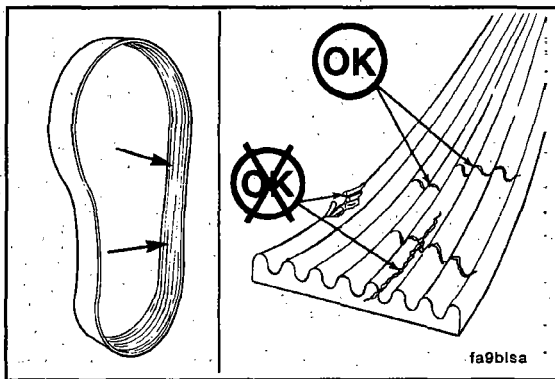
Page 6-1

Maintenance Procedures - General Information

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

1. Check the engine oil level.





Drive Belts

Maintenance Check

Inspect the belts daily. Check the belts for intersecting cracks. Transverse (across the belt width) cracks are acceptable. Longitudinal (direction of the belt length) cracks that intersect the transverse cracks are **not** acceptable. Replace a belt if it is frayed or has pieces of material missing. Refer to Section A for belt adjustment and replacement procedures.

Belt damage can be caused by

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

Fan Hub, Belt Driven

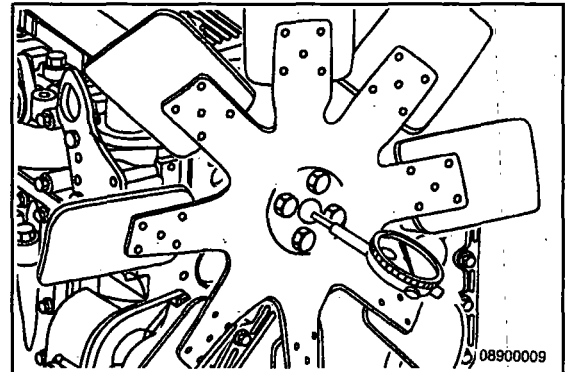
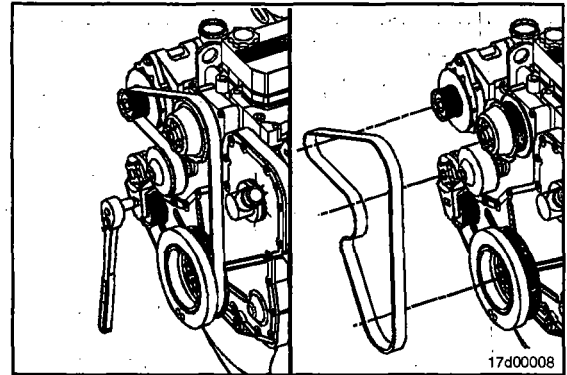
Maintenance Check

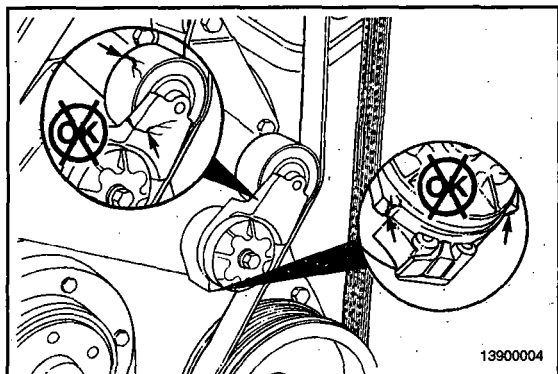
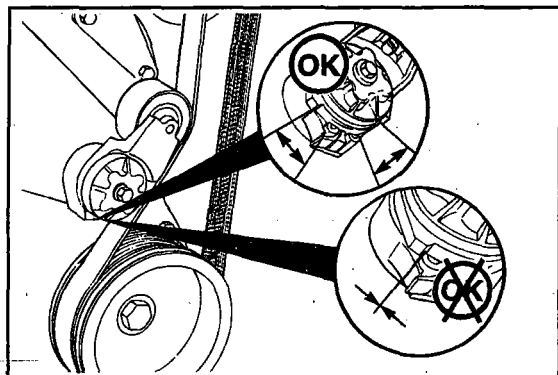
Remove the drive belt.

NOTE: The fan hub **must** rotate without any wobble or excessive end play.

- Check the fan hub bearing.

Fan Hub End Play		
mm		in
0.15	MAX	0.006





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Belt Tensioner, Automatic Maintenance Check

Every 48,000 km [30,000 mi], 1000 hours, or 1 year, whichever occurs first, inspect the automatic belt tensioner.

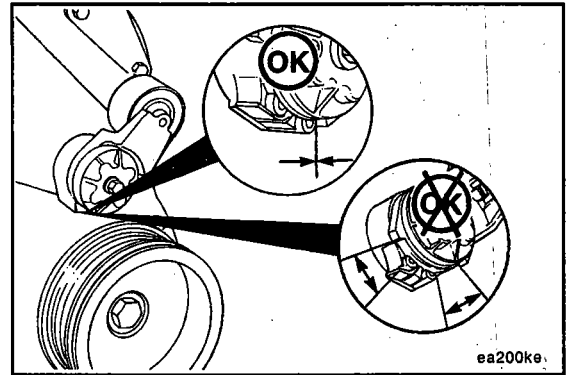
With the engine turned off, check that neither the top nor bottom tensioner arm stop is touching the cast boss on the tensioner body. If either of the stops is touching a boss, the alternator belt **must** be replaced. Check to make sure the correct belt part number is being used if either condition exists.

Check the tensioner pulley and body for cracks. If any cracks are noticed, the tensioner **must** be replaced. Refer to a Cummins Authorized Repair Facility. Check the tensioner for dirt buildup. If this condition exists, the tensioner **must** be removed and steam-cleaned.

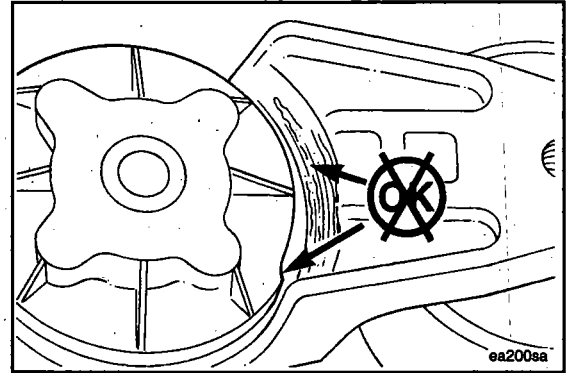


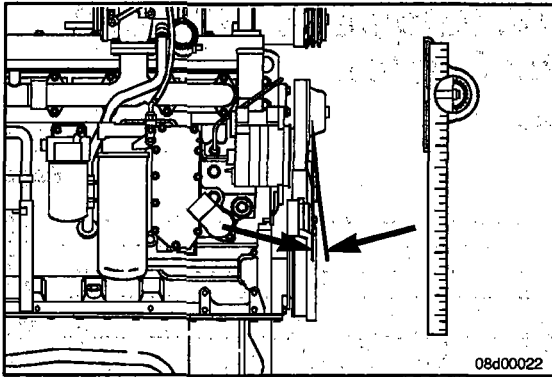
ISC
Maintenance Procedures at 48,000 km [30,000 mi]

Check that the bottom tensioner arm stop is in contact with the bottom tensioner arm stop boss on the tensioner body. If these two are **not** touching, the tensioner **must** be replaced.



Inspect the tensioner for evidence of the pivoting tensioner arm contacting the stationary circular base. If there is evidence of these two areas touching, the pivot tube bushing has failed and the tensioner **must** be replaced.





A worn tensioner that has play in it or a belt that “walks” off its pulley possibly indicates pulley misalignment.

NOTE: Maximum pulley misalignment is three degrees.



This measurement can be taken with a straightedge and an inclinometer.

Install the belt.

Maintenance Procedures at 96,000 Kilometers [60,000 Miles], 2000 Hours, or 2 Years

Section Contents

	Page
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Fill	7-7
Flush	7-4
Maintenance Procedures - General Information	7-1
Vibration Damper	7-10
Inspect	7-10
Vibration Damper, Rubber	7-9
Inspect	7-9

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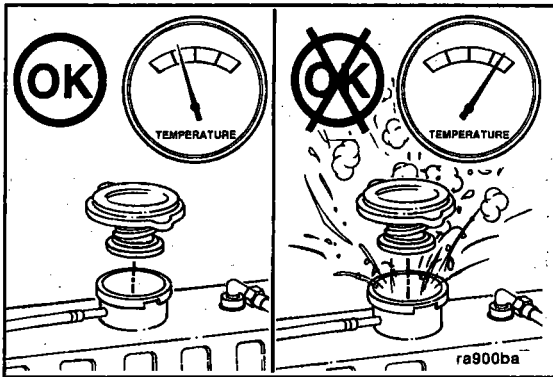
Maintenance Procedures - General Information

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

THIS MAINTENANCE PROCEDURE IS NOT A



7



Cooling System

Drain

⚠ WARNING ⚠

Wait until the temperature is below 50°C [122°F] before removing the coolant system pressure cap. Failure to do so can cause personal injury from heated coolant spray.

⚠ WARNING ⚠

Avoid prolonged or repeated skin contact with used antifreeze. Such prolonged, repeated contact can cause skin disorders or other bodily injury.

⚠ CAUTION ⚠

Protect the environment: Handling and disposing of used antifreeze is subject to federal, state, and local regulations. Use authorized waste disposal facilities, including civic amenity sites and garages providing authorized facilities for the receipt of used antifreeze. If in doubt, contact local authorities of the environmental protection agency (EPA) for guidance as to proper handling of used antifreeze.

- Avoid excessive contact, and wash thoroughly after contact.
- Keep out of reach of children.

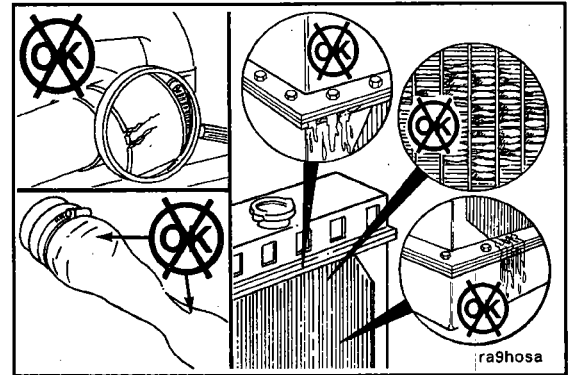
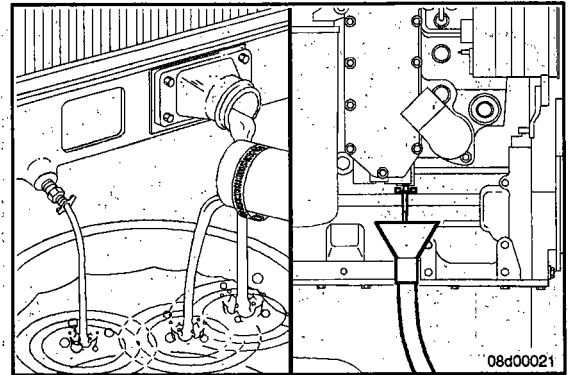
▲ WARNING ▲

Coolant is toxic. If not reused, dispose of in accordance with local environmental regulations.

Drain the cooling system by opening the drain valve on the radiator and removing the plug in the bottom of the water inlet hose. A drain pan with a capacity of 19 liters [5 gal] will be adequate for most applications.

Check for damaged hoses and loose or damaged hose clamps. Replace as required.

Check the radiator for leaks, damage, and buildup of dirt. Clean and replace as required.

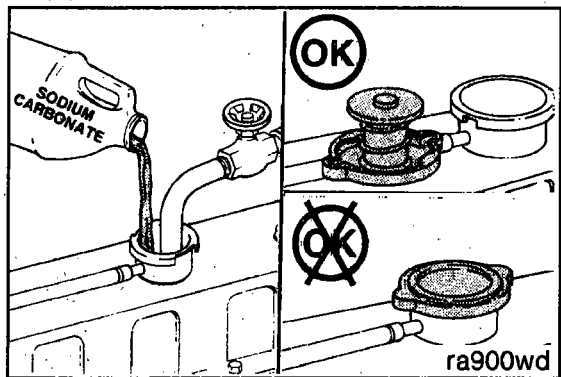
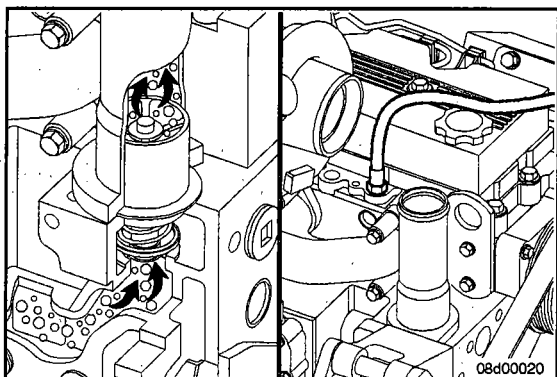


Flush

⚠ CAUTION ⚠

The system must be filled properly to prevent air locks. During filling, air must be purged from the engine coolant passages. Be sure to open the petcock on the aftercooler for aftercooled engines. Wait 2 to 3 minutes to allow air to be vented; then add mixture to bring the level to the top.

NOTE: Adequate venting is provided for a fill rate of 19 liters [5 gal] per minute.



⚠ CAUTION ⚠

Do not install the radiator cap. The engine is to be operated without the cap for this process.

Fill the system with a mixture of sodium carbonate and water (or a commercially available equivalent).

NOTE: Use 0.5 kg [1lb] of sodium carbonate for every 23 liters [6 gal] of water.

▲ WARNING ▲

Coolant is toxic. If not reused, dispose of in accordance with local environmental regulations.

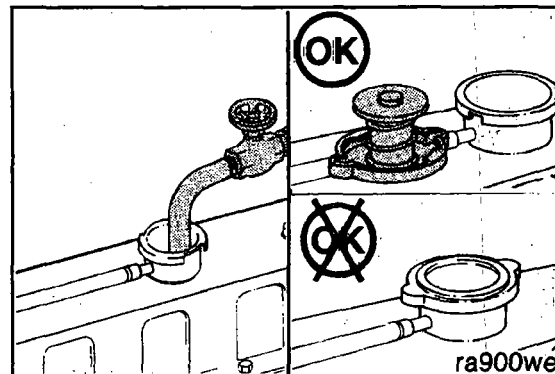
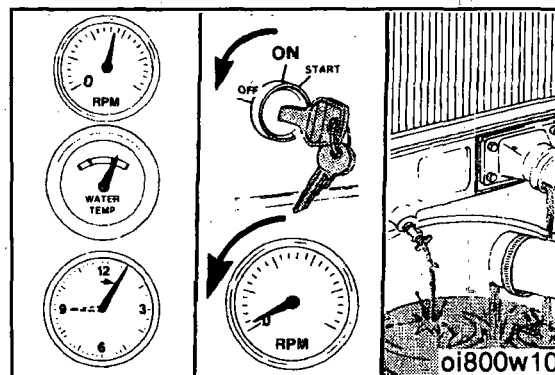
Operate the engine for 5 minutes with the coolant temperature above 80°C [176°F].

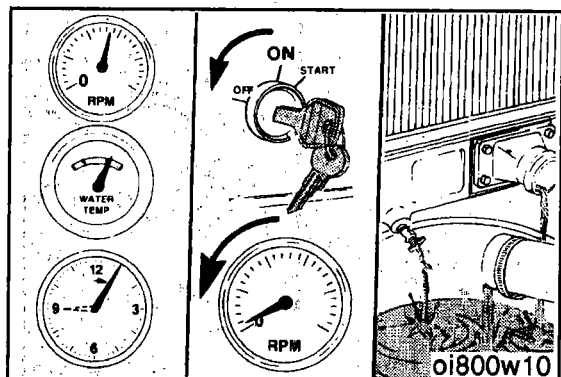
Shut the engine off, and drain the cooling system.

Fill the cooling system with high-quality water.

NOTE: Be sure to vent the engine and aftercooler for complete filling.

NOTE: Do **not** install the radiator cap or the new coolant filter.





ISC
Maintenance Procedures at 96,000 km [60,000 mi]

Operate the engine for 5 minutes with the coolant temperature above 80°C [176°F].

Shut the engine off, and drain the cooling system.

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

Fill

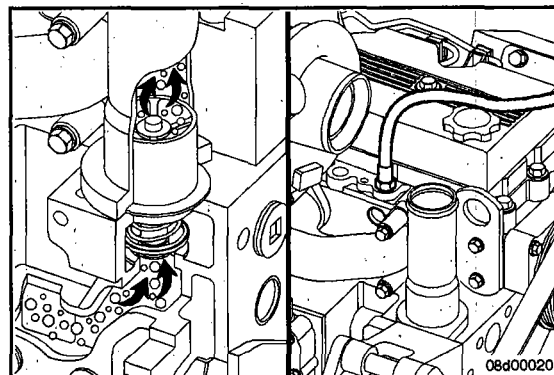
⚠ CAUTION ⚠

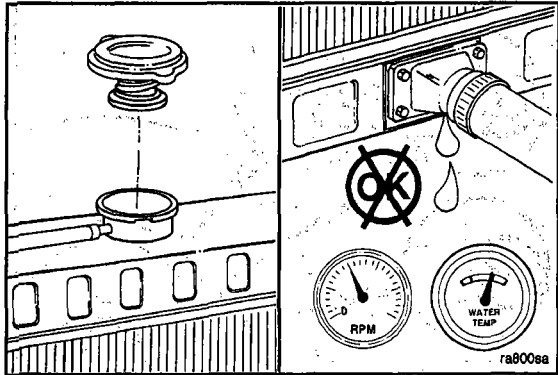
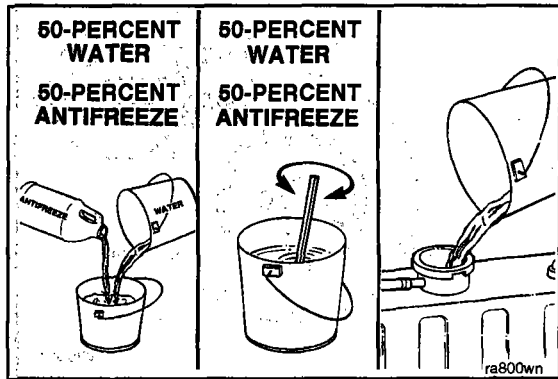
The system must be filled properly to prevent air locks. During filling, air must be purged from the engine coolant passages. Be sure to open the petcock on the aftercooler for aftercooled engines. Wait 2 to 3 minutes to allow air to be vented; then add mixture to bring the level to the top.

The system is designed to use a specific quantity of coolant. If the coolant level is low, the engine will run hot.

If frequent addition of coolant is necessary, the engine or system has a leak. Find and repair the leak.

The system has a designed fill rate of 19 liters [5 gal] per minute.





⚠ CAUTION ⚠

Never use water alone for coolant. This can result in damage from corrosion.

Use a mixture of 50-percent water and 50-percent ethylene glycol or propylene glycol antifreeze to fill the cooling system.

Coolant Capacity (Engine Only)

	liters		U.S.gal
ISC (Charge-Air Cooled)	10.9	MAX	11.5

⚠ WARNING ⚠

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

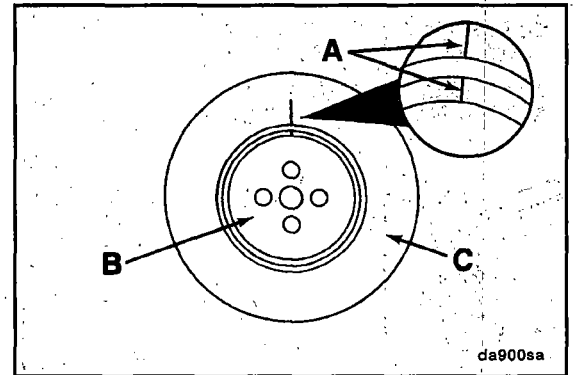
Install the pressure cap. Operate the engine until the coolant reaches a temperature of 80°C [180°F], and check for coolant leaks.

Check the coolant level again to make sure the system is full of coolant or that the coolant level has risen to the hot level in the recovery bottle on the system, if so equipped.

Vibration Damper, Rubber

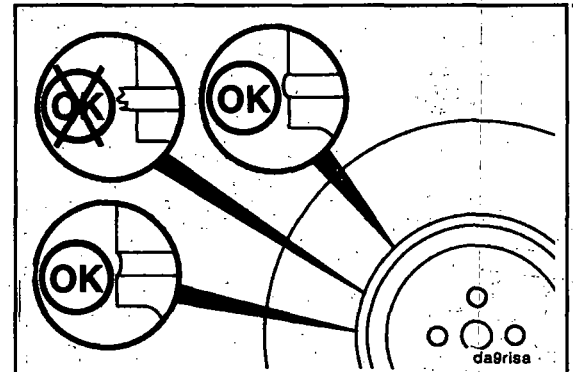
Inspect

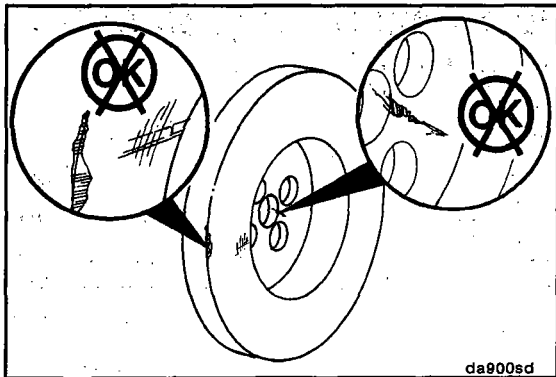
Check the index lines (A) in the vibration damper hub (B) and the inertia member (C). If the lines are more than 1.59 mm [1/16 in] out of alignment, replace the vibration damper.



Inspect the rubber member for deterioration. If pieces of the rubber are missing or if the elastic member is more than 3.18 mm [1/8 in] below the metal surface, replace the damper.

NOTE: Look for forward movement on the damper ring on the hub. Replace the vibration damper if any movement is detected.





Vibration Damper

Inspect



△ CAUTION △

The silicone fluid in the vibration damper will become solid after extended service and will make the damper inoperative. An inoperative vibration damper can cause major engine or drivetrain failures.

Check the vibration damper for evidence of fluid loss, dents, and wobble. Inspect the vibration damper thickness for any deformation or raising of the damper cover plate.

If any variations or deformations are detected, refer to the Troubleshooting and Repair Manual, ISC Engine, Bulletin No. 3666245, for inspection procedures.

Maintenance Procedures at 241,500 Kilometers [150,000 Miles], 5000 Hours, or 4 Years

Section Contents

	Page
Maintenance Procedures - General Information.....	8-1
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Measure	8-2

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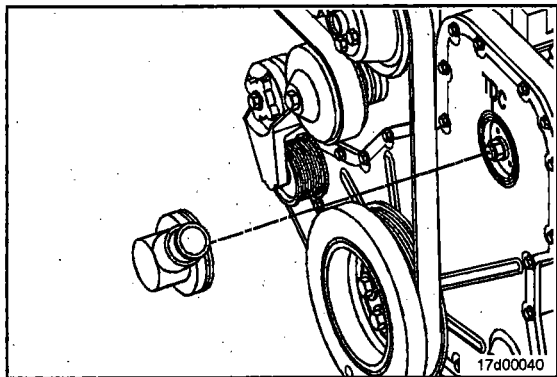
Maintenance Procedures - General Information

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



Overhead Set

Valve lash reset **must** be performed at 241,500 km [150,000 mi] and at 81,000 km [50,000 mi] intervals thereafter.



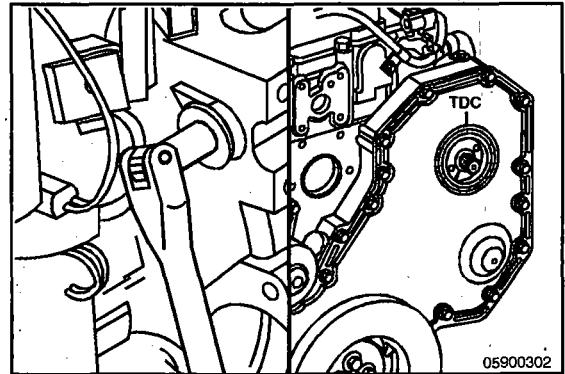
Measure



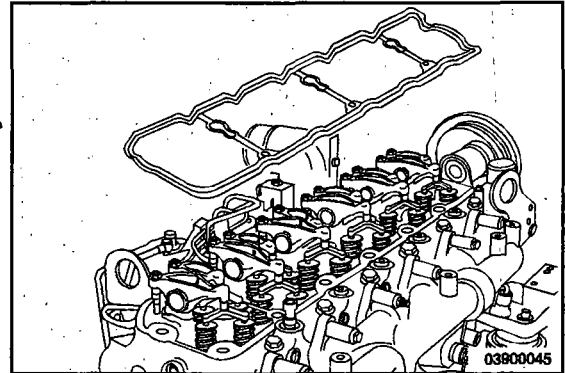
Engine coolant temperature should be less than 60°C [140°F].

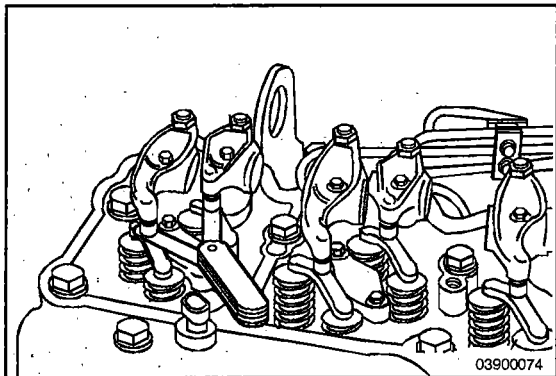
Remove the plastic fuel pump drive cover located on the front of the engine.

Use the barring tool, Cummins Part No. 3824591, to rotate the crankshaft to align the top dead center (TDC) marks on the gear cover and fuel pump gear.



Remove the rocker lever cover and gasket.





ISC
Maintenance Procedures at 241,500 km [150,000 mi]

With the engine in this position, lash can be reset on the following rocker arms: 1I, 1E, 2I, 3E, 4I, and 5E.

Nominal Valve Lash

Intake	0.305 mm	Nominal	0.012 in
Exhaust	0.559 mm	Nominal	0.022 in

Reset lash to the nominal specification above.

NOTE: Valve lash measurements are sometimes performed as part of a troubleshooting procedure. If the lash measurement does **not** coincide with a scheduled lash reset (at 241,500 km [150,000 mi] or 31,056 km [50,000 mi] intervals thereafter), and the measurement falls within the following range, the lash does **not** need to be reset. Lash measurements in this range will **not** affect engine performance, noise, emissions, or durability.

Valve Lash Acceptable Range

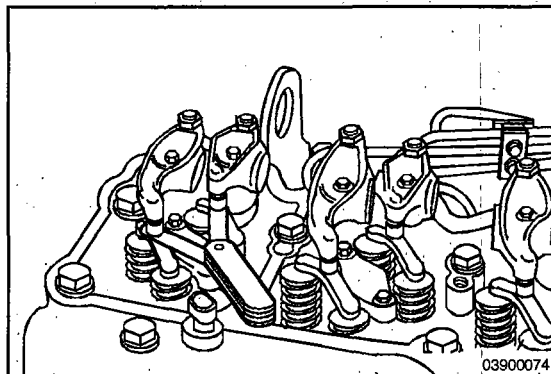
	mm		in
Intake	0.152	MIN	0.006
	0.559	MAX	0.022
Exhaust	0.381	MIN	0.015
	0.813	MAX	0.032

ISC
Maintenance Procedures at 241,500 km [150,000 mi]

Overhead Set
Page 8-5

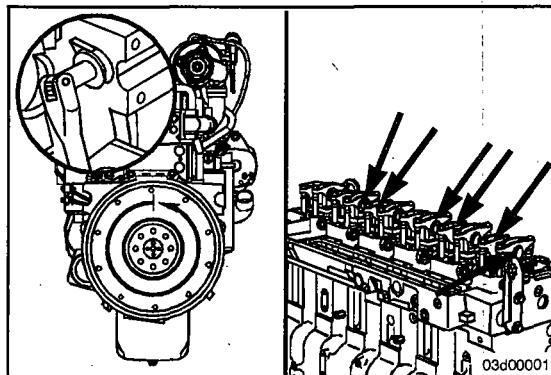
Reset valve lash by inserting the proper feeler gauge between the crosshead and the rocker lever ball insert and socket. If the lash measurement is out of specification, loosen the locknut, and adjust the lash to nominal specifications.

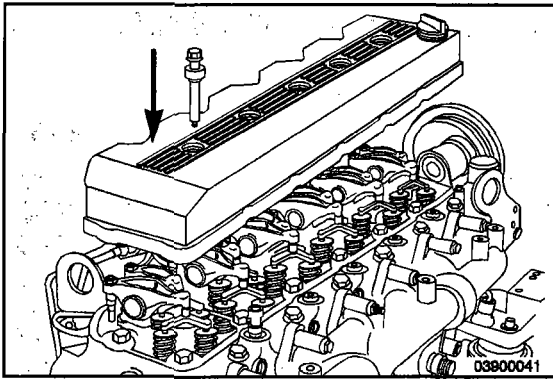
Tighten the locknut to the rocker lever and measure again.



Use a barring tool, Cummins Part No. 3824591, to rotate the crankshaft 360 degrees (the mark on the fuel pump gear rotates 180 degrees), and measure lash for rocker arms 2E, 3I, 4E, 5I, 6I, and 6E.

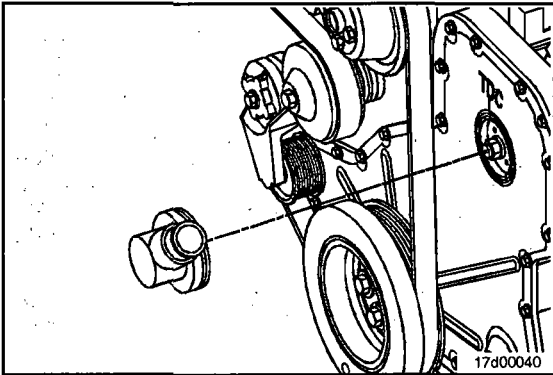
Reset to nominal specification.





Install the gasket and rocker lever cover.

Torque Value: 12 N•m [106 in-lb]



Install the fuel pump drive cover.

Section A - Adjustment, Repair, and Replacement

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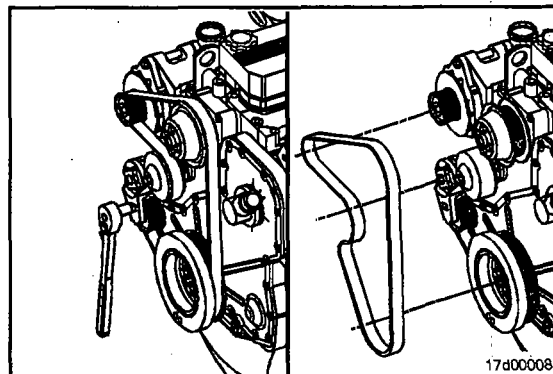
Drive Belt, Water Pump

Remove

3/8-Inch Square Drive

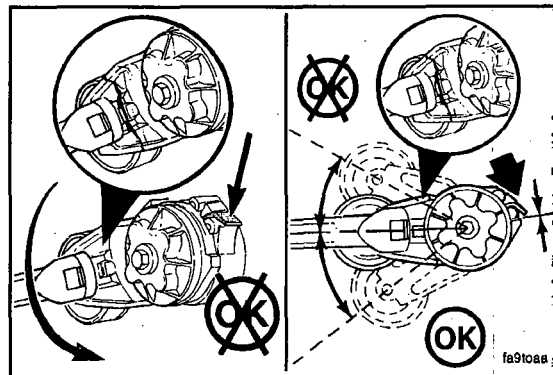
Lift the tensioner to remove the drive belt.

NOTE: The belt tensioner winds in the direction that the spring tang is bent over the tensioner body. To loosen the tension on the belt, rotate the tensioner to wind the spring tighter.

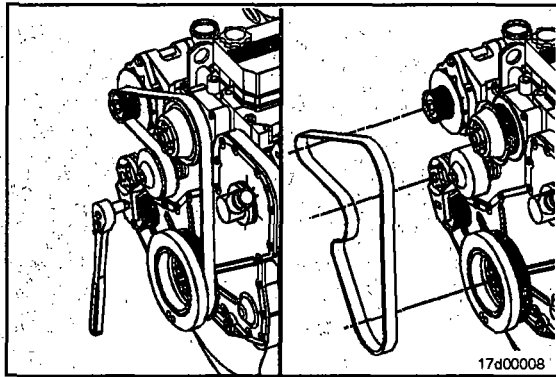


⚠ CAUTION ⚠

Applying excessive force in the opposite direction of wind-up or after the tensioner has been wound-up to the positive stop can cause the tensioner arm to break.



Section A - Adjustment, Repair, and Replacement



Install

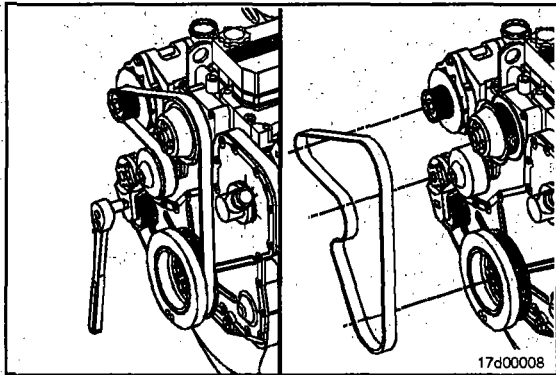
3/8-Inch Square Drive

Lift the tensioner to install the drive belt.



CAUTION

The belt tensioner is spring-loaded and must be pivoted away from the drive belt. Pivoting in the wrong direction can result in damage to the belt tensioner.



Belt Tensioner, Automatic

Preparatory

Remove the drive belt.

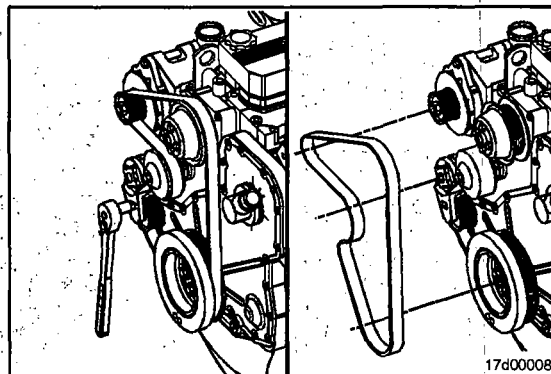
Remove



The belt tensioner is spring-loaded and must be pivoted away from the drive belt. Pivoting in the wrong direction can damage the belt tensioner.

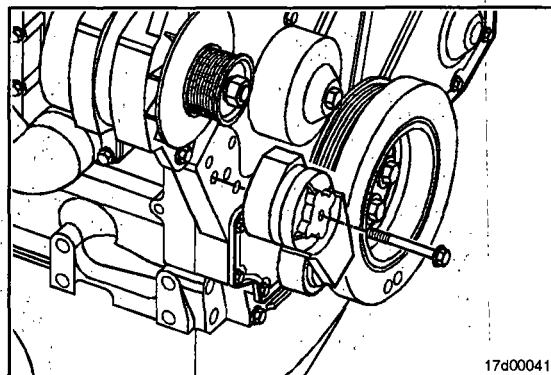
3/8-Inch Square Drive

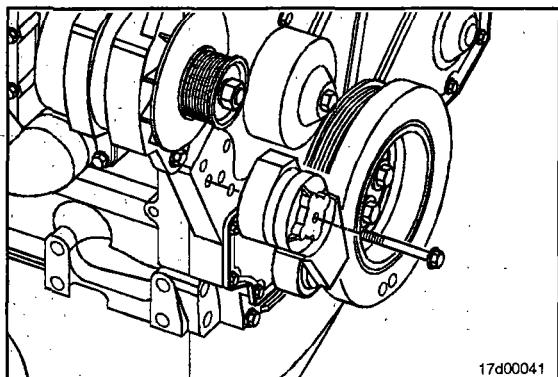
Lift the belt tensioner to relieve tension in the belt, and remove the belt.



15 mm

Remove the capscrew and belt tensioner from the bracket.





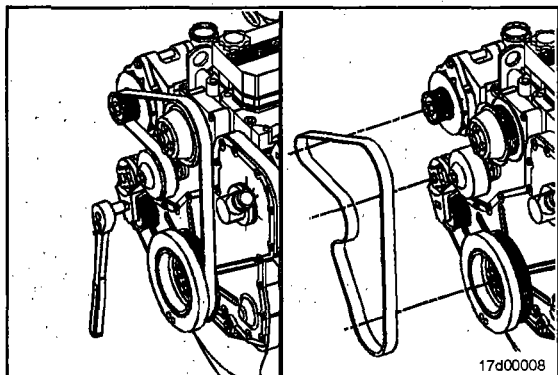
Install

15 mm

Install the belt tensioner and capscrews.



Torque Value: 43 N•m [32 ft-lb]



3/8-Inch Square Drive

Lift and hold the tensioner. Install the drive belt, and release the tensioner.



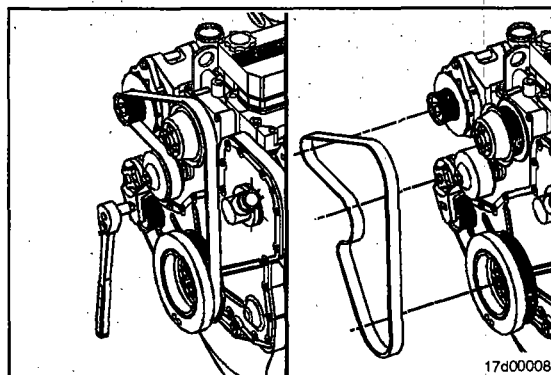
Service Tip: If difficulty is experienced installing the drive belt or if the belt seems too short, position the belt over the grooved pulleys first; then, while holding the tensioner up, slide the belt over the water pump pulley.

Fan Spacer and Pulley

Preparatory

Remove the drive belt.

SERVICE TIP: Loosen the capscrews before removing the belt, and tighten the capscrews after the belt is installed.



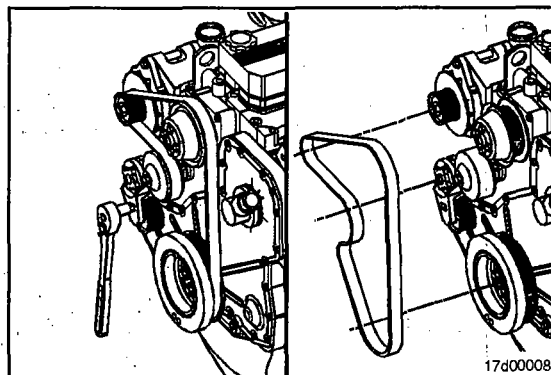
Remove

3/8-Inch Square Drive

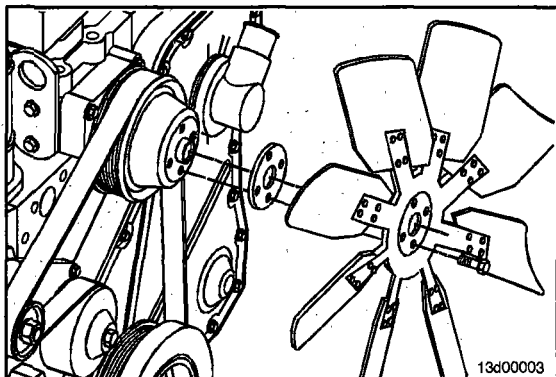
Lift the tensioner to relieve tension in the belt. Remove the belt.



The belt tensioner is spring-loaded and must be pivoted away from the drive belt. Pivoting in the wrong direction can result in damage to the belt tensioner.

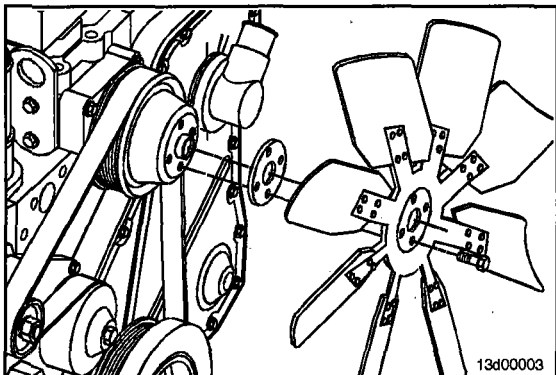


Section A - Adjustment, Repair, and Replacement



Remove the fan cap screws, fan, and spacer.

Remove the fan pulley.



Install

13 mm



Install the fan pulley.



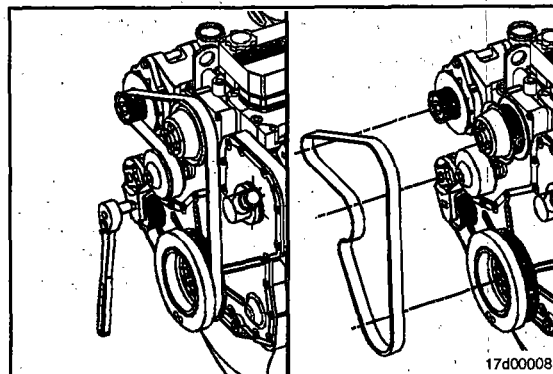
Install the spacer, fan, and fan cap screws.

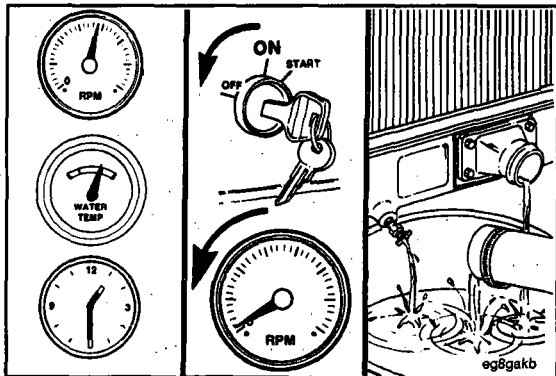
Torque Value: 24 N•m [18 ft-lb]

3/8-Inch Square Drive

Lift the tensioner, and install the belt.

Service Tip: If difficulty is experienced installing the drive belt or if the belt seems too short, position the belt over the grooved pulleys first; then, while holding the tensioner up, slide the belt over the water pump pulley.





Coolant Thermostat

Preparatory

▲ WARNING ▲

Avoid prolonged or repeated skin contact with used antifreeze. Such prolonged, repeated contact can cause skin disorders or other bodily injury.

▲ WARNING ▲

Wait until the temperature is below 50°C [122°F] before removing the coolant system pressure cap. Failure to do so can cause personal injury from heated coolant spray.

Drain the coolant from the radiator.

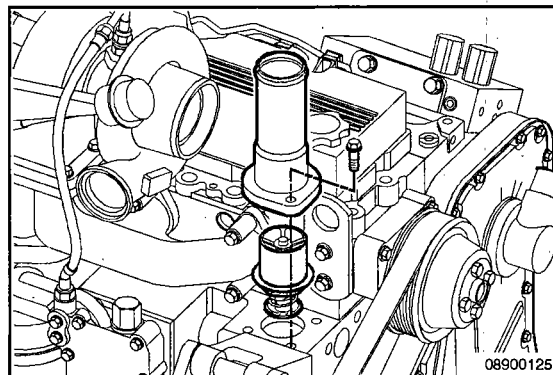
Disconnect the upper radiator hose.

Remove

10 mm

Remove the water outlet tube capscrews and water outlet tube.

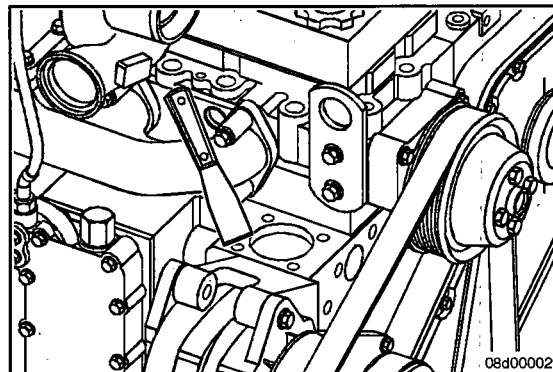
Remove the thermostat.



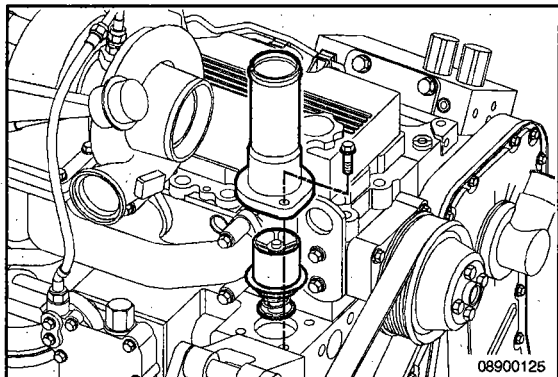
Clean

Clean all the mating surfaces.

NOTE: Do **not** let any debris fall into the thermostat cavity when cleaning the surfaces.

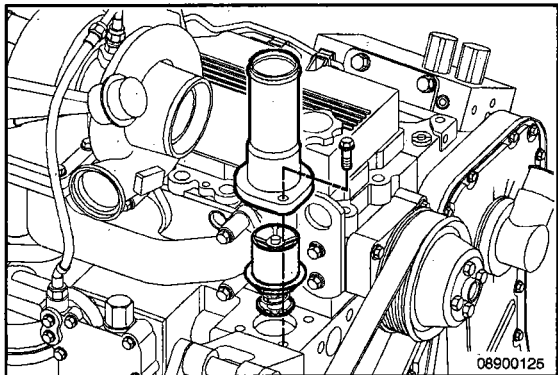


Section A - Adjustment, Repair, and Replacement



Install

Install the new thermostat into the thermostat housing. Make sure that the top and bottom o-rings are in place.



10 mm

Install the water outlet tube and capscrews.



Torque Value: 24 N•m [18 ft-lb]

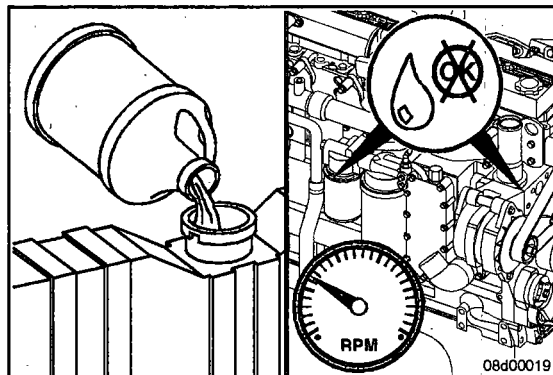


⚠ CAUTION ⚠

Always vent the engine and aftercooler during filling to remove air from the coolant system, or overheating will result.

Fill the cooling system.

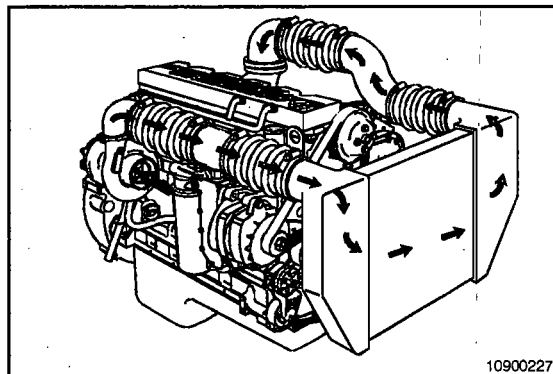
Operate the engine, and check for leaks.



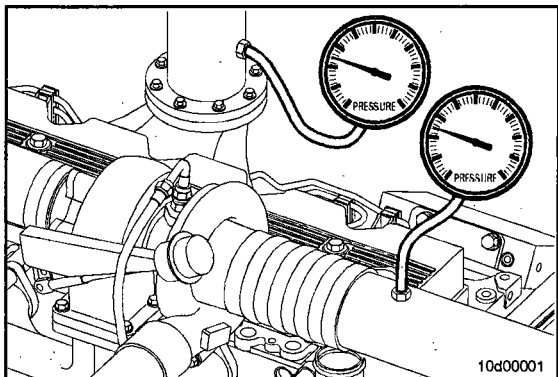
Charge-Air Cooler (CAC)

General Information

NOTE: The long-term integrity of the charge-air cooler (CAC) system is the responsibility of the vehicle and component manufacturers; however, the following can be checked by any Cummins Authorized Repair Facility.



Section A - Adjustment, Repair, and Replacement



Pressure Test

Pressure Gauge, Part No. ST-1273



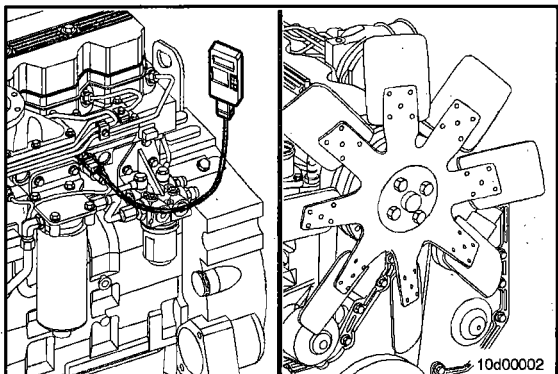
Install pressure gauge, Part No. ST-1273, to the fitting in the turbocharger outlet.



Install another pressure gauge, Part No. ST-1273, in the intake manifold.

Operate the engine at rated rpm and load. Record the readings on the two gauges.

If the differential pressure is greater than 50 kPa [7 psi], check the charge-air cooler for plugging. Clean or replace if necessary.



Temperature Differential Test

Install a temperature gauge in the intake manifold.



Lock the fan drive in the ON mode to prevent erratic test results. This can be done by installing a jumper across the temperature switch or supplying shop air to the fan. Refer to the fan drive manufacturer for lockup procedure.

NOTE: Some trucks have a manual switch that will lock on the fan.

ISC
Section A - Adjustment, Repair, and Replacement

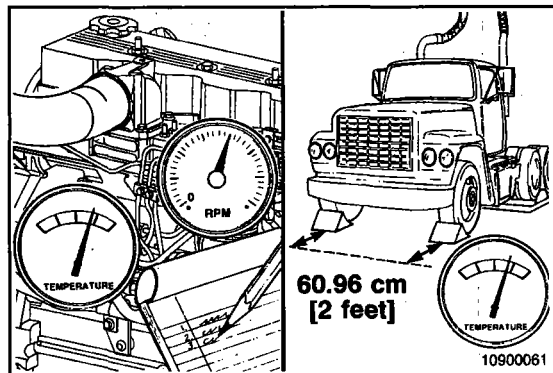
Charge-Air Cooler (CAC)
Page A-13

Operate the engine at rated rpm and load. Record the intake manifold temperature.

Measure the ambient temperature at least two feet in front of the vehicle.

The maximum temperature differential **must not** be greater than 25°C [77°F].

If the temperature differential is greater than 25°C [77°F], check the charge-air cooler for dirt and debris on the fins, and clean as necessary. If the problem still exists, check the cooler for internal contamination or plugging.



Leak Test

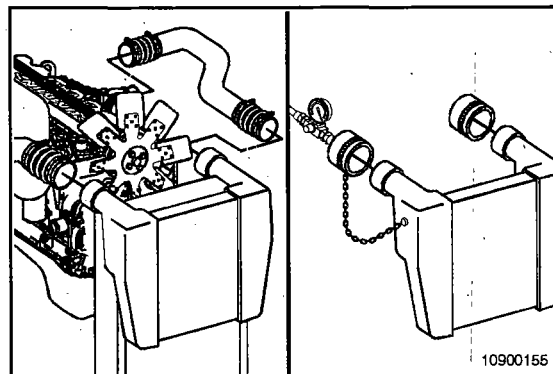
⚠ WARNING ⚠

To prevent injury in the event of the pressure cap blowing off, the pressure cap must be attached with a chain to the aftercooler.

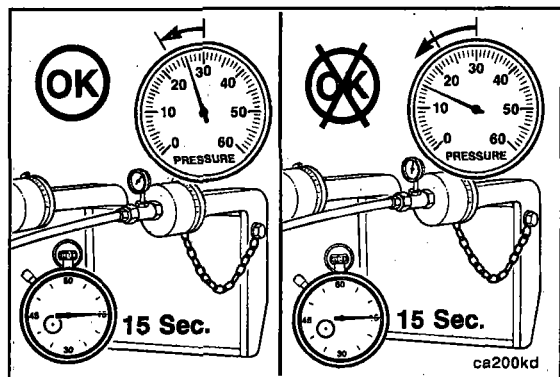
To check the charge-air cooler for cracked tubes or header, remove the inlet and outlet hoses from the cooler.

Remove the charge-air cooler.

Use Service Tool No. 3824556 to install a cap over the outlet side of the cooler. Install a pressure gauge and a shop air supply line to the inlet side of the cooler.



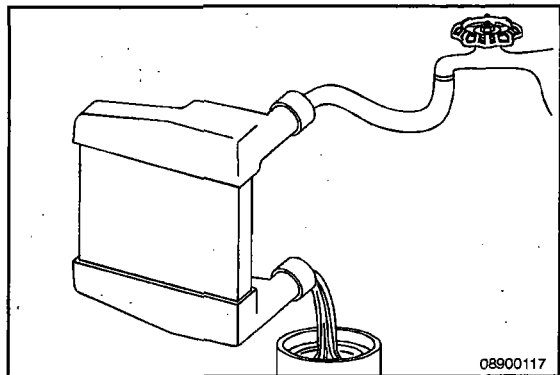
Section A - Adjustment, Repair, and Replacement



Apply 207 kPa [30 psi] of air pressure to the cooler. If the pressure drop is 48 kPa [7 psi] or more in 15 seconds, the charge-air cooler **must** be repaired or replaced. Refer to the charge-air cooler manufacturer for repair instructions.



NOTE: A leak tank can be used to locate the air leak.



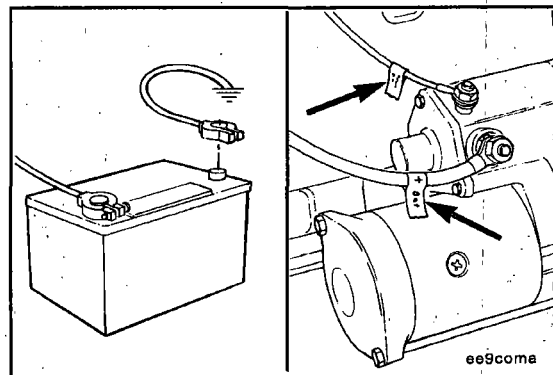
CAUTION

The charge-air cooler must be cleaned following any turbocharger or air cleaner failure. Debris trapped in the charge-air cooler, if not cleaned, can cause internal engine damage.

Starting Motor

Preparatory

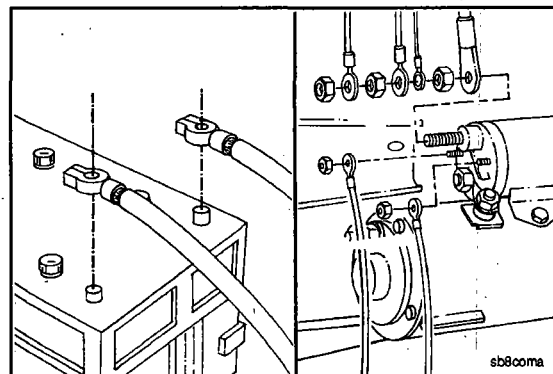
Disconnect the ground cable from the battery terminal.
Identify each electrical wire with a tag indicating location.

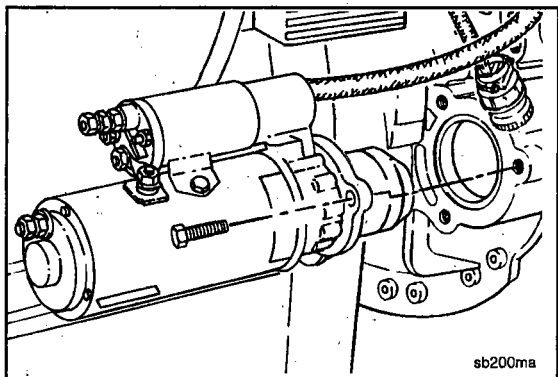


Remove

Remove the electrical connections from the batteries, negative (-) cable first.

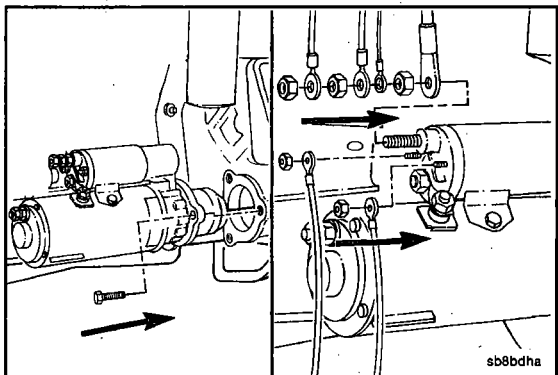
Remove the electrical connections from the starter motor, and identify each wire with a tag indicating location.





10 mm

Remove the three capscrews and the starter motor.



Install

10 mm

Install the starter motor in the reverse order of removal.

Connect all the cables. Connect the negative (-) cable last.

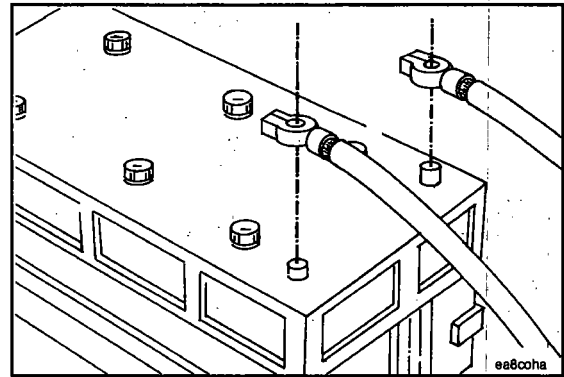
Torque Value: 43 N•m [32 ft-lb]

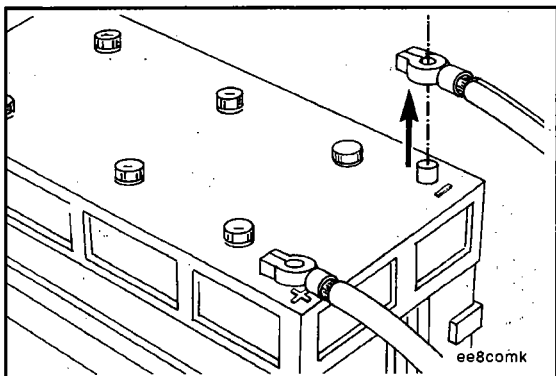


▲ WARNING ▲

Always connect the ground or negative (-) cable last to avoid arcing that can ignite explosive battery gases.

Install and tighten the battery electrical connections. Connect the negative (-) cable last.





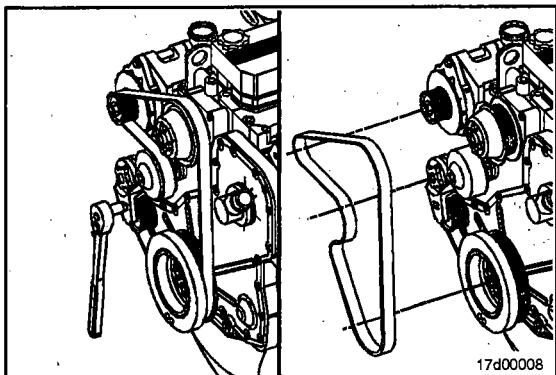
Alternator Preparatory

▲ WARNING ▲

Always connect the ground or negative (-) cable last to avoid arcing that can ignite explosive battery gases.

Disconnect the ground cable from the battery terminal.

Remove and tag all wires.



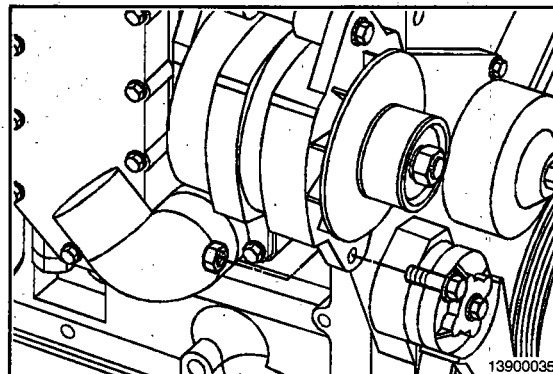
Remove the drive belt from the alternator pulley.

Refer to the Troubleshooting and Repair Manual, ISC Engine, Bulletin No. 3666245.

Remove

13 mm

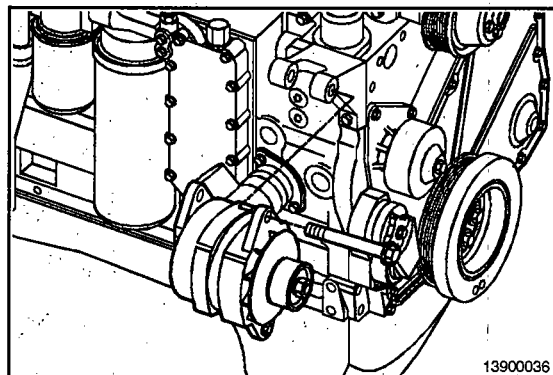
Remove the alternator link cap screw.



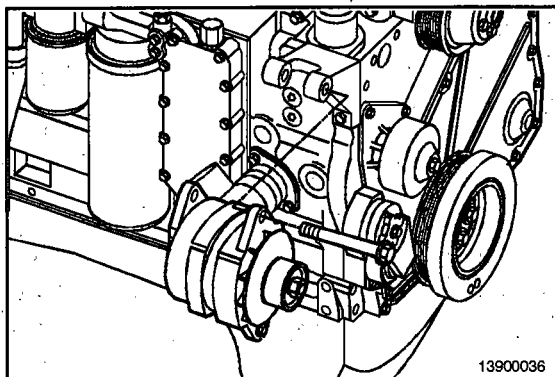
16 mm

Remove the alternator mounting cap screw.

Remove the alternator.



Section A - Adjustment, Repair, and Replacement



Install

To install the alternator, the alternator mounting components **must** be tightened in the following sequence:

1. Alternator-to-alternator bracket capscrew
2. Lower brace-to-alternator capscrew
3. Lower alternator brace-to-water pump capscrew
4. Water inlet-to-block capscrews.

NOTE: The wrench size and torque value is determined by the make and model of the alternator. Refer to the Troubleshooting and Repair Manual, ISC Engine, Bulletin No. 3666245.

Section D - System Diagrams

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Flow Diagram, Air Intake System.....	D-14
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Flow Diagram, Cooling System.....	D-12
Flow Diagram, Exhaust System.....	D-16
Flow Diagram, Fuel System.....	D-2
Flow Diagram, Lubricating Oil System.....	D-4
System Diagrams - General Information.....	D-1
General Information.....	D-1

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System Diagrams - General Information

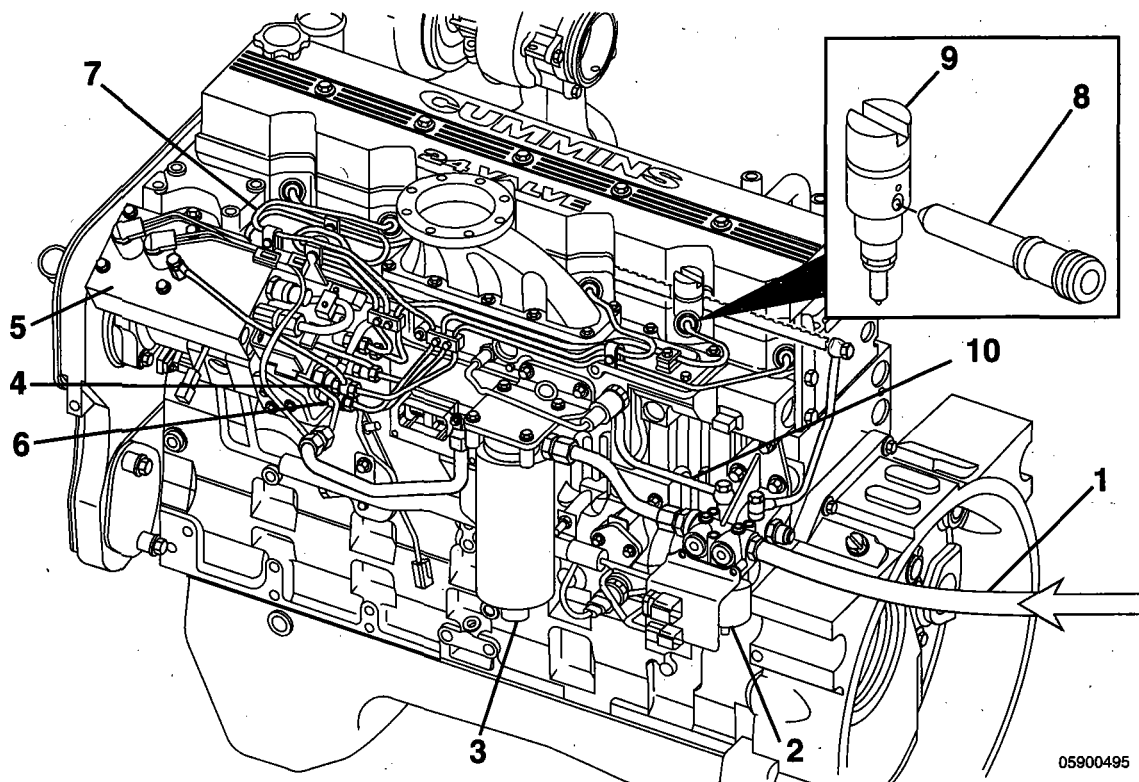
General Information

The following drawings show the flow through the engine systems. Although the parts can be different for various 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.

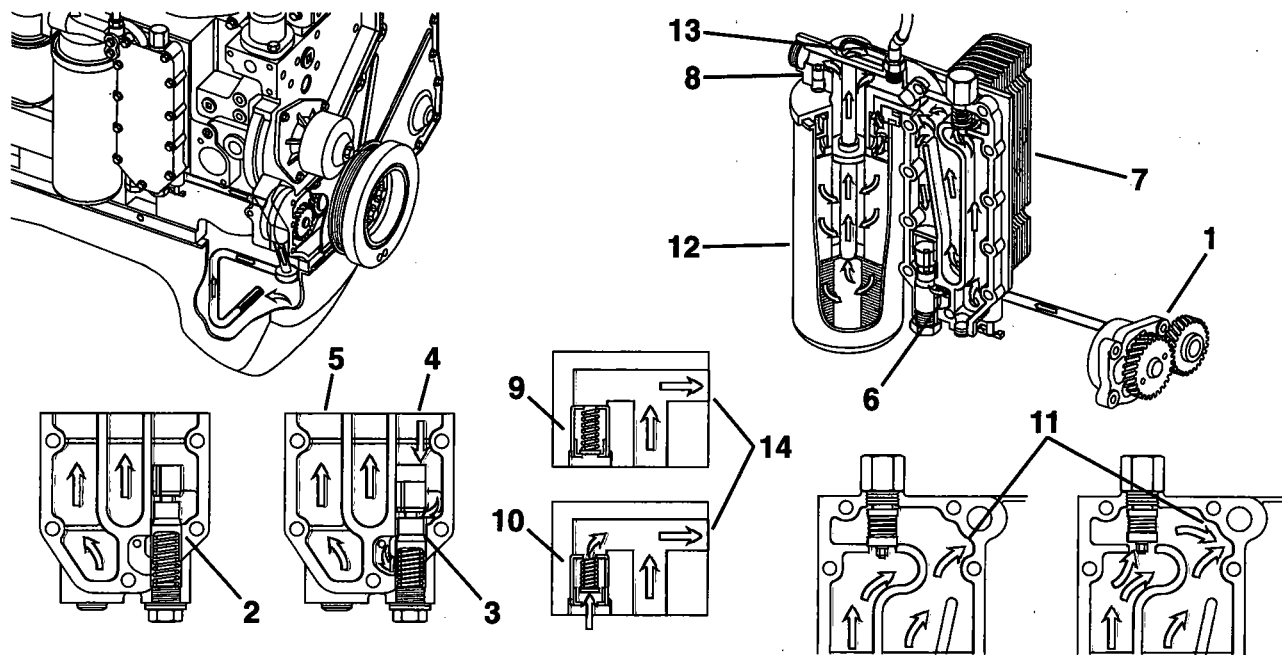
Knowledge of the engine systems can help in troubleshooting, servicing, and general maintenance of the engine.

Flow Diagram, Fuel System



1. Fuel from supply tank
2. Electronic lift pump
3. Fuel filter and water separator
4. Fuel drain line
5. Cummins Accumulator Pumping System (CAPS) injection pump
6. Distributor outlet fitting
7. High-pressure supply lines
8. Fuel connector
9. Injectors
10. Fuel return to supply tank.

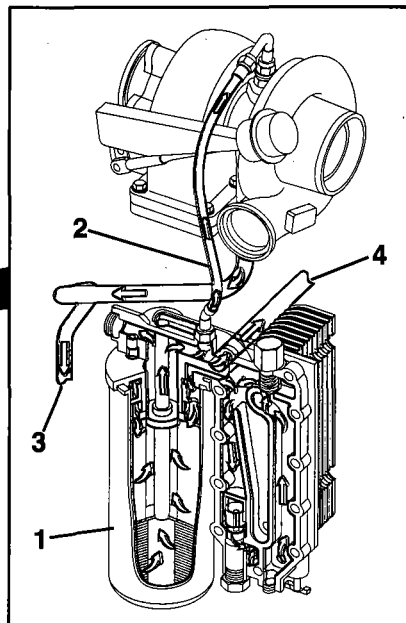
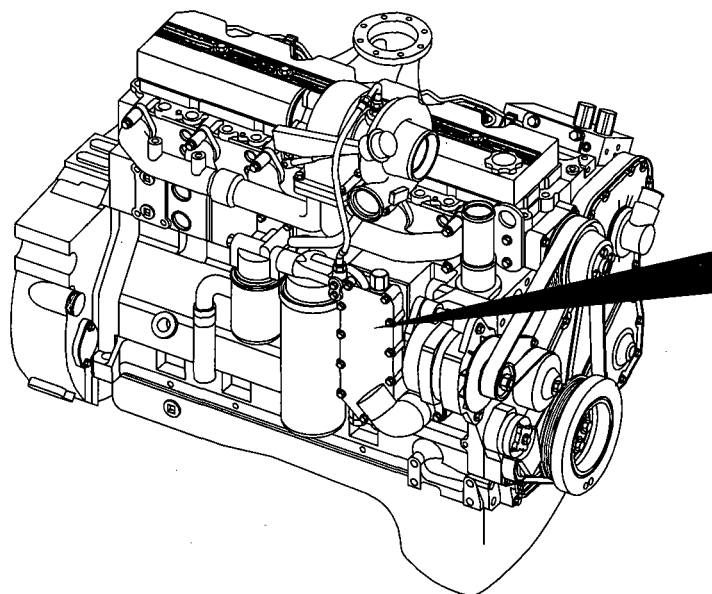
Flow Diagram, Lubricating Oil System



07d00003

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

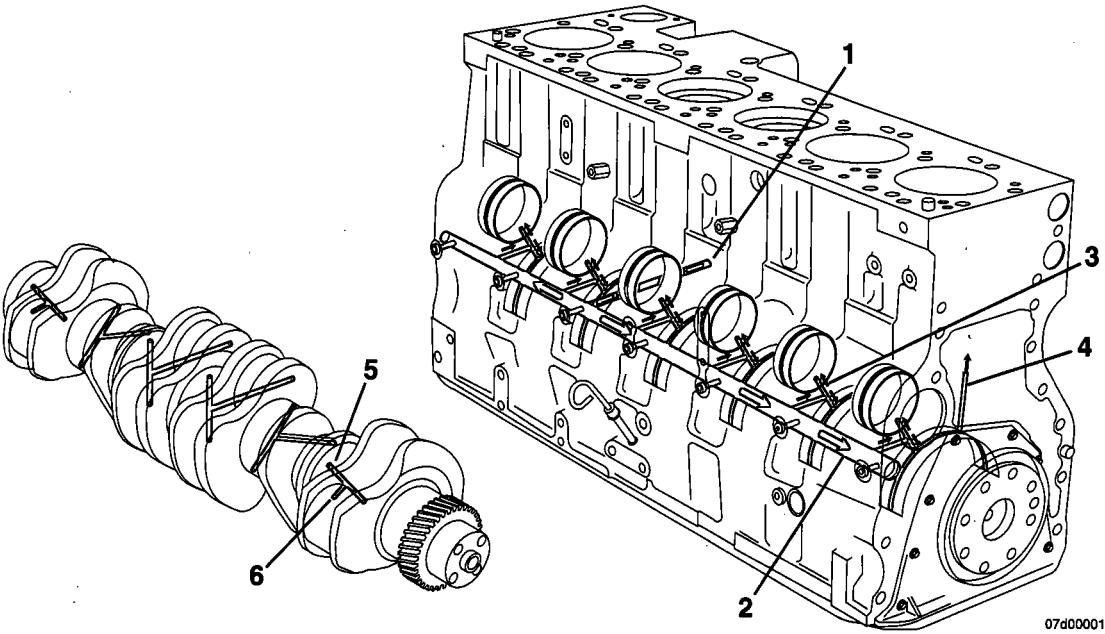
Lubrication for the Turbocharger



07900133

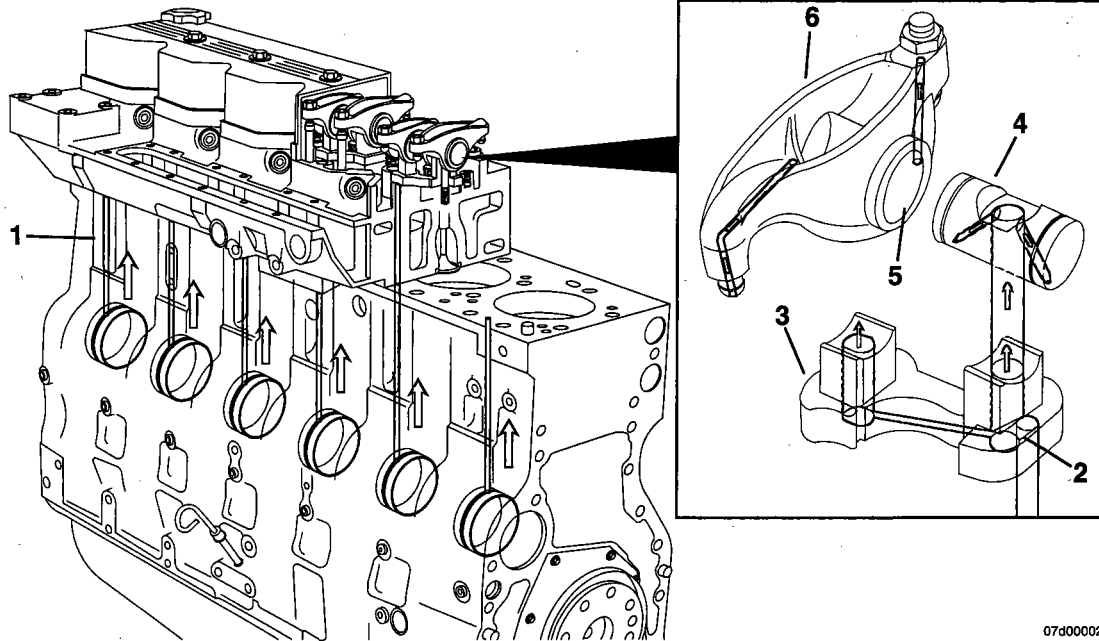
1. Lubricating oil filter
2. Turbocharger lubricating oil supply
3. Turbocharger lubricating oil drain
4. To main lubricating oil rifle.

Lubrication for the Power Components



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

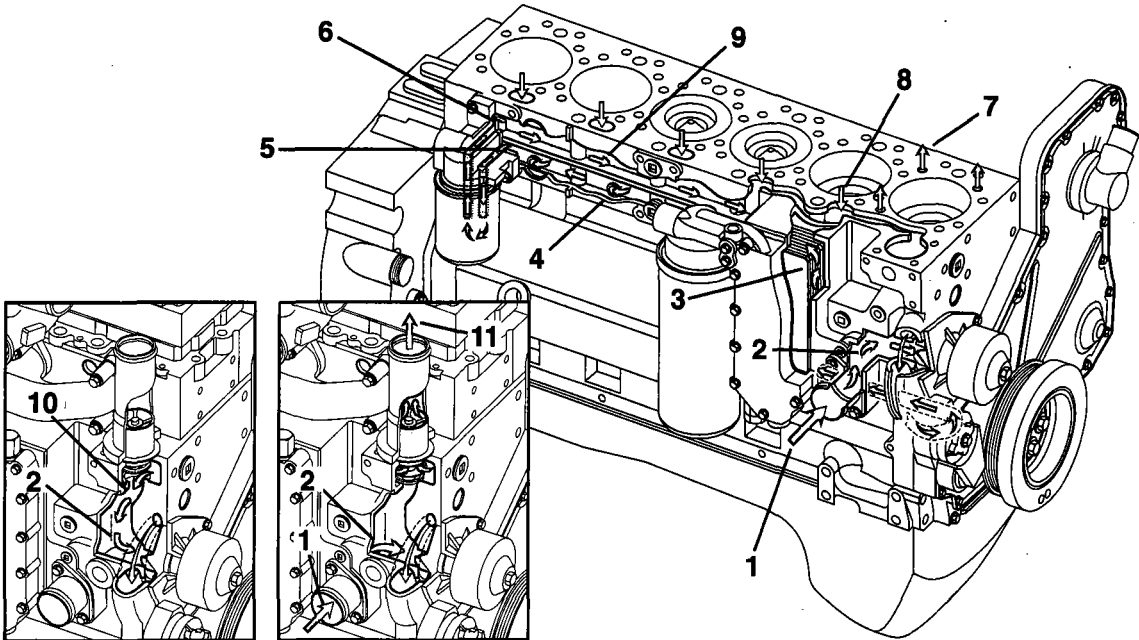
Lubrication for the Overhead



07d00002

1. From cam bushings
2. Transfer slot
3. Rocker lever support
4. Rocker lever shaft
5. Rocker lever bore
6. Rocker lever.

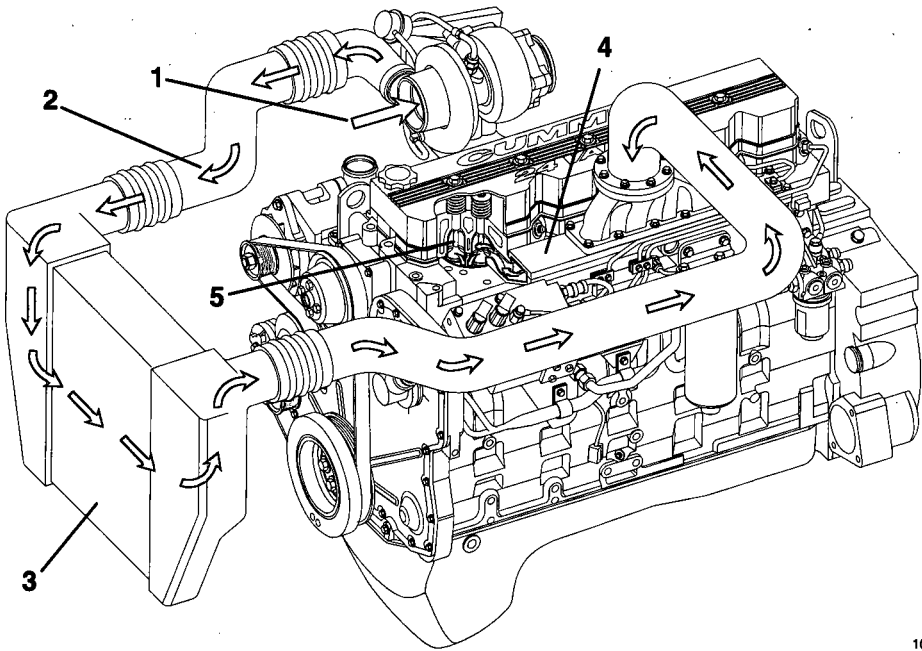
Flow Diagram, Cooling System



08900119

1. Coolant inlet from radiator
2. Water pump suction
3. Coolant flow through lubricating oil cooler
4. Block lower water manifold (to cylinders)
5. Coolant filter inlet
6. Coolant filter outlet
7. Coolant supply to cylinder head
8. Coolant return from cylinder head
9. Block upper water manifold
10. Thermostat bypass
11. Coolant return to radiator

Flow Diagram, Air Intake System

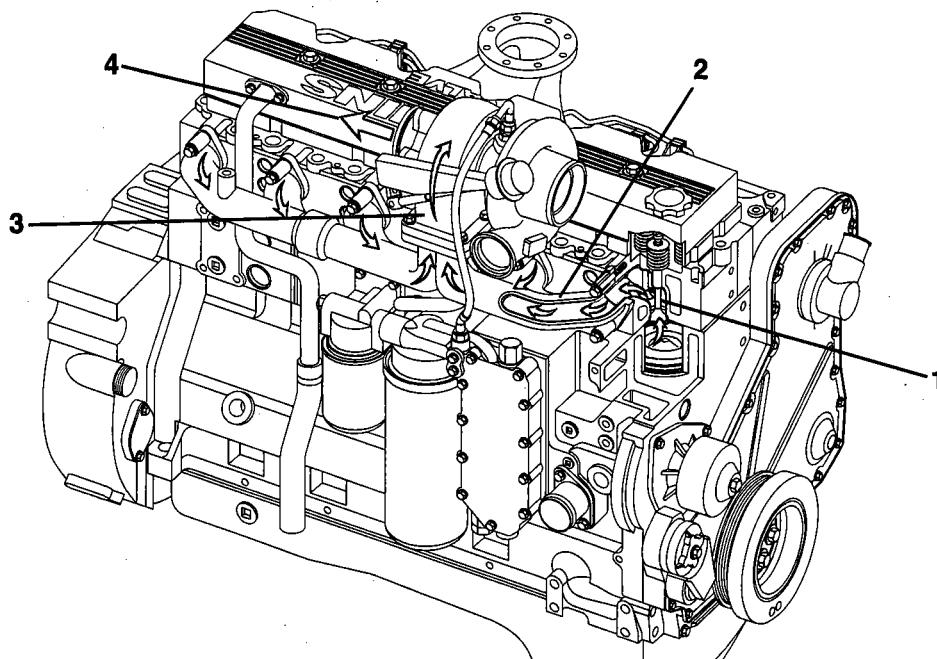


10900225

1. Intake air inlet to turbocharger
2. Turbocharger air to charge air cooler
3. Charge air cooler
4. Intake manifold (integral part of cylinder head)
5. Intake valve



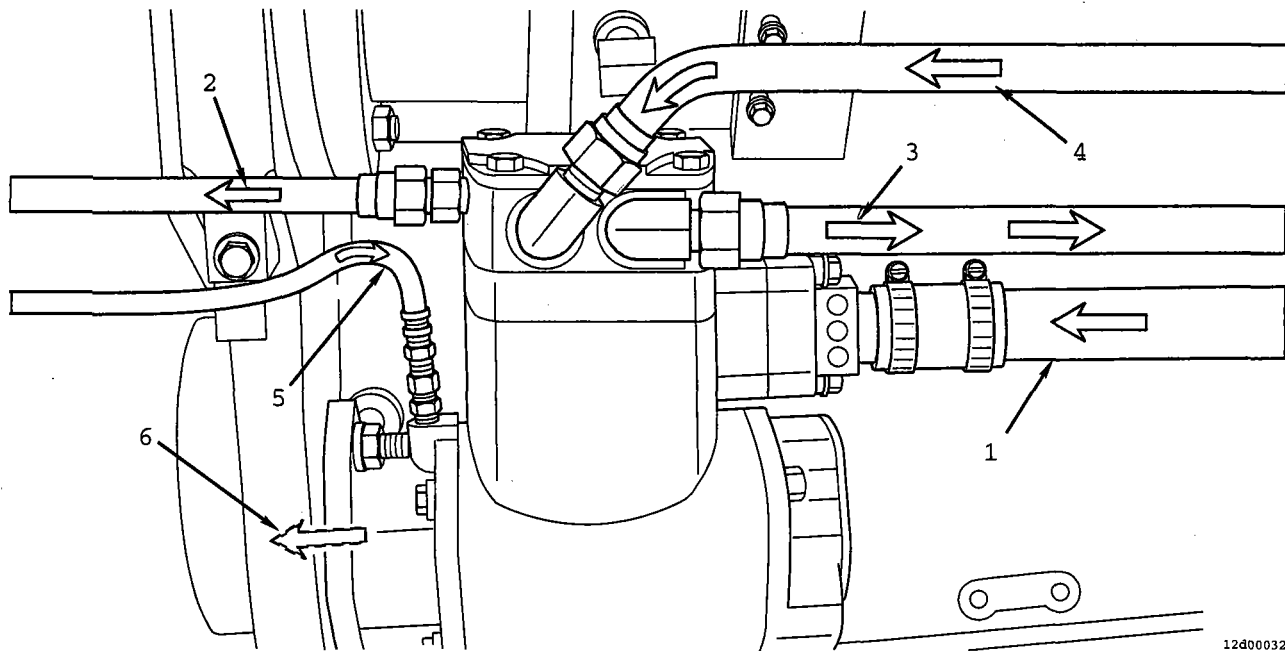
Flow Diagram, Exhaust System



11d00001

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

Flow Diagram, Compressed Air System



1. Air in
2. Air out
3. Coolant out
4. Coolant in

5. Lubricating oil in
6. Lubricating oil out (internal to the gear housing).

NOTES

Section L - Service Literature

Section Contents

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Additional Service Literature.....	L-1
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Additional Service Literature

The following publications can be purchased.

Bulletin No.	Title of Publication
3666262	Operation and Maintenance Manual, ISC Engines
3666245	Troubleshooting and Repair Manual, ISC Engines
3666267	ISC Wiring/Fault Code Diagram
3669001	Fuel for Cummins Engines Bulletin
3810340	Cummins Engine Oil Recommendations Bulletin
3666132	Coolant Requirements and Maintenance Bulletin
3666271	Troubleshooting and Repair Manual ISC Fuel System ISC Engines

Service Literature Ordering Location

Region

United States and Canada

U.K., Europe, Mid-East, Africa,
and Eastern European Countries

South and Central America
(excluding Brazil and Mexico)

Brazil and Mexico

Far East (excluding
Australia and New Zealand)

Australia and New Zealand

Ordering Location

Cummins Distributors

or

Contact 1-800-DIESELS
(1-800-343-7357)

Cummins Engine Co., Ltd.
Royal Oak Way South
Daventry
Northants, NN11 5NU, England

Cummins Americas, Inc.
16085 N.W. 52nd Avenue
Hialeah, FL 33104

Cummins Engine Co., Inc.
International Parts Order Dept., MC 40931
Box 3005
Columbus, IN 47202-3005

Cummins Diesel Sales Corp.
Literature Center
8 Tanjong Penjuru
Jurong Industrial Estate
Singapore

Cummins Diesel Australia
Maroondah Highway, P.O.B. 139
Ringwood 3134
Victoria, Australia

Obtain current price information from your local Cummins Distributor.

Section M - Component Manufacturers

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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

Butech 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

Kysor Cooling Systems N.A.
6040 West 62nd Street
Indianapolis, IN 46278
Telephone: (317) 328-3330

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: 1-800-22-Filters
(1-800-223-4583)

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 Pumps

Robert Bosch Corp.
Automotive Group
2800 South 25th Ave.
Broadview, IL 60153

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

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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.

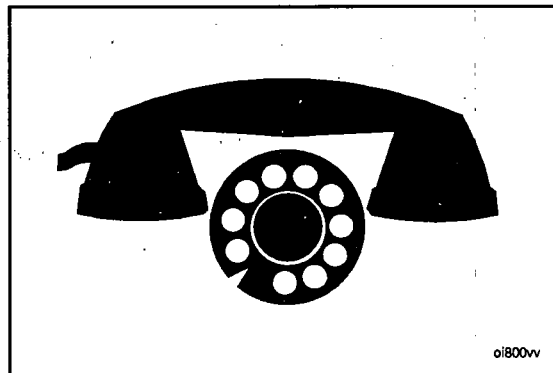
Emergency and Technical Service

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:

Cummins Customer Assistance Center - 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 N. Beltline Hwy.
Mobile, AL 36601-1598
Telephone: (205) 456-2236
FAX: (205) 452-6419

Mobile Onan/Marine Branch

Cummins Alabama, Inc.
3422 Georgia Pacific Avenue
Mobile, AL 36617
Telephone: (205) 452-6426
FAX: (205) 473-6657

Montgomery Branch

Cummins Alabama, Inc.
2325 West Fairview Avenue
P.O. Box 9271
Montgomery, AL 36108
Telephone: (205) 263-2594
FAX: (205) 263-2594

Alaska

Anchorage - (Branch of Seattle)

Cummins Northwest, Inc.
2618 Commercial Drive
Anchorage, AK 99501-3095
Telephone: (907) 279-7594
FAX: (907) 276-6340

Arizona

Phoenix Distributor and Branch

Cummins Southwest, Inc.
2239 N. Black Canyon Hwy
Phoenix, AZ 85009
Telephone: (602) 252-8021
FAX: (602) 253-6725

Tucson Branch

Cummins Southwest, Inc.
1912 West Prince Road
Tucson, AZ 85705
Telephone: (520) 887-7440
FAX: (520) 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 96001
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) 756-8700
FAX: (714) 757-5991

Montebello Branch

Cummins Cal Pacific Inc.
1105 South Greenwood Avenue
Montebello, CA 90640
Telephone: (310) 728-8111
FAX: (310) 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.
13595 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.
914 Cromwell Ave.
Rocky Hill, CT 06067
Telephone: (860) 529-7474
FAX: (860) 529-7524

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
Ft. Myers, FL 33902
Telephone: (914) 337-1211
FAX: (914) 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

Ocala Branch

Cummins Southeastern Power
321 Southwest 52nd Ave.
Ocala, FL 34474-1892
Telephone: (352) 861-1122
FAX: (352) 861-1130

Orlando Branch

Cummins Southeastern Power, Inc.
4020 North
Orange Blossom Trail
Orlando, FL 32810
Telephone: (407) 298-2080
FAX: (407) 290-8727

Tampa Branch

Cummins Southeastern Power, Inc.
5912 E. Hillsborough Avenue
P. O. Box 11737
Tampa, FL 33610
Telephone: (813) 626-1101
FAX: (813) 626-8888

Georgia

Atlanta Distributor

Cummins South, Inc.
5125 Georgia Highway 85
College Park, GA 30349
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 City
P.O. Box 5212
Boise, ID 83705
Telephone: (208) 336-5000
FAX: N/A

Pocatello - (Branch of Salt Lake City)

Cummins Intermountain, Inc.
1429 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.
2008 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 67201
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

Baltimore Distributor

Cummins Power Systems, Inc.
3140 Washington Blvd.
Baltimore, MD 21230
Telephone: (410) 644-6500
FAX: (410) 644-2438

Massachusetts

Boston Distributor

Cummins Northeast, Inc.
100 Allied Drive
Dedham, MA 02026
Telephone: (781) 329-1750
FAX: (781) 329-4428

West Springfield Branch

Cummins Northeast, Inc.
177 Rocus Street
Springfield, MA 1089
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 Vincent Court
Novi, MI 48375
Telephone: (248) 478-9700
FAX: (248) 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: (248) 843-6200
FAX: (248) 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: (248) 380-4300
FAX: (248) 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

Hibbing Branch

Cummins North Central, Inc.
604 West 41st Street
Hibbing, MN 55746
Telephone: (218) 263-7558
FAX: (218) 263-7400

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.
8201 NE Parvin Road
Kansas City, MO 64161
Telephone: (816) 414-8200
FAX: (816) 414-8299

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 65205
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: (973) 491-0100
FAX: (973) 578-8873

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.
29 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 Freddy Boulevard (27406)
P.O. Box 22066
Greensboro, NC 27420-2066
Telephone: (919) 275-4531
FAX: (919) 275-8304

Wilson Branch

Cummins Atlantic, Inc.
1514 Cargill Avenue (27893)
P.O. Box 1177
Wilson, NC 27894-1117
Telephone: (252) 237-9111
FAX: (252) 237-9132

North Dakota

Fargo - (Branch of St. Paul)

Cummins Diesel Sales, Inc.
3801 - 34th Ave. SW
Fargo, ND 58104
Telephone: (701) 282-2466
FAX: (701) 277-5399

Grand Forks - (Branch of St. Paul)

Cummins Diesel Sales, Inc.
4728 Gateway Drive
P.O. Box 12637
Grand Forks, ND 58201
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 Branch

Cummins Interstate Power, Inc.
4000 Lyman Drive
Hilliard (Columbus), OH 43026
Telephone: (614) 771-1000
FAX: (614) 771-0769

Columbus Distributor

Cummins Interstate Power, Inc.
2297 Southwest Blvd., Suite K
Grove City, OH 43123
Telephone: (614) 771-1000

Akron Branch

Cummins Interstate Power, Inc.
1033 Kelly Avenue
Akron, OH 44306
Telephone: (216) 773-7821
FAX: (216) 773-2201

Cincinnati Branch

Cummins Interstate Power, Inc.
10470 Evendale Drive
Cincinnati, OH 45241
Telephone: (513) 563-6670
FAX: (513) 563-0594

Cleveland Branch

Cummins Interstate Power, Inc.
7585 Northfield Road
Cleveland, OH 44146
Telephone: (440) 439-6800
FAX: (440) 439-7390

Strasburg Branch

Cummins Interstate Power, Inc.
777 South Wooster Avenue
Box 136
Strasburg, OH 44680
Telephone: (216) 878-5511
FAX: (216) 878-7666

Toledo Branch

Cummins Interstate Power, Inc.
801 Illinois Avenue
Maumee
(Toledo), OH 43537
Telephone: (419) 893-8711
FAX: (419) 893-5362

Youngstown Branch

Cummins Interstate Power, 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.
16525 East Skelly Drive
P.O. Box 471616
Tulsa, OK 74116
Telephone: (918) 234-3240
FAX: (918) 234-2342

Oregon

Bend - (Branch of Seattle)

Cummins Northwest, Inc.
3500 N. Highway 97 (97701-5729)
P.O. Box 309
Bend, OR 97709-0309
Telephone: (541) 389-1900
FAX: (541) 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: (541) 687-0000
FAX: (541) 687-1977

Medford - (Branch of Seattle)

Cummins Northwest, Inc.
4045 Crater Lake Highway
Medford, OR 97504-9796
Telephone: (541) 779-0151
FAX: (541) 772-2395

Pendleton - (Branch of Seattle)

Cummins Northwest, Inc.
223 S.W. 23rd Street
Pendleton, OR 97801-1810
Telephone: (541) 276-2561
FAX: (541) 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 Mossdale 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 West Montague Avenue
Charleston, SC 29418-5593
Telephone: (843) 554-5112
FAX: (843) 745-0745

Charleston - (Onan Branch of Charlotte)

Cummins Atlantic Inc.
Power Generation Group
231 Farmington Road
Summerville, SC 29483
Telephone: (803) 851-9819
FAX: (803) 875-4338

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

Chattanooga - (Branch of Atlanta)

Cummins South, Inc.
1509 East 26th Street
Chattanooga, TN 37407-1095
Telephone: (615) 629-1447
FAX: (615) 629-1494

Nashville - (Branch of Louisville)

Cummins Cumberland, Inc.
706 Spence Lane
Nashville, TN 37217
Telephone: (615) 366-4341
FAX: (615) 366-5693

Texas

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

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

Cloverdale - (Branch of Charlotte)

Cummins Atlantic, Inc.
2987 Simmons Drive
Cloverdale, VA 24077
Telephone: (540) 966-3169
FAX: (540) 966-3749

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
Roanoke, VA 24019-7237
Telephone: (540) 966-3169
FAX: (540) 996-3749

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: (425) 235-3400
FAX: (425) 235-8202

Chehalis Branch

Cummins Northwest, Inc.
926 N.W. Maryland
Chehalis, WA 98532-0339
Telephone: (360) 748-8841
FAX: (360) 748-8843

Spokane Branch

Cummins Northwest, Inc.
11134 W. Westbow Blvd.
Spokane, WA 99204
Telephone: (509) 455-4411
FAX: (509) 624-4681

Tacoma Branch

Cummins Northwest, Inc.
3701 Pacific Highway East
Tacoma, WA 98424-1135
Telephone: (253) 922-2191
FAX: (253) 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.
3100 MacCorkle Ave. SW
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.
2030 St. Highway 53
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: (920) 336-9631
(800) 236-1191
FAX: (920) 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

ISC
Section S - Service Assistance

Service Assistance
Page S-21

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
11751 - 181 Street
Edmonton, AB T5S 2K5
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 Prairie
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. V0B 2G0, Canada
Telephone: (604) 425-0522
FAX: (604) 425-0323

Tumbler Ridge Branch

Cummins British Columbia
Industrial Site, Box 226
Tumbler Ridge, B.C.
Canada V0C 2W0
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.
7175 Pacific Circle
Mississauga, ON L5T 2A5
Telephone: (905) 795-0050
FAX: (905) 795-0021

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
Palmerston North, New Zealand
Location:
852-860 Tremaine Avenue
Telephone: (64-6) 356-2209

Section TS - Troubleshooting Symptoms

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Troubleshooting Procedures and Techniques

This guide describes some typical engine operating problems, their causes, and some acceptable corrections to those problems. Unless noted otherwise, the problems listed are those which an operator can diagnose and repair.

WARNING

Performing troubleshooting procedures NOT outlined in this section can result in equipment damage or personal injury or death. Troubleshooting must be performed by trained, experienced technicians. Consult a Cummins Authorized Repair Location for diagnosis and repair beyond that which is outlined, and for symptoms not listed in this section. Before beginning any troubleshooting, refer to General Safety Instructions in Section i of this manual.

Follow the suggestions below for troubleshooting:

- Study the complaint thoroughly before acting
- Refer to the engine system diagrams
- Do the easiest and most logical things first
- Find and correct the cause of the complaint

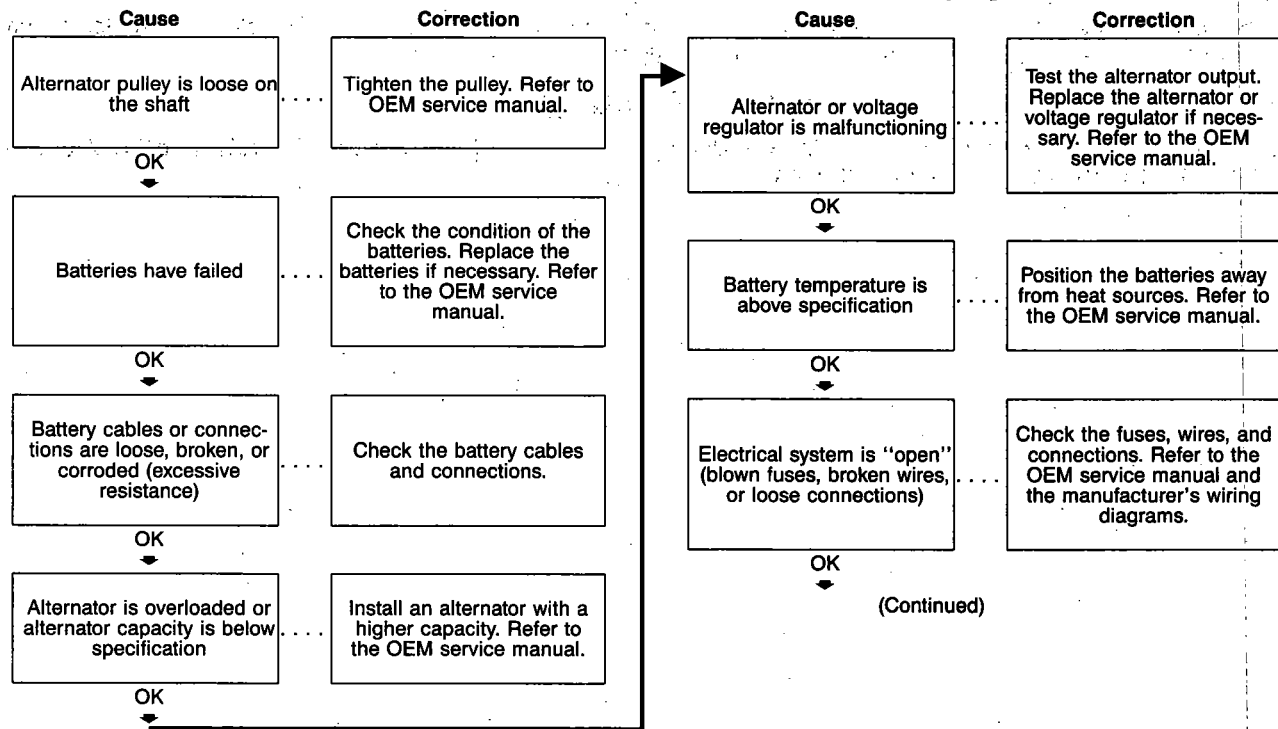
Troubleshooting Symptoms Charts

Use the following charts to aid in diagnosing specific engine symptoms. Read each row of blocks from top to bottom. Follow the arrows through the chart to identify corrective action.

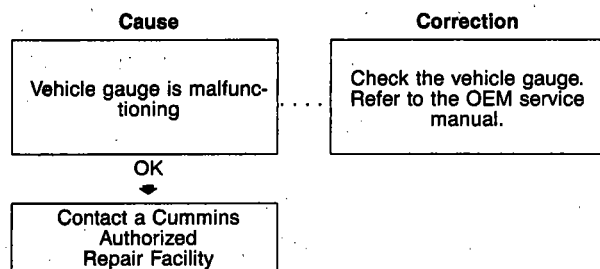


Troubleshooting presents the risk of equipment damage, personal injury or death. Troubleshooting must be performed by trained experienced technicians.

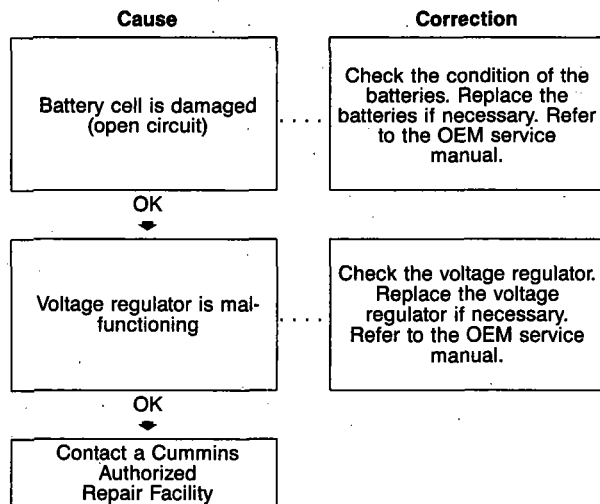
Alternator Not Charging or Insufficient Charging



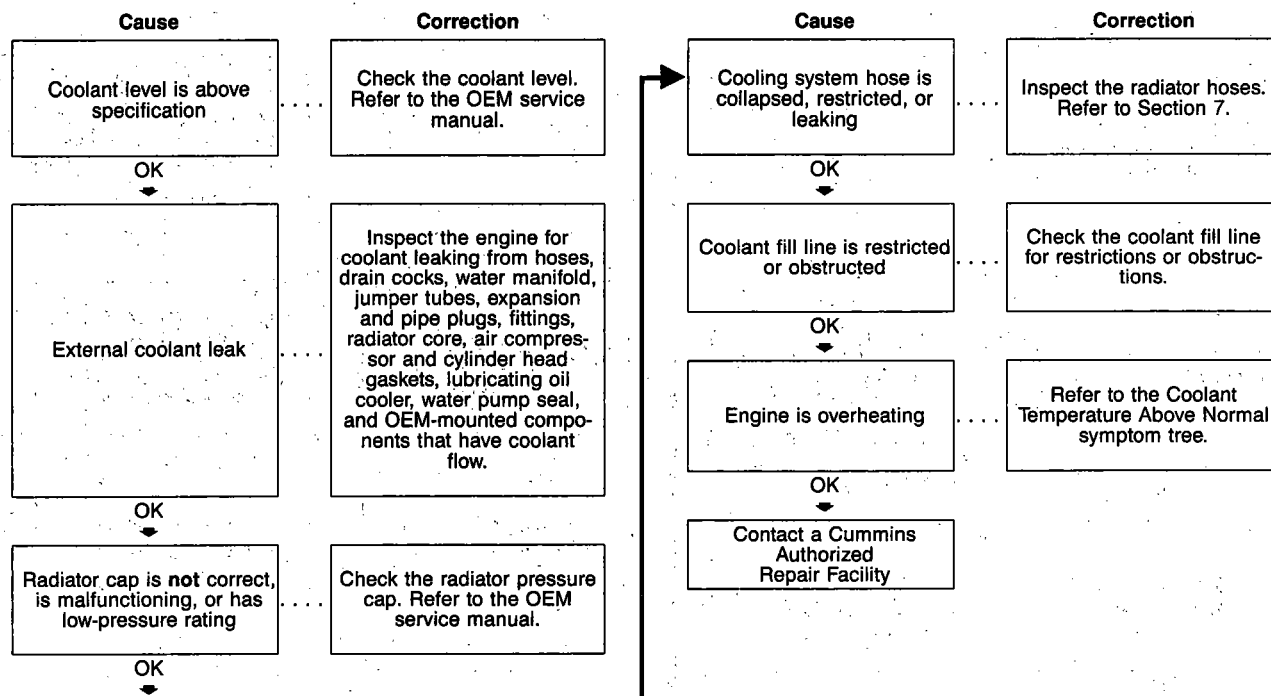
Alternator Not Charging or Insufficient Charging (Continued)



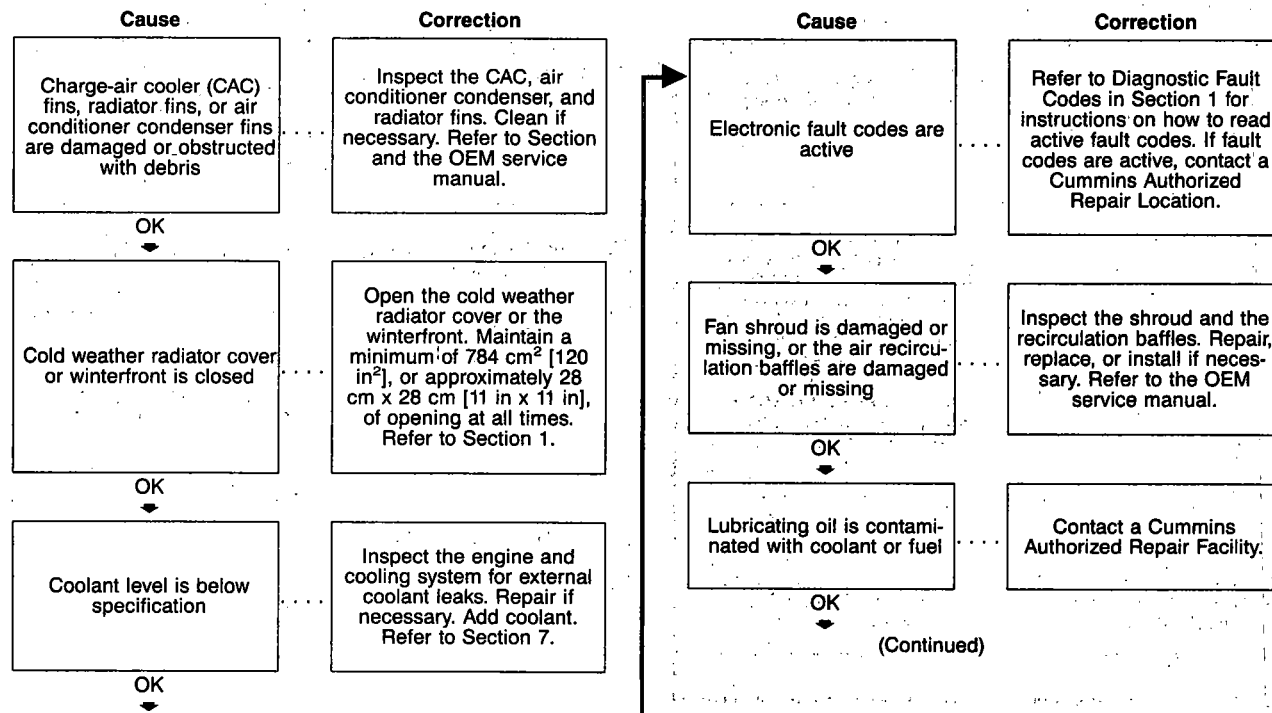
Alternator Overcharging



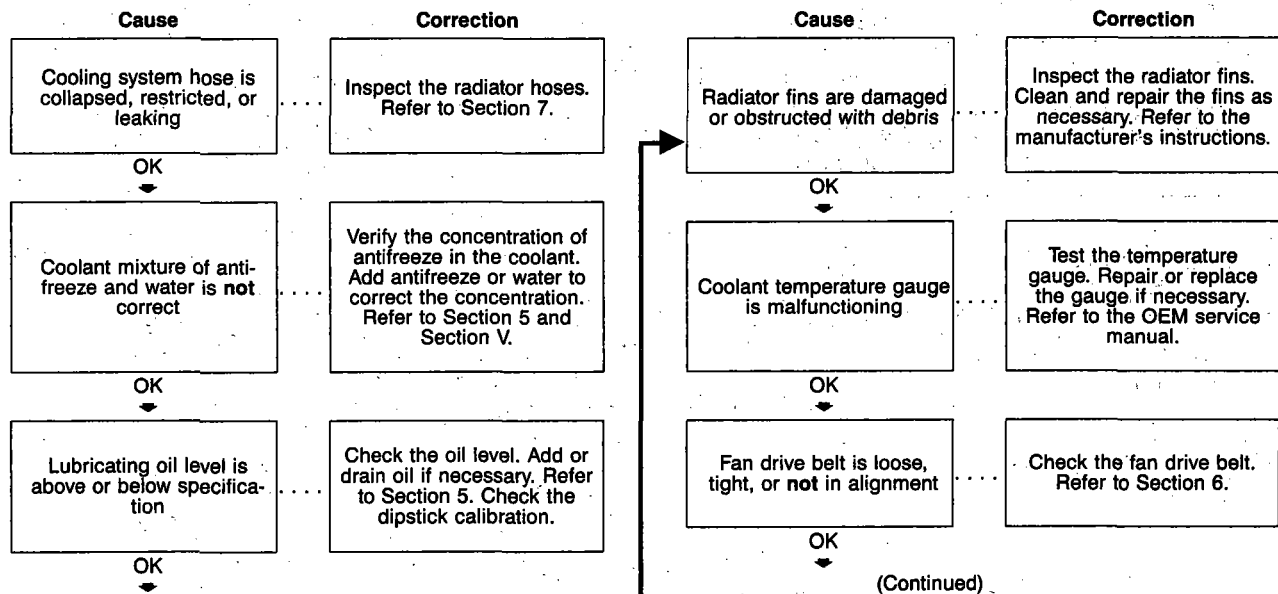
Coolant Loss - External

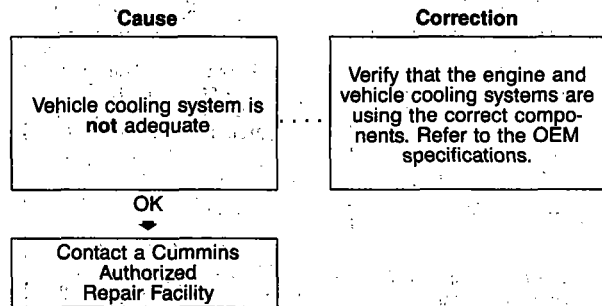


Coolant Temperature Above Normal – Gradual Overheat

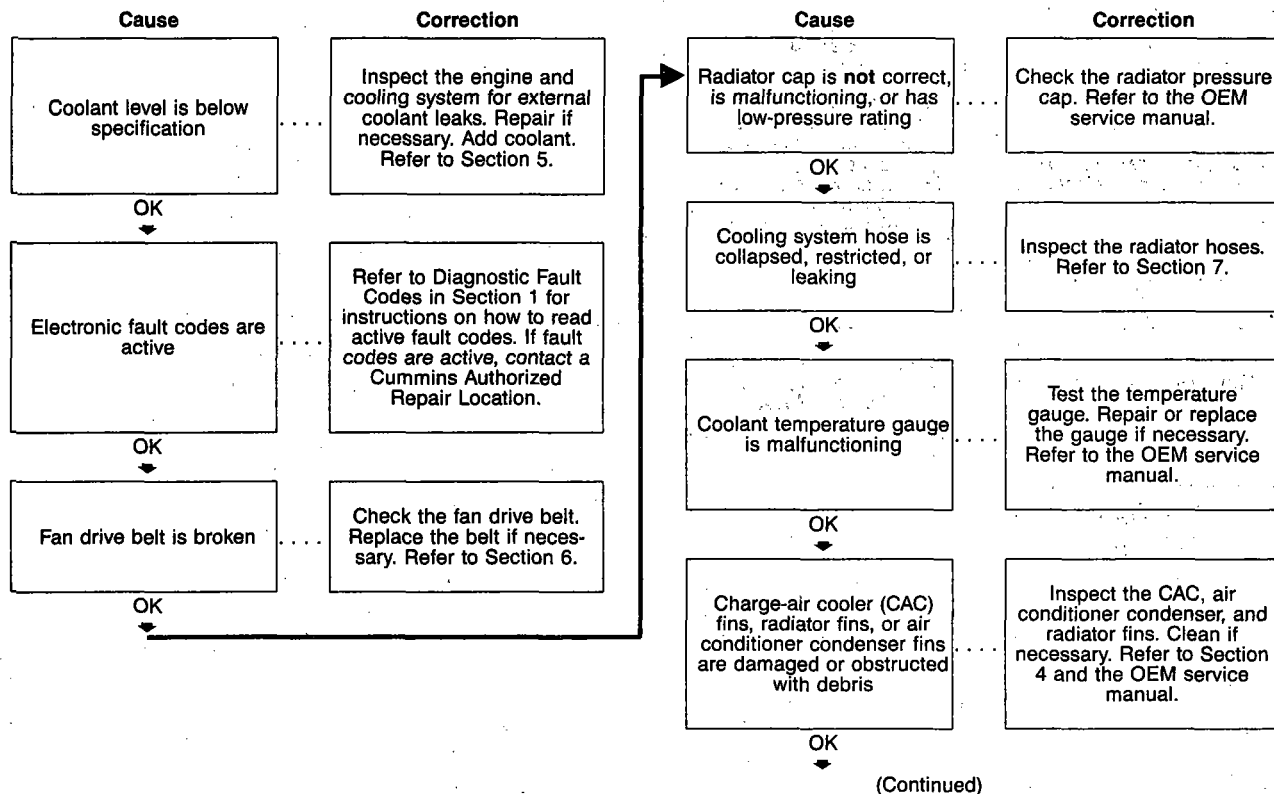


Coolant Temperature Above Normal – Gradual Overheat (Continued)



Coolant Temperature Above Normal – Gradual Overheat (Continued)

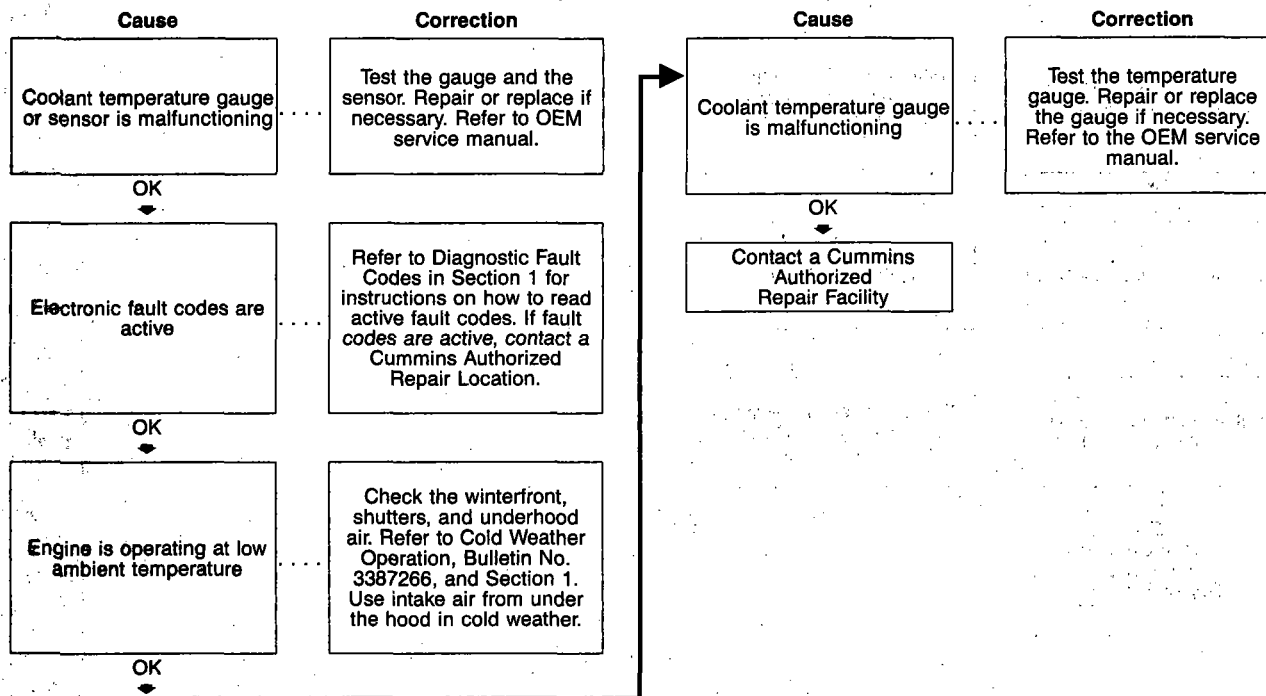
Coolant Temperature is Above Normal – Sudden Overheat



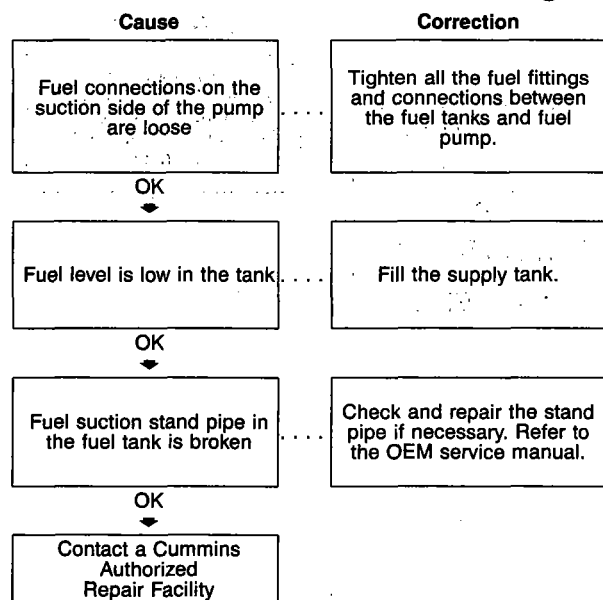
Coolant Temperature is Above Normal – Sudden Overheat (Continued)

Cause	Correction
Cold weather radiator cover or winterfront is closed	Open the cold weather radiator cover or the winterfront. Maintain a minimum of 784 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.
OK	
Fan drive belt is broken	Check the fan drive belt. Replace the belt if necessary. Refer to Section 3.
OK	
Contact a Cummins Authorized Repair Facility	

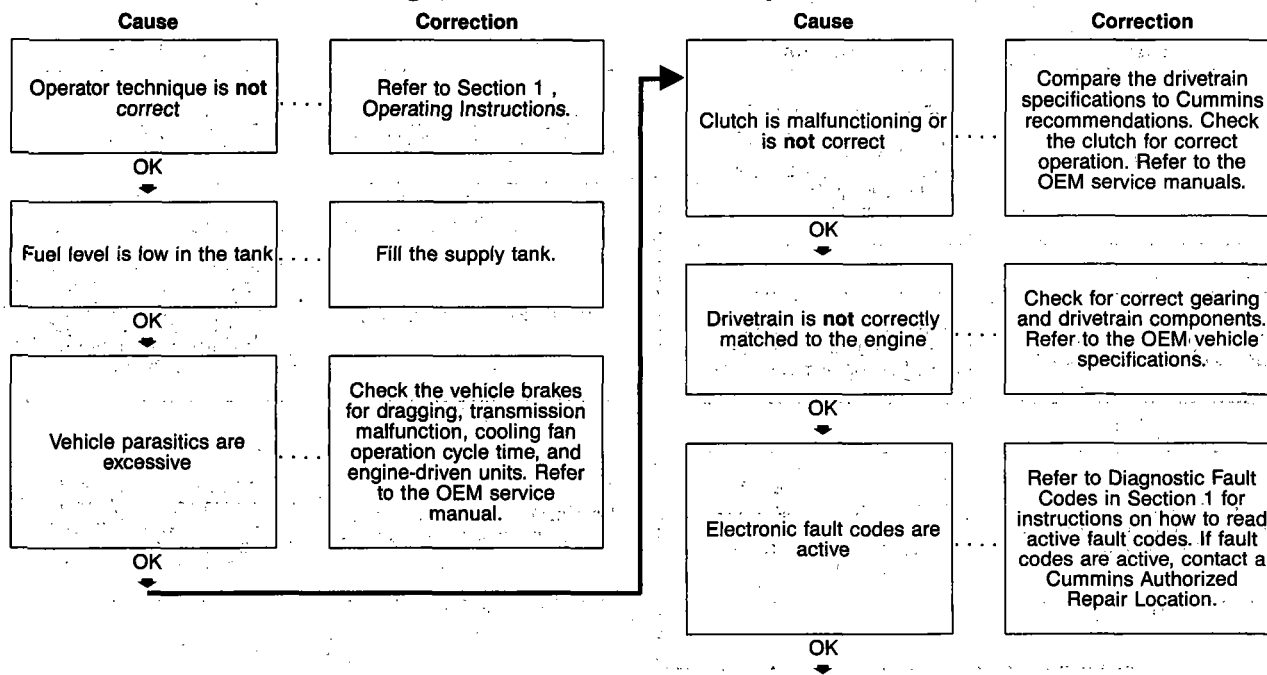
Coolant Temperature is Below Normal



Cranking Fuel Pressure is Low

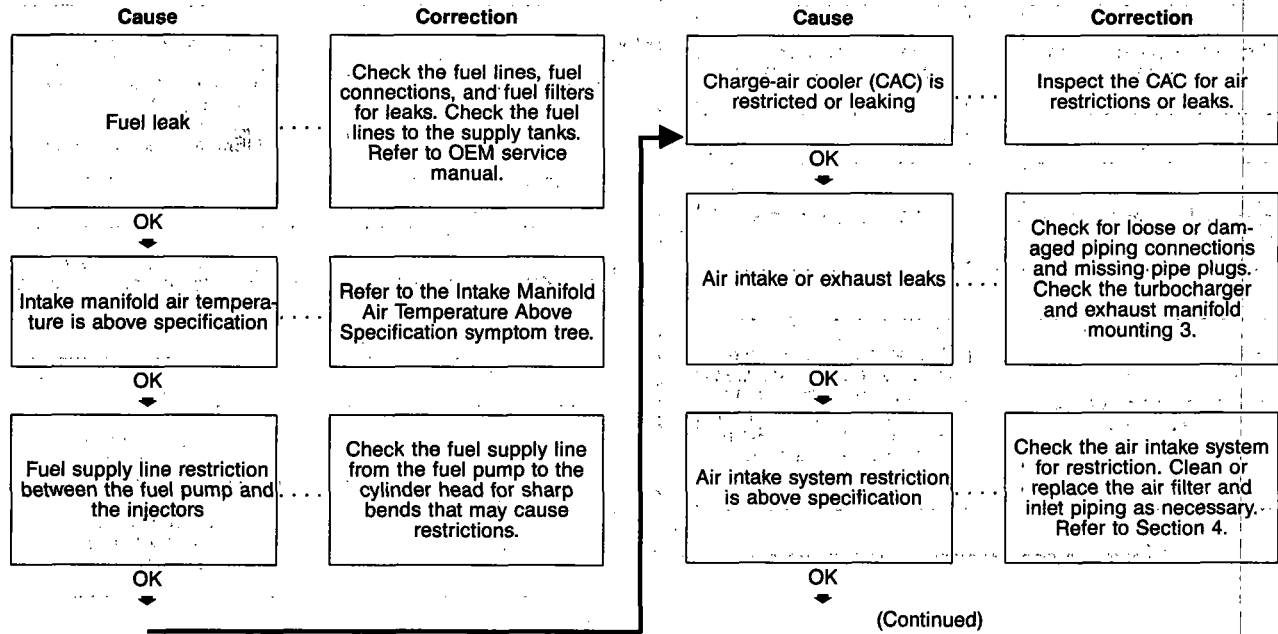


Engine Acceleration or Response Poor



(Continued)

Engine Acceleration or Response Poor (Continued)



Engine Acceleration or Response Poor (Continued)

Cause

Fuel grade is not correct
for the application, or the
fuel quality is poor

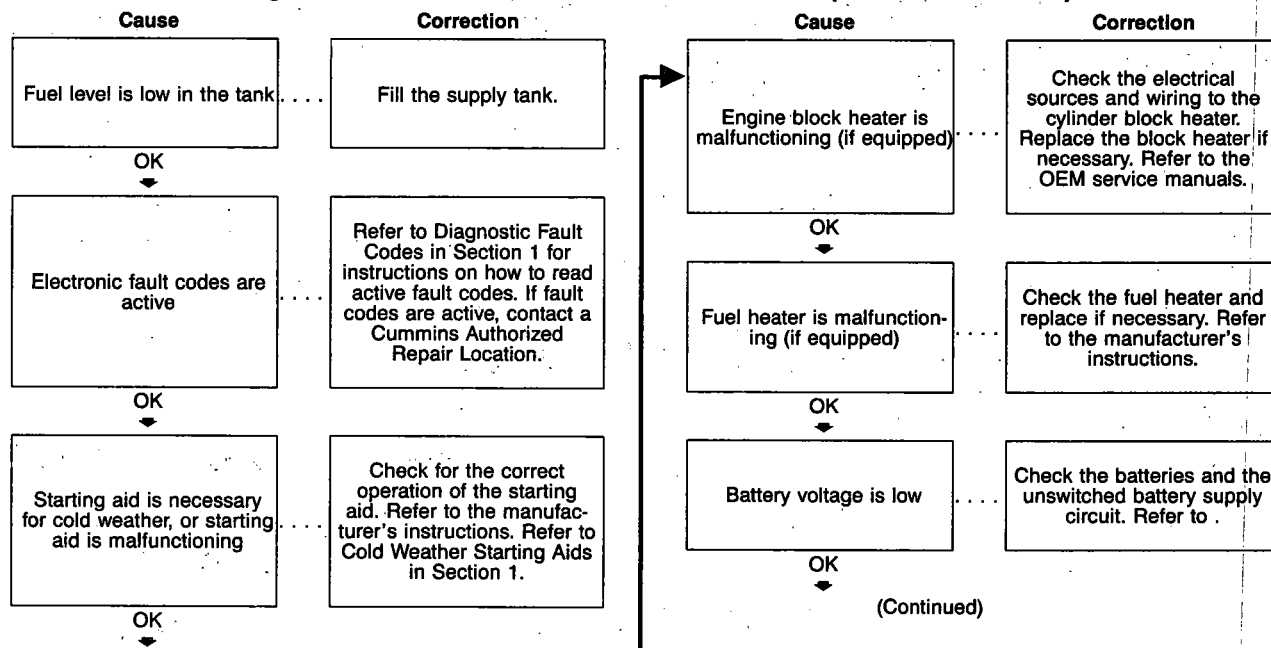
OK
↓

Contact a Cummins
Authorized
Repair Facility

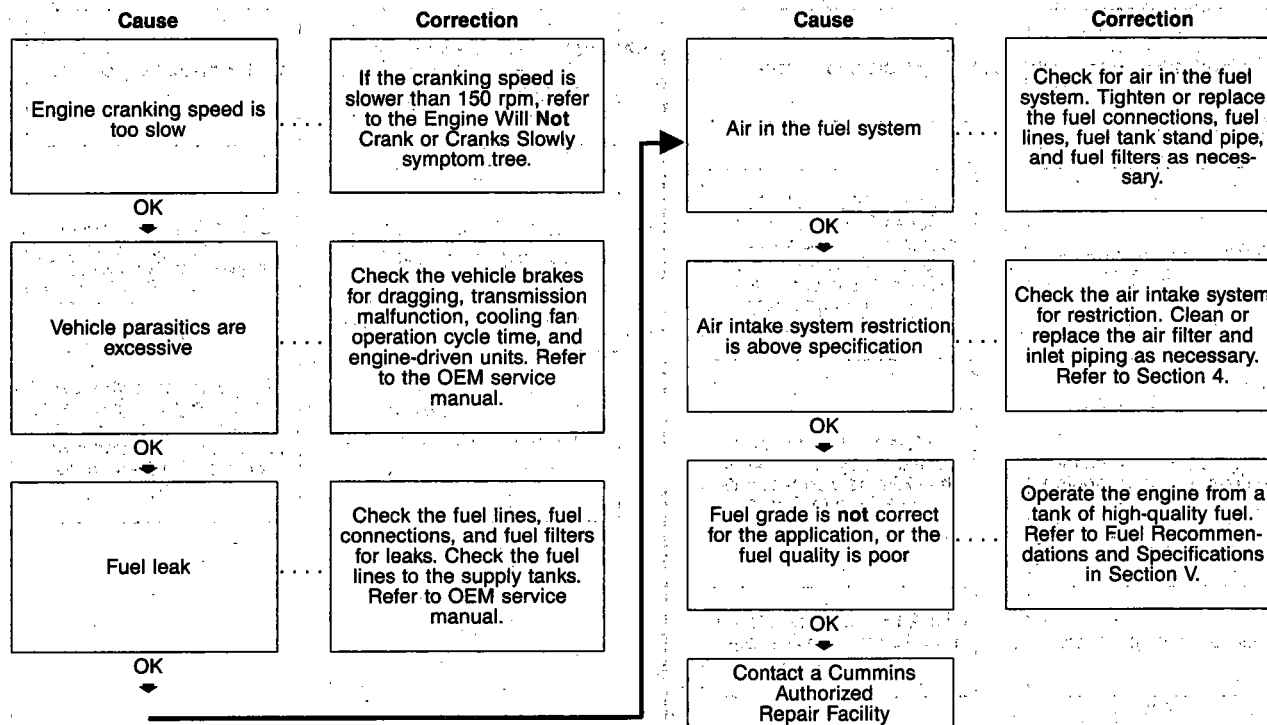
Correction

Operate the engine from a
tank of high-quality fuel.
Refer to Fuel Recommen-
dations and Specifications
in Section V.

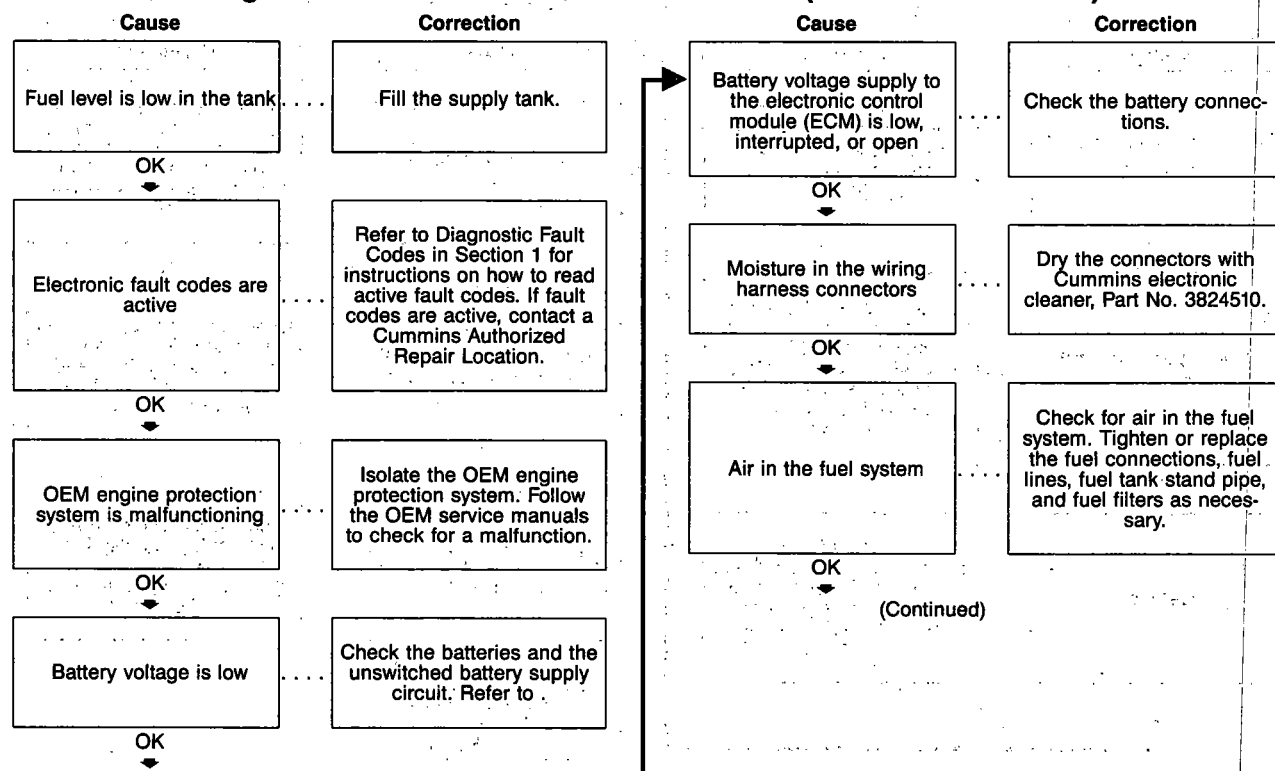
Engine Difficult to Start or Will Not Start (Exhaust Smoke)



Engine Difficult to Start or Will Not Start (Exhaust Smoke) (Continued)



Engine Difficult to Start or Will Not Start (No Exhaust Smoke)



Engine Difficult to Start or Will Not Start (No Exhaust Smoke) (Continued)

Cause

Electronic control module
(ECM) is locked up

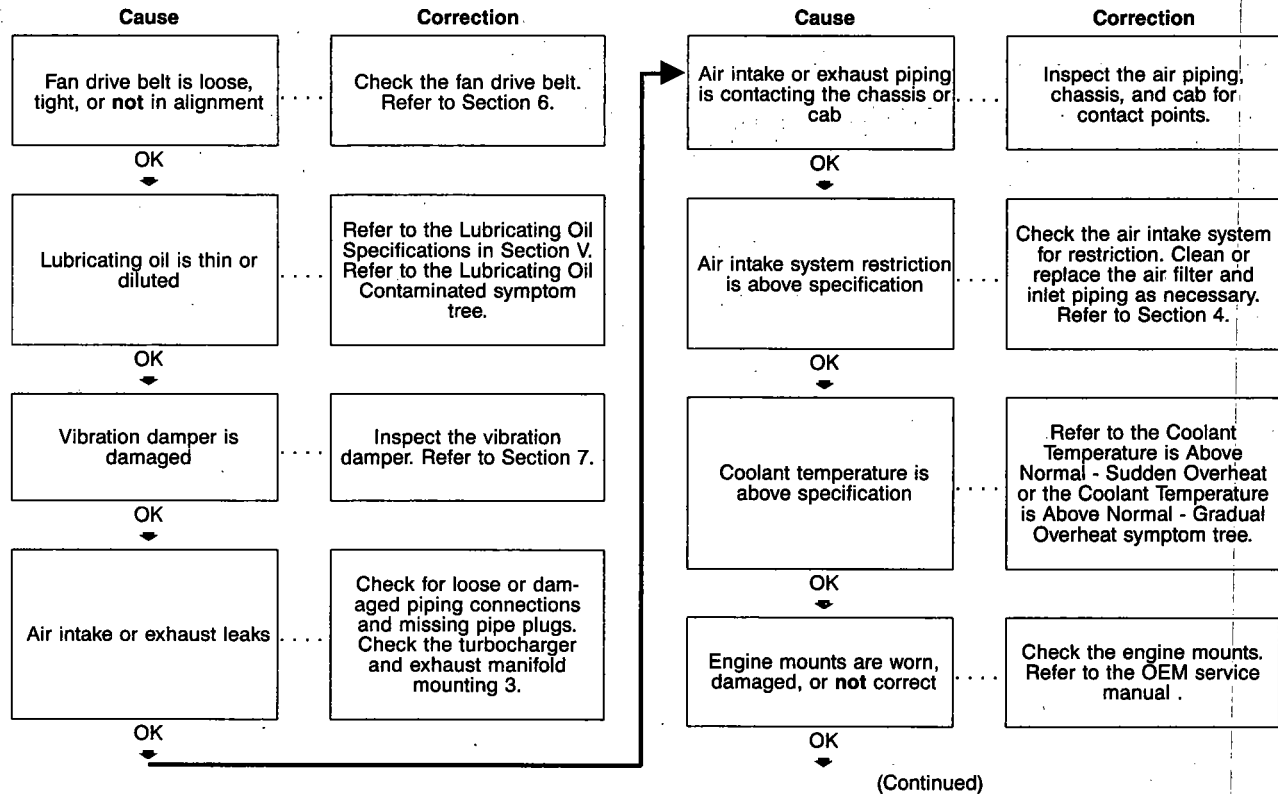
Correction

Disconnect the battery
cables for 30 seconds.
Connect the battery cables,
and start the engine.

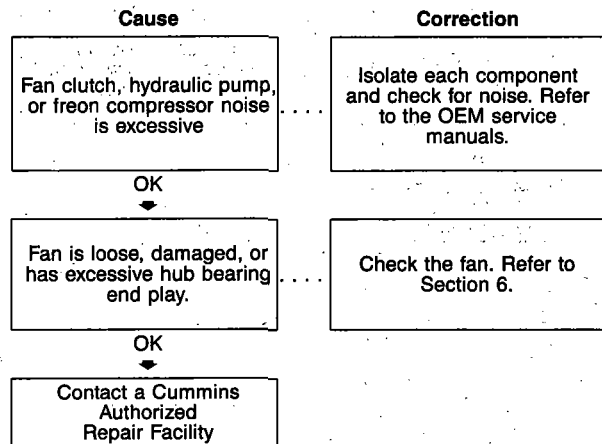
OK
↓

Contact a Cummins
Authorized
Repair Facility

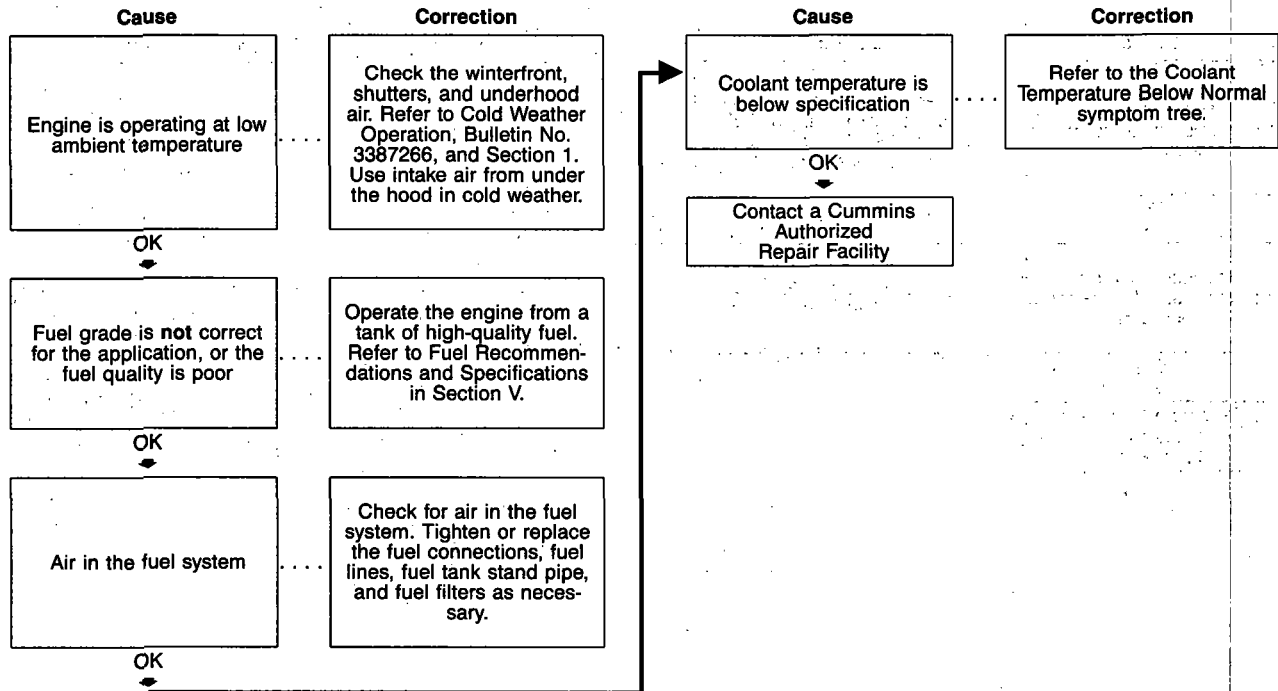
Engine Noise Excessive



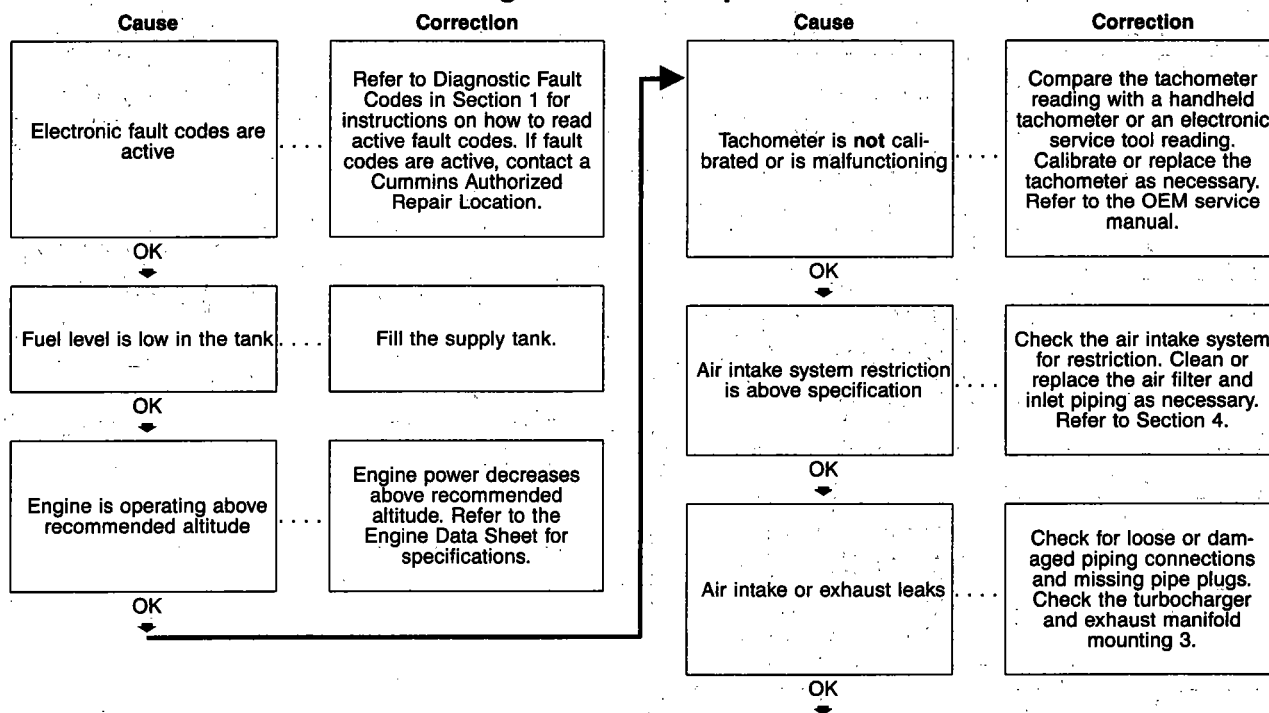
Engine Noise Excessive (Continued)



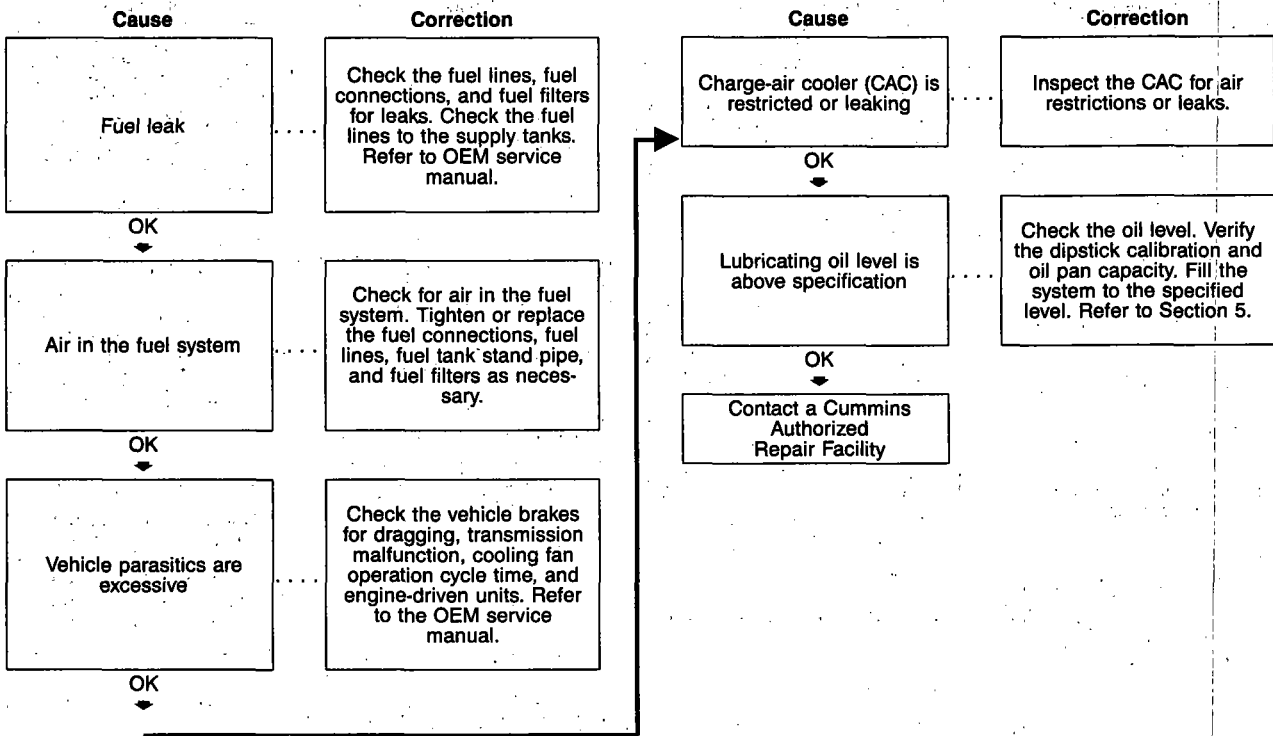
Engine Noise Excessive — Combustion Knocks



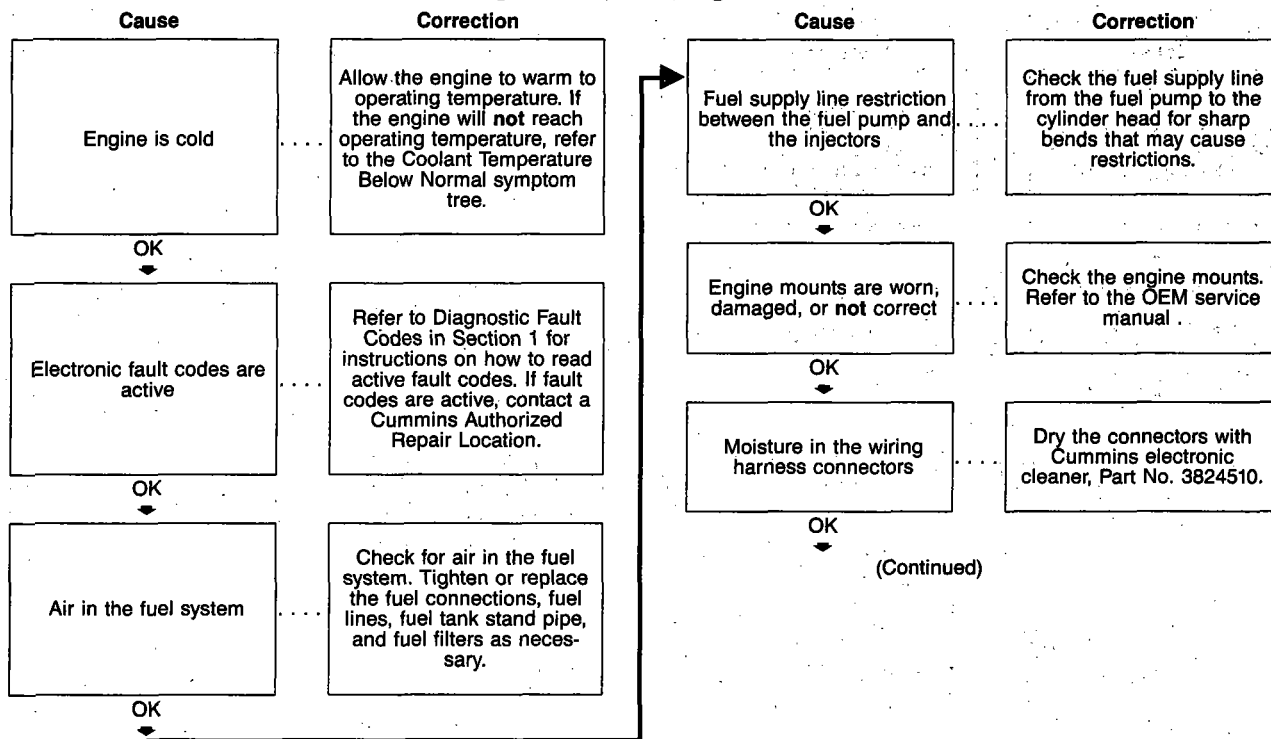
Engine Power Output Low



Engine Power Output Low (Continued)



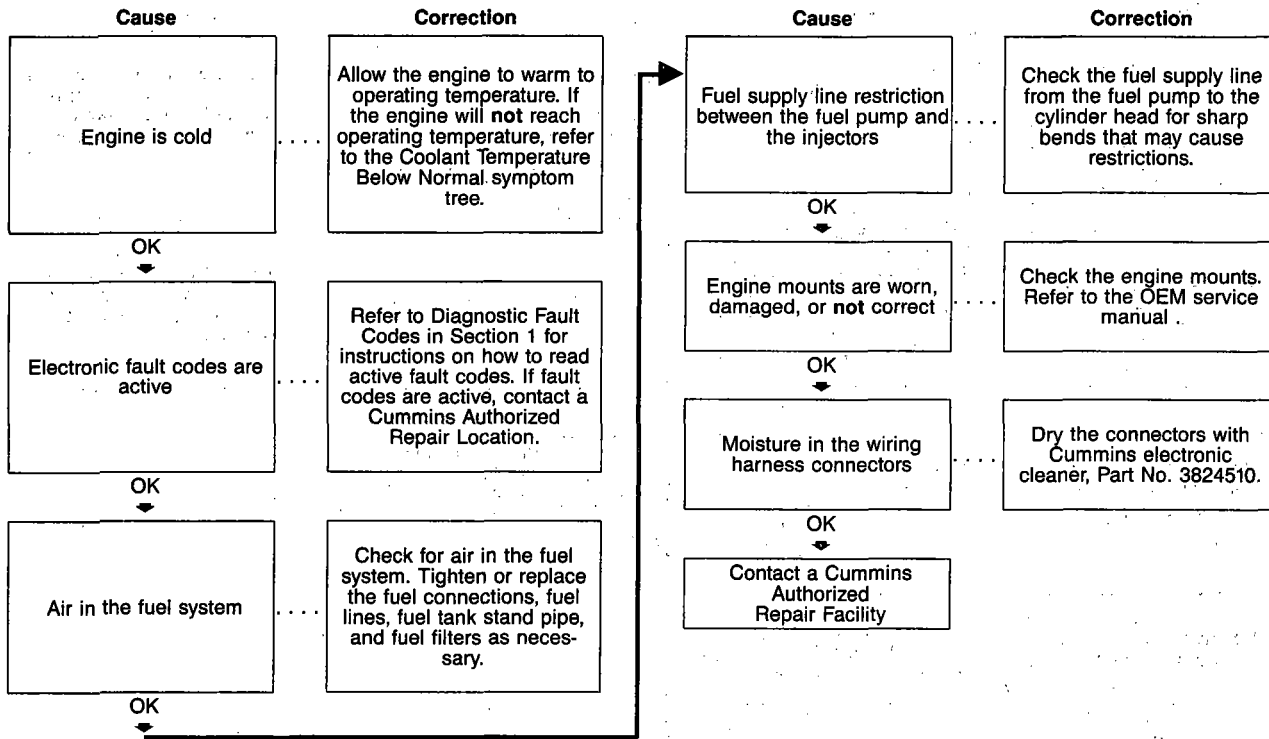
Engine Runs Rough at Idle



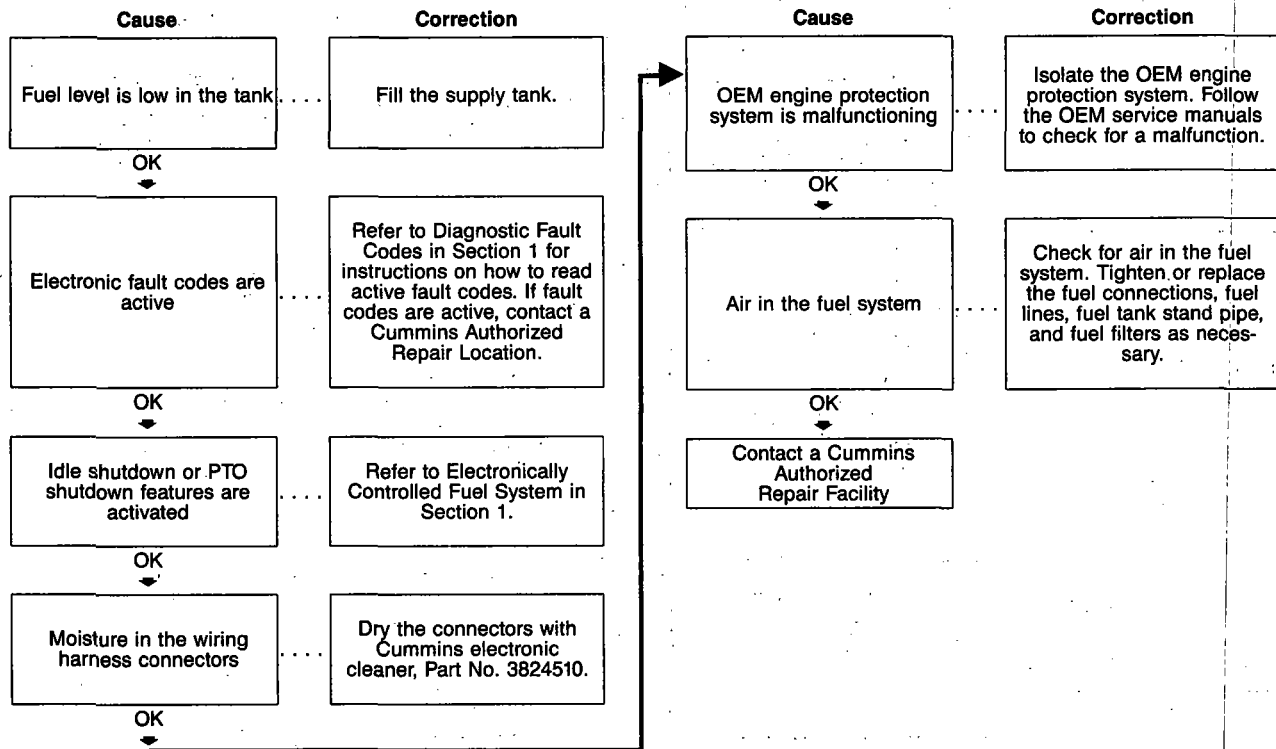
Engine Runs Rough at Idle (Continued)

Cause	Correction
Fuel grade is not correct for the application, or the fuel quality is poor	Operate the engine from a tank of high-quality fuel. Refer to Fuel Recommendations and Specifications in Section V.
OK ↓	
Contact a Cummins Authorized Repair Facility	

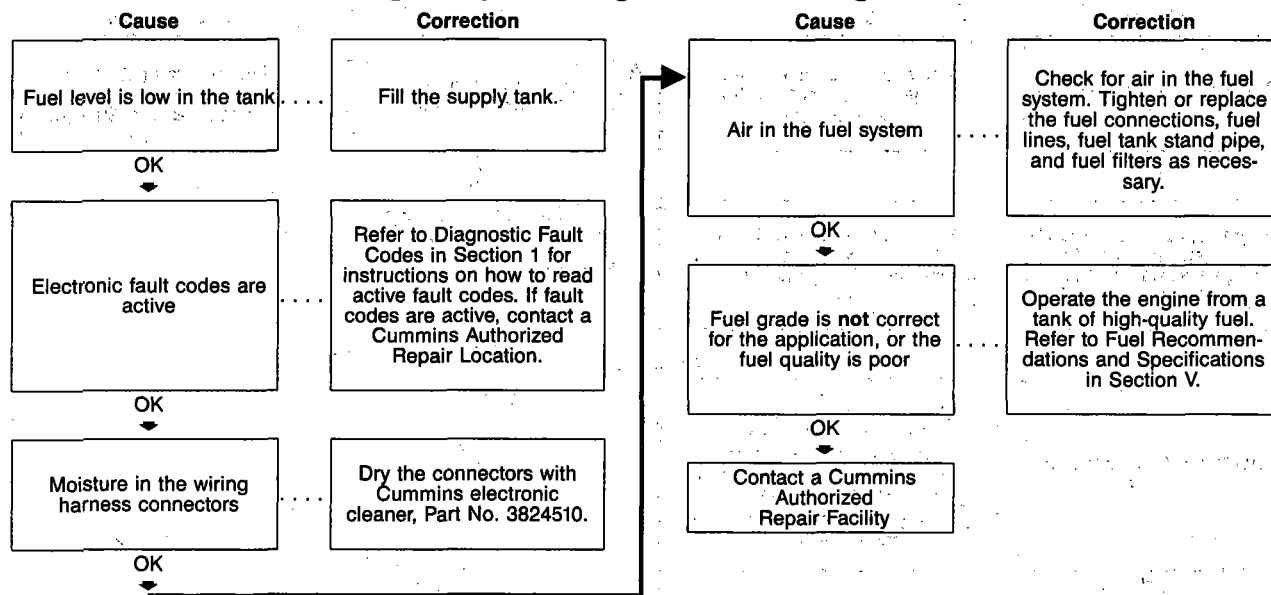
Engine Runs Rough or Misfires



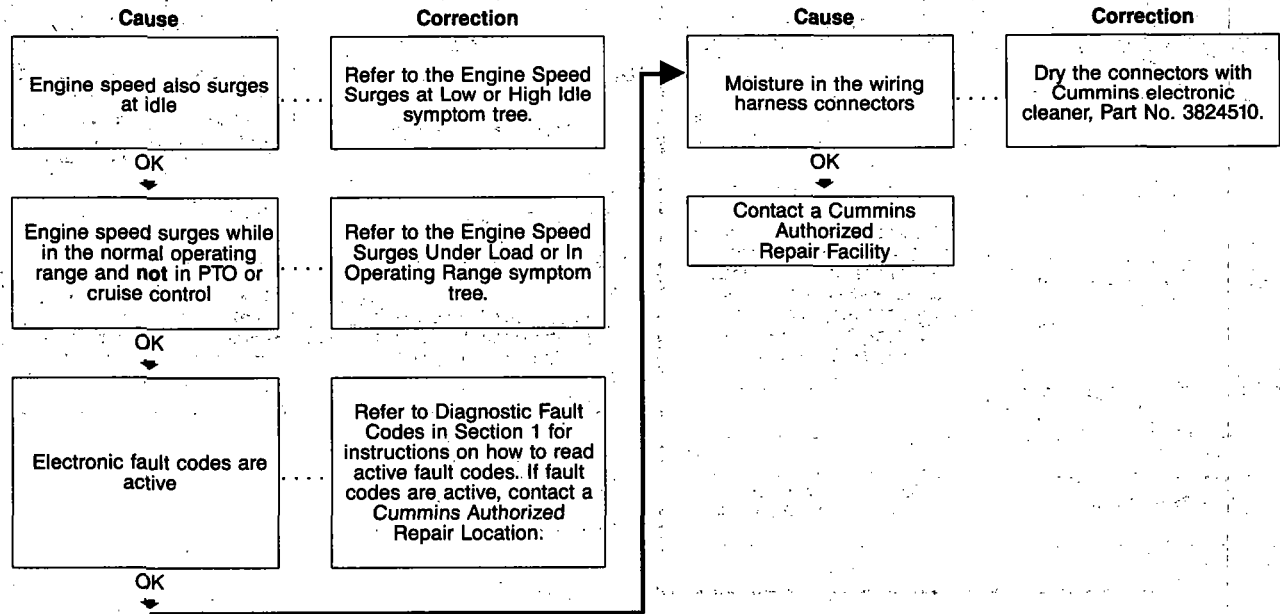
Engine Shuts Off Unexpectedly or Dies During Deceleration



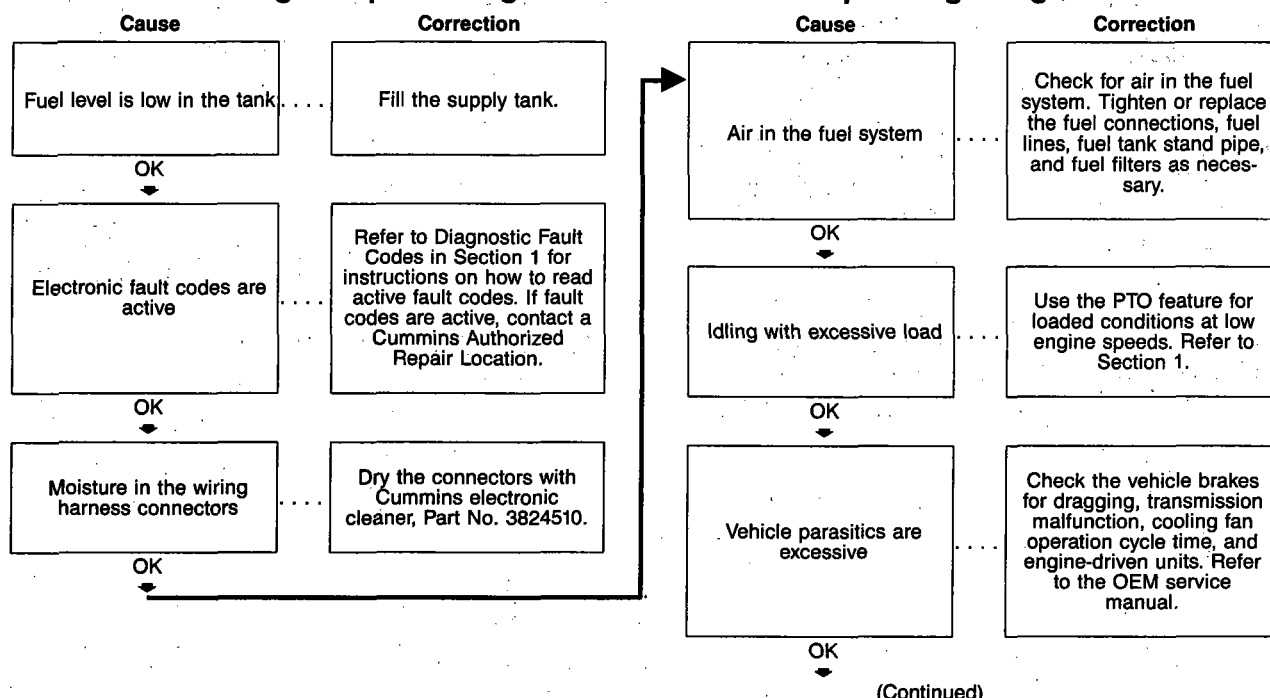
Engine Speed Surges at Low or High Idle



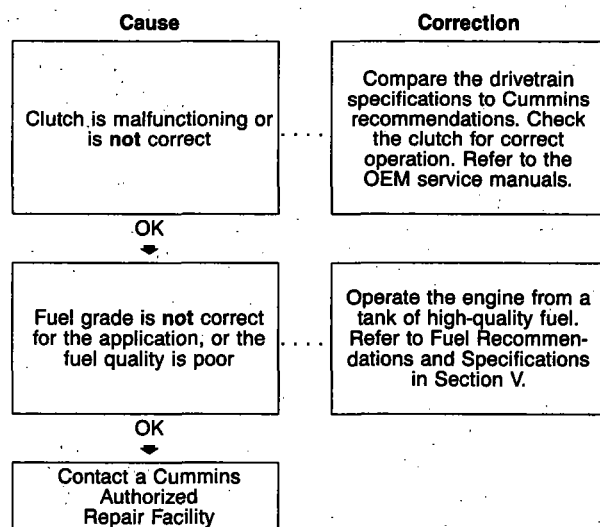
Engine Speed Surges in PTO or Cruise Control



Engine Speed Surges Under Load or in Operating Range



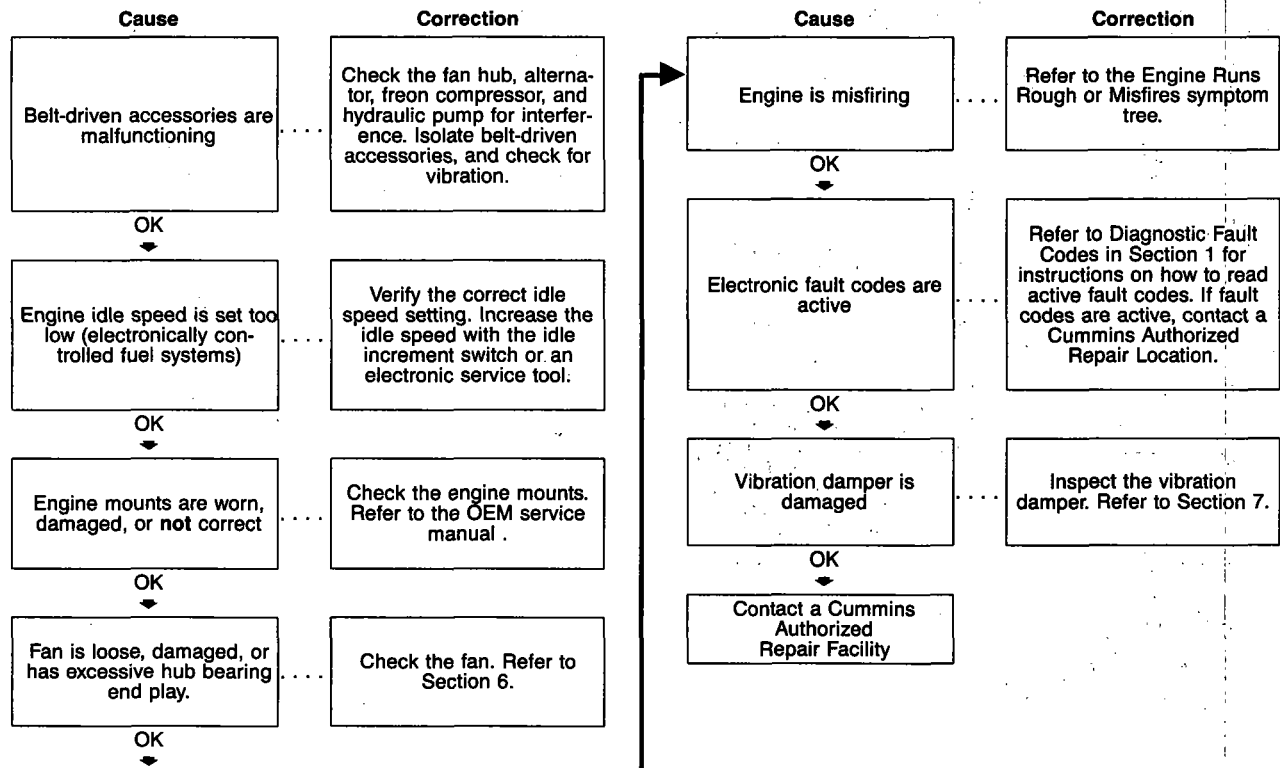
Engine Speed Surges Under Load or in Operating Range (Continued)



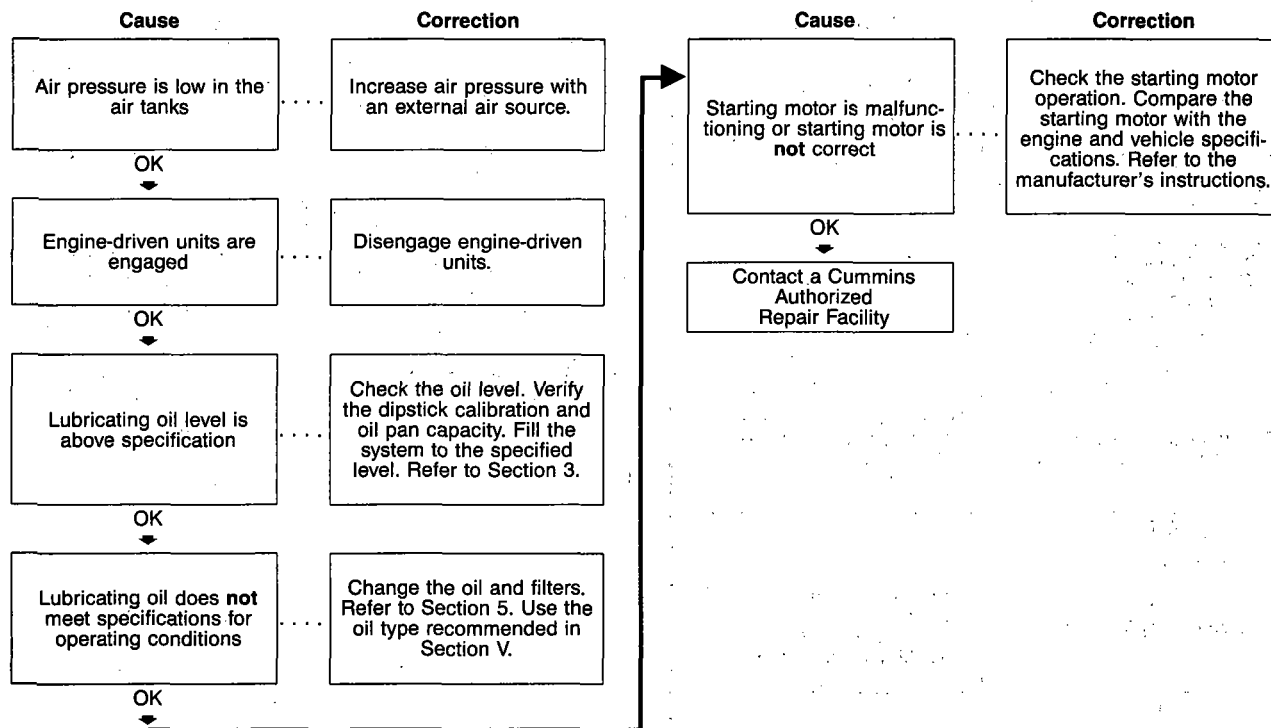
Engine Starts But Will Not Keep Running

Cause	Correction
Fuel level is low in the tank.	Fill the supply tank.
OK ↓	
Battery voltage supply to the electronic control module (ECM) is low, interrupted, or open.	Check the battery connections.
OK ↓	
Electronic fault codes are active.	Refer to Diagnostic Fault Codes in Section 1 for instructions on how to read active fault codes. If fault codes are active, contact a Cummins Authorized Repair Location.
OK ↓	
Contact a Cummins Authorized Repair Facility.	

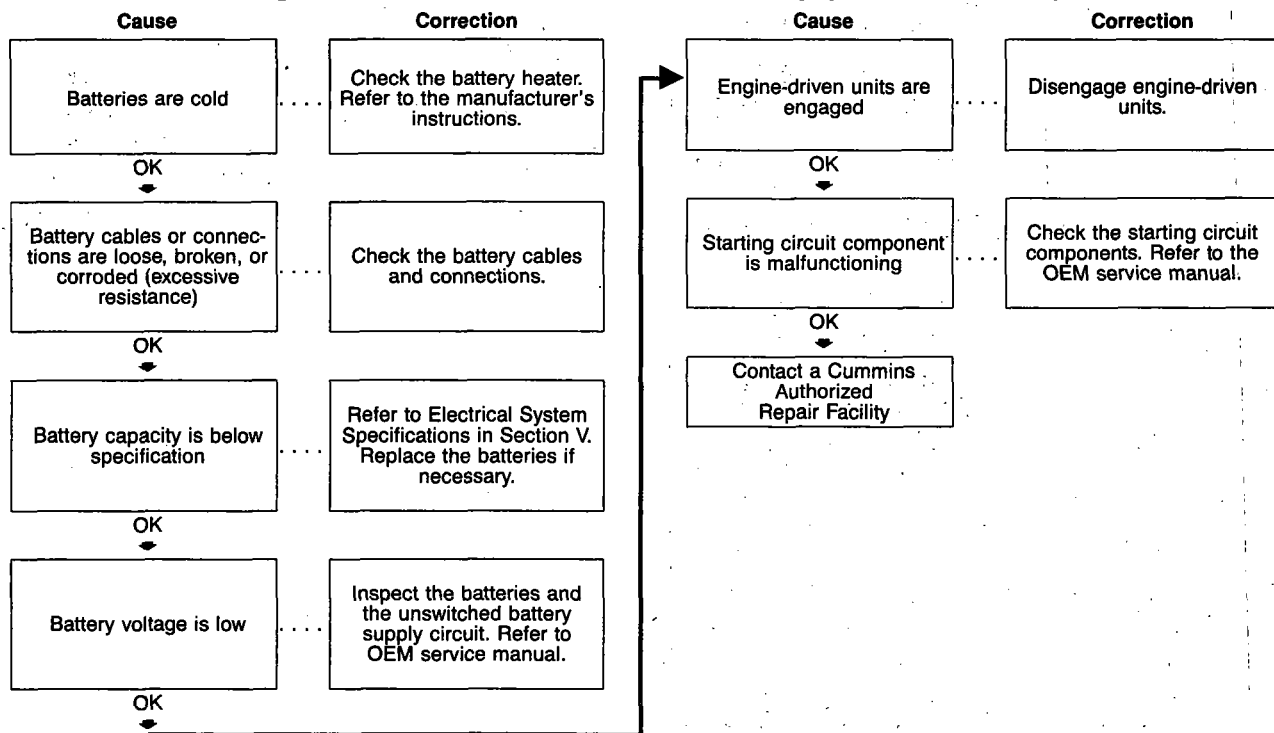
Engine Vibration Excessive



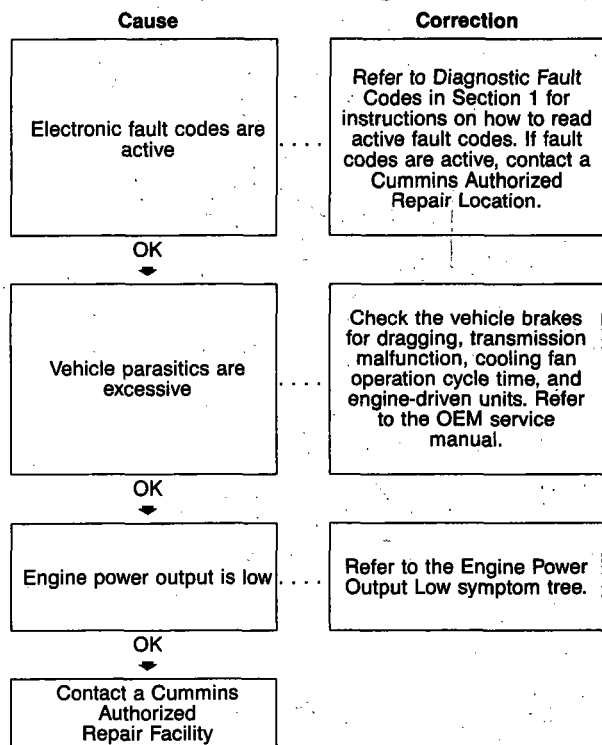
Engine Will Not Crank or Cranks Slowly (Air Starter)



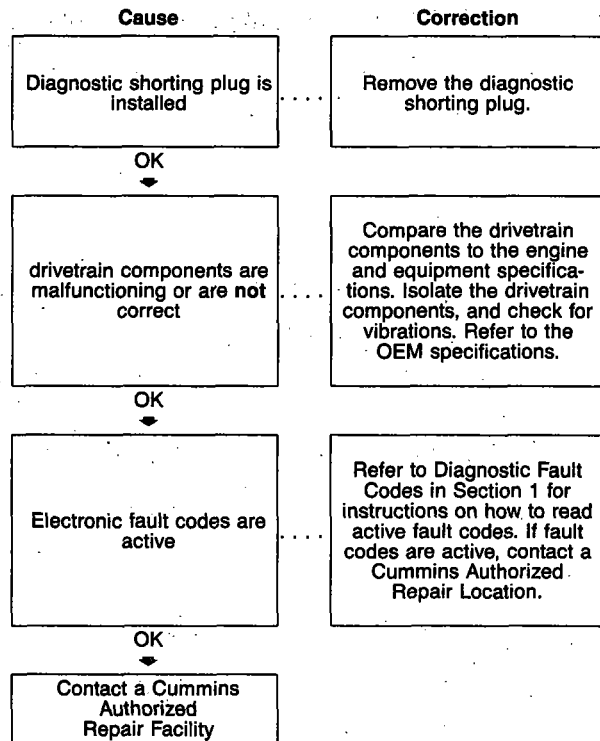
Engine Will Not Crank or Cranks Slowly (Electric Starter)



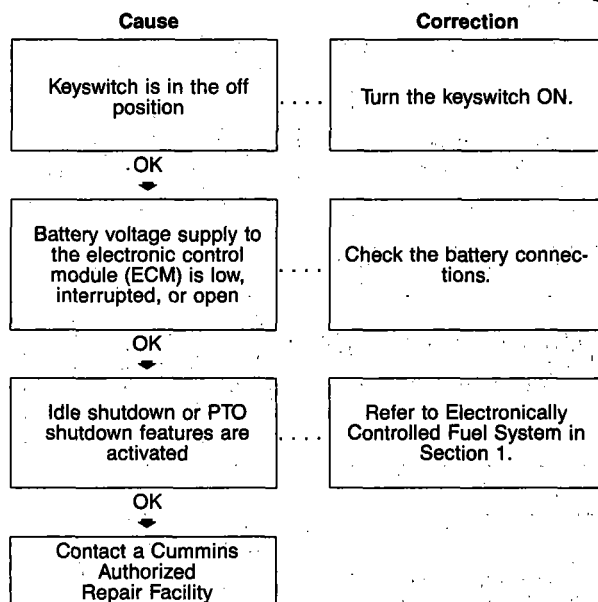
Engine Will Not Reach Rated Speed (RPM)



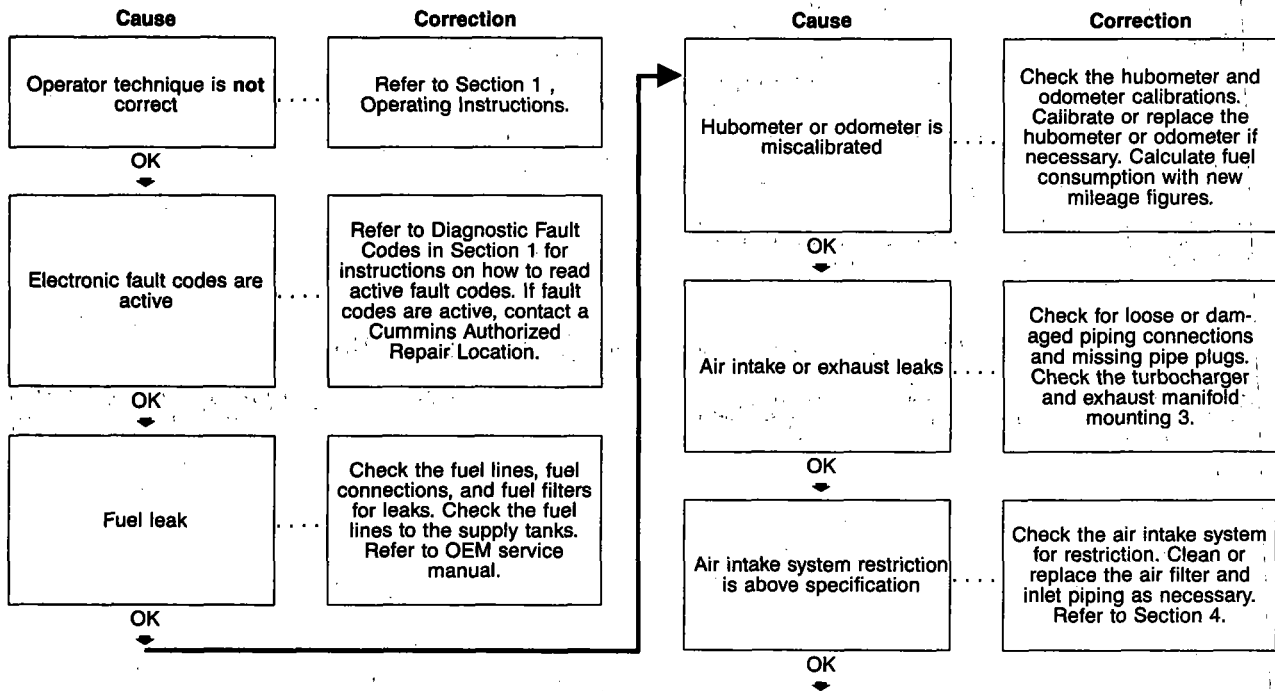
Fault Code Warning Lamps Stay On (No Apparent Reason)



Fault Code Warning Lamps Do Not Illuminate



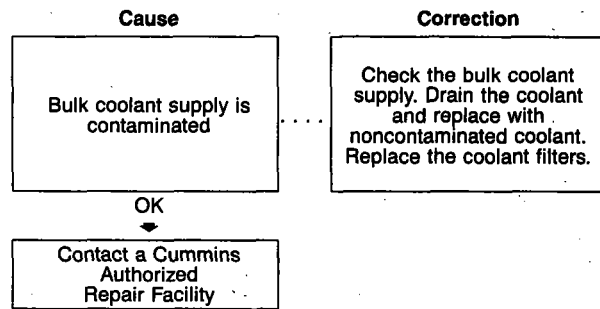
Fuel Consumption Excessive



Fuel Consumption Excessive (Continued)

Cause	Correction
Equipment and environmental factors are affecting fuel consumption	Consider ambient temperatures, wind, tire size, axle alignment, routes, and use of aerodynamic aids when evaluating fuel consumption.
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 V.
OK	
Contact a Cummins Authorized Repair Facility	

Fuel in Coolant



Fuel in the Lubricating Oil

Cause

Correction

Engine idle time is excessive

Low oil and coolant temperatures may be caused by long idle time (greater than 10 minutes). Shut off the engine rather than idle for long periods. If idle time is necessary, raise the idle speed.

OK
↓

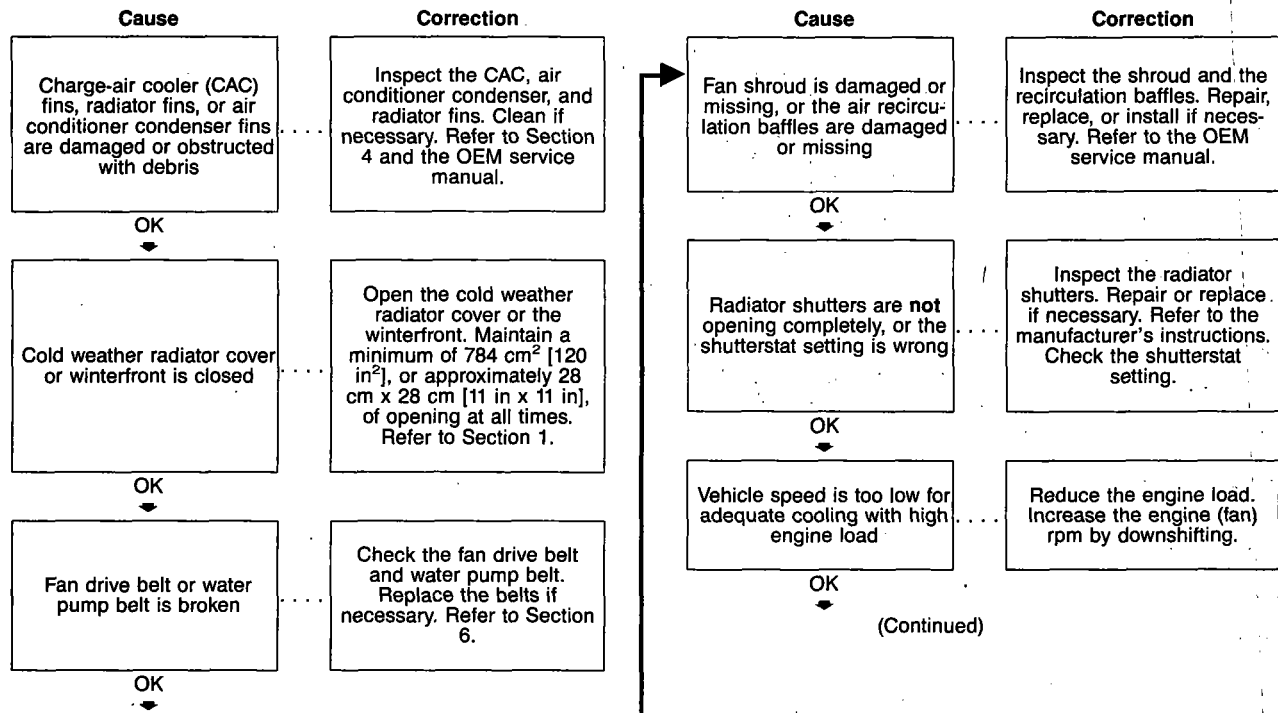
Bulk oil supply is contaminated

Check the bulk oil supply. Drain the oil, and replace with noncontaminated oil. Replace the oil filters.

OK
↓

Contact a Cummins
Authorized
Repair Facility

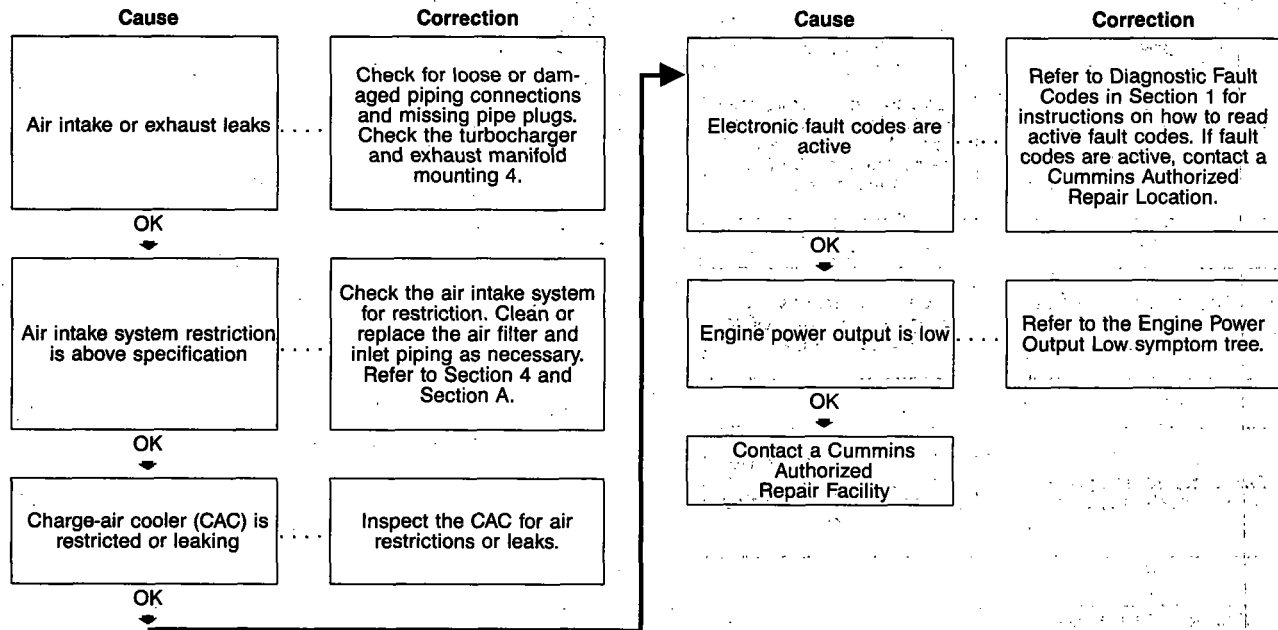
Intake Manifold Air Temperature Above Specification



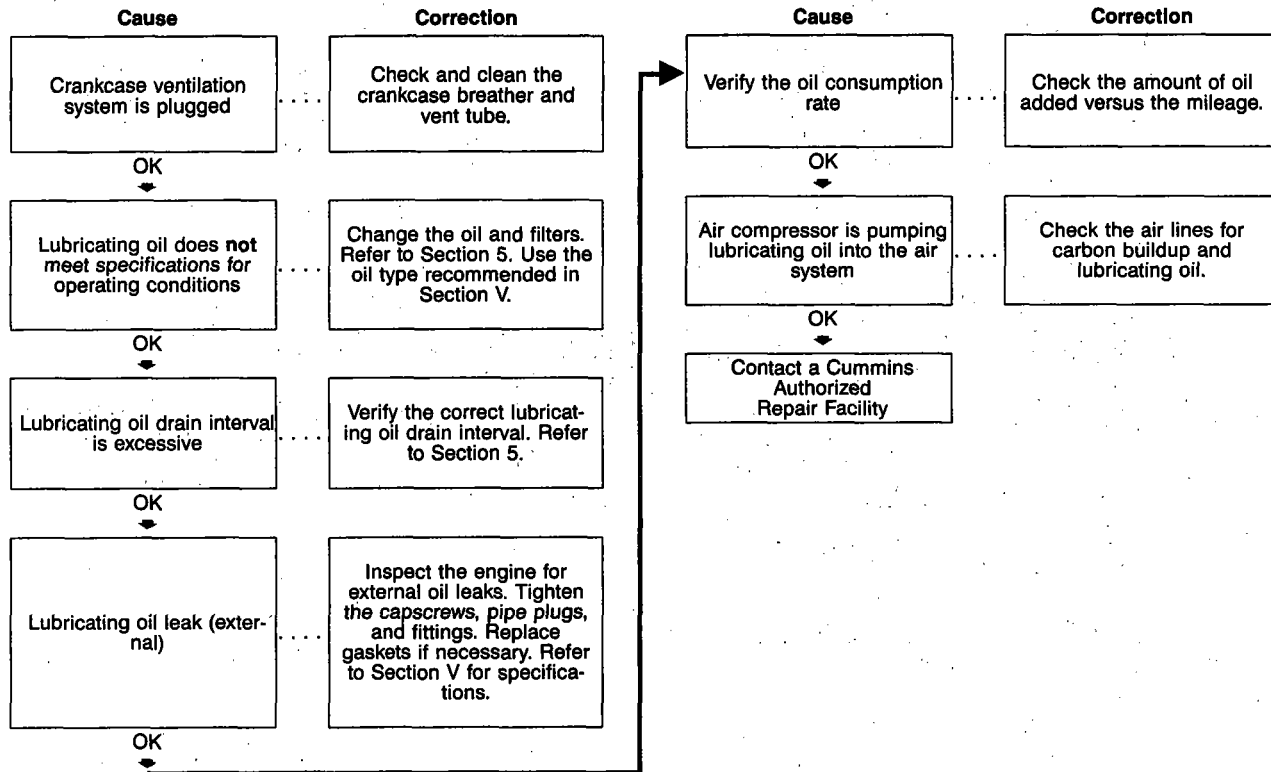
Intake Manifold Air Temperature Above Specification (Continued)

Cause	Correction
Vehicle cooling system is not adequate	Verify that the engine and vehicle cooling systems are using the correct components. Refer to the OEM specifications.
OK	
Intake manifold temperature gauge is malfunctioning, if equipped	Test the temperature gauge. Refer to the OEM service manual.
OK	
Fan is not an adequate size for the application	Verify that the fan is the correct size. Refer to the engine and OEM specifications.
OK	
Contact a Cummins Authorized Repair Facility	

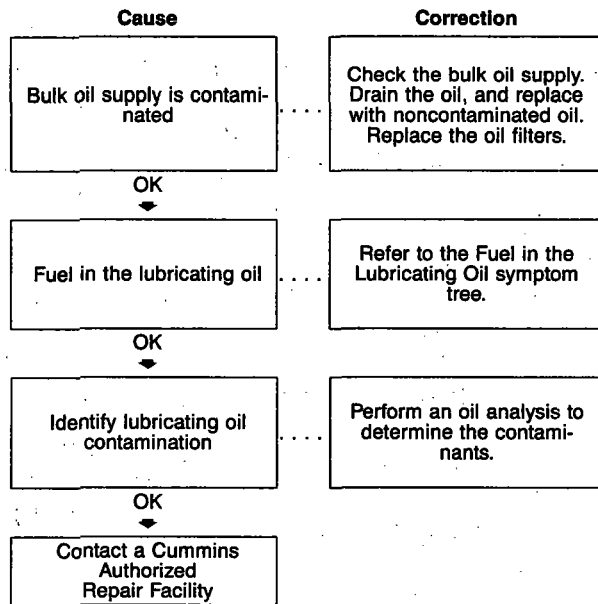
Intake Manifold Pressure (Boost) is Below Normal



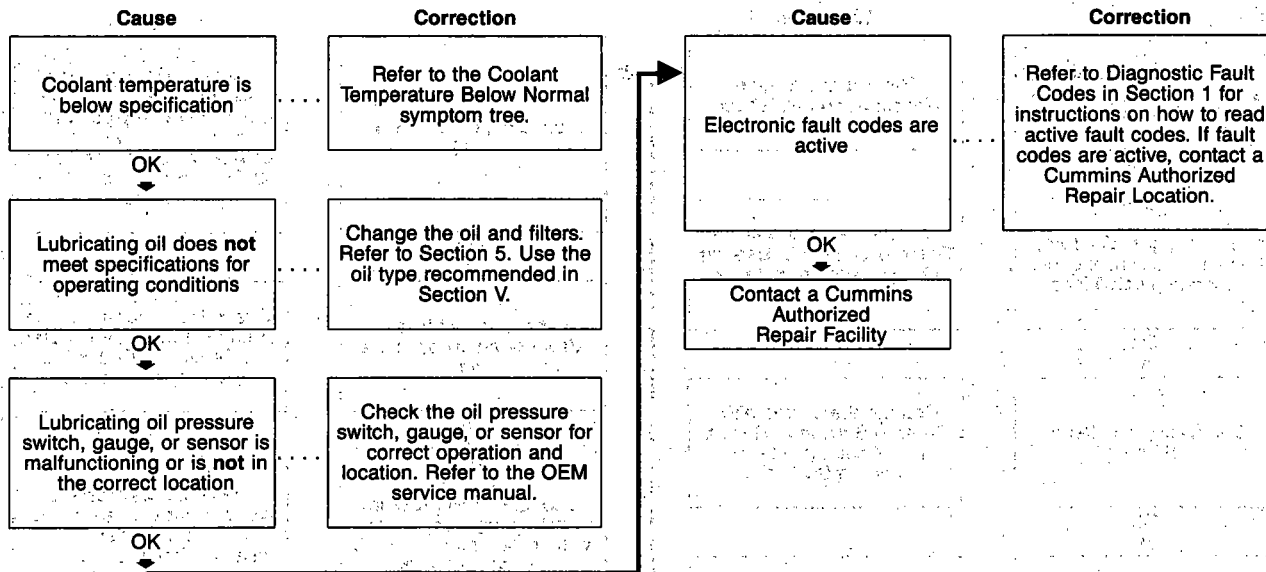
Lubricating Oil Consumption Excessive



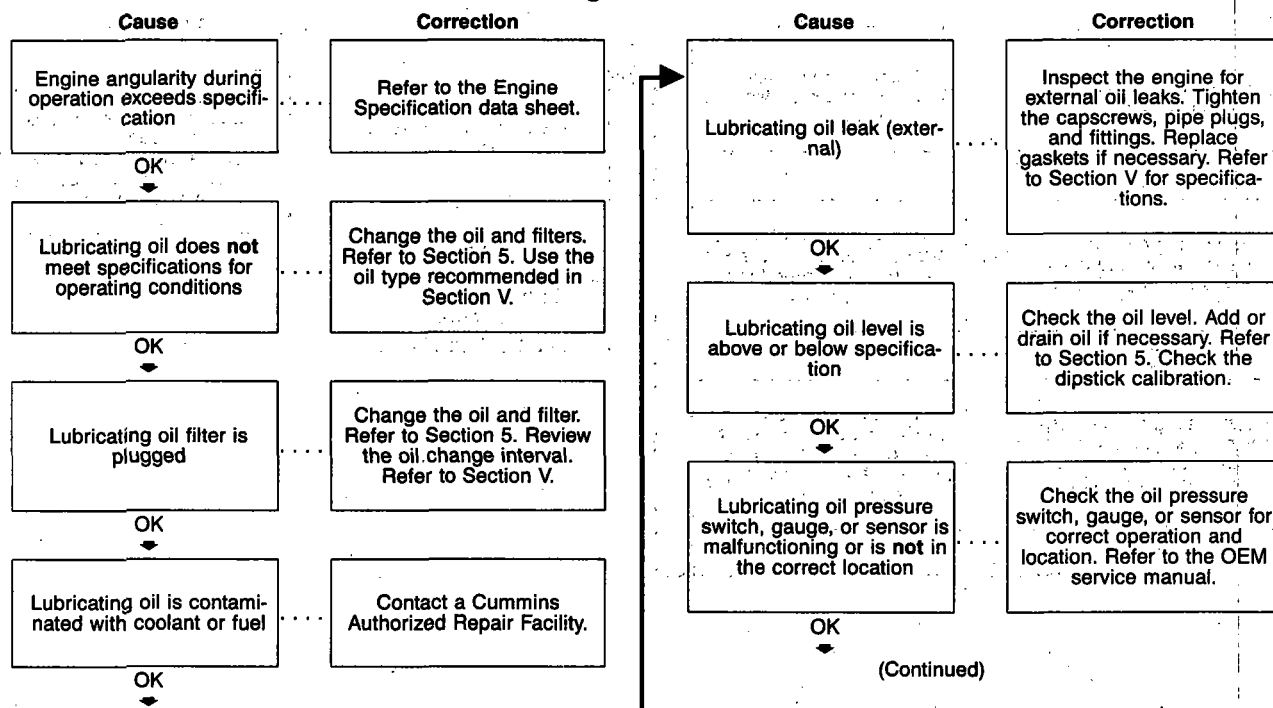
Lubricating Oil Contaminated



Lubricating Oil Pressure High



Lubricating Oil Pressure Low



Lubricating Oil Pressure Low (Continued)

Cause

Electronic fault codes are active

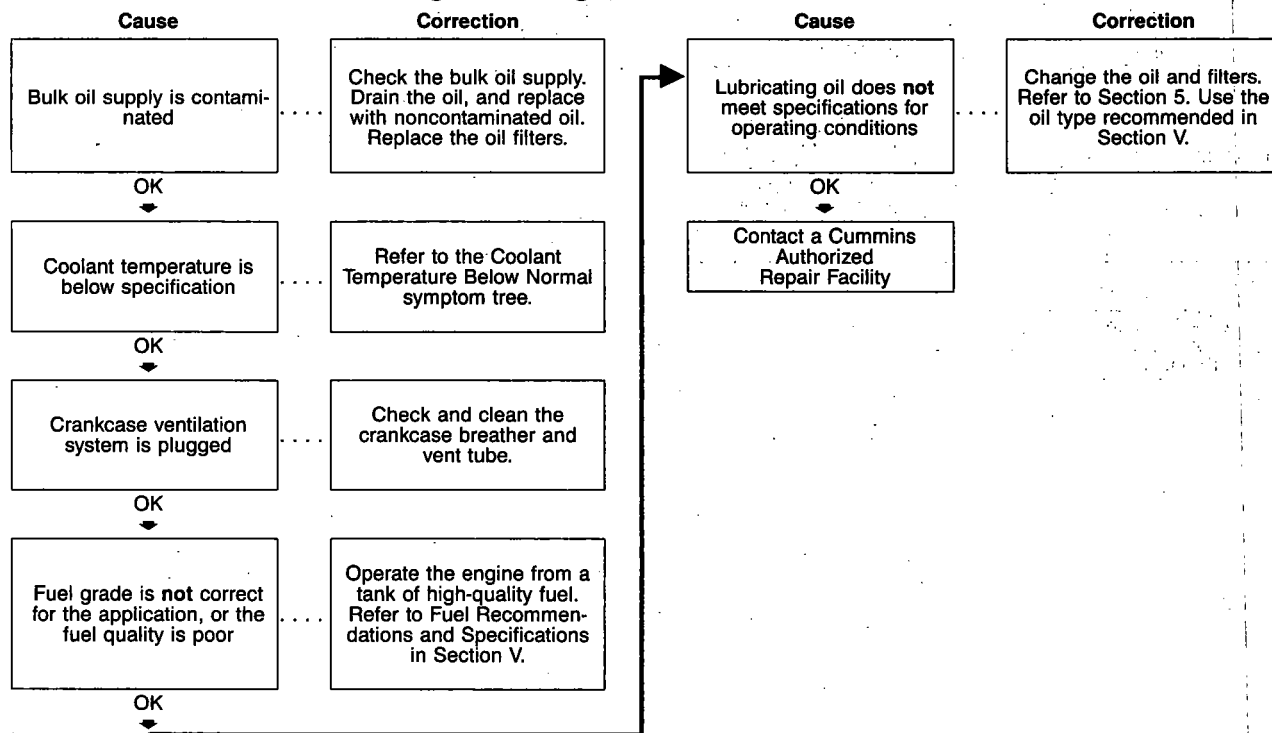
OK
↓

Contact a Cummins
Authorized
Repair Facility

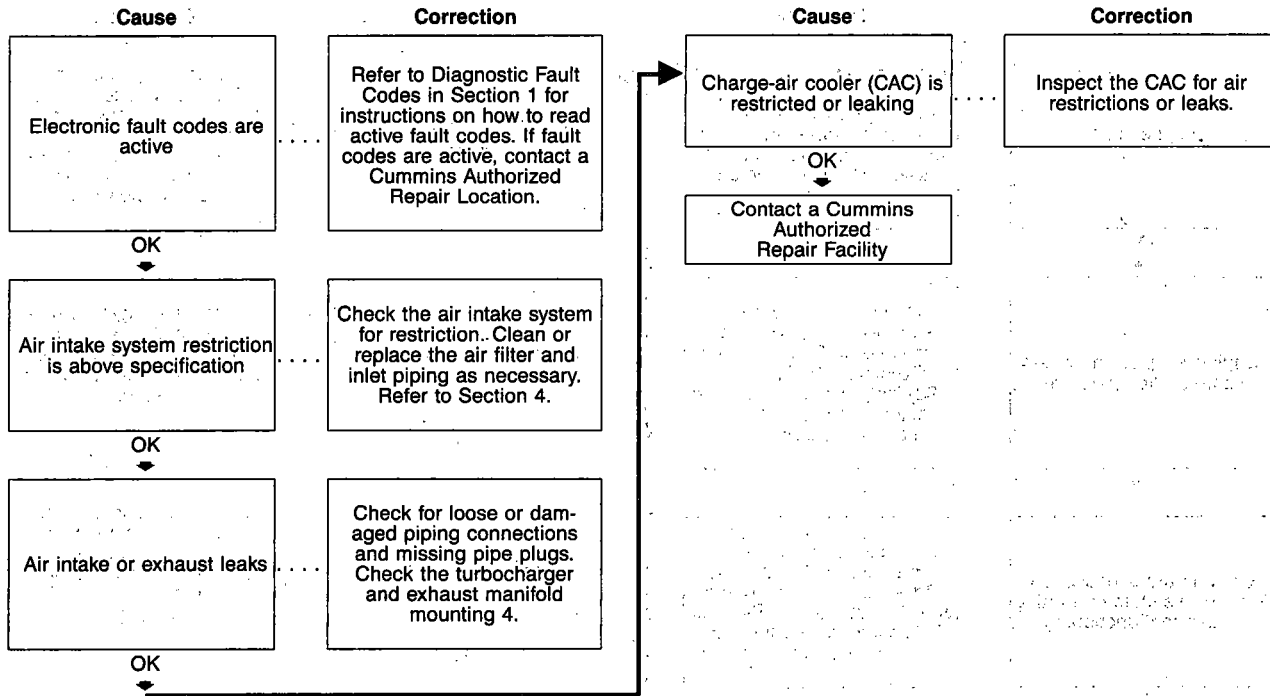
Correction

Refer to Diagnostic Fault Codes in Section 1 for instructions on how to read active fault codes. If fault codes are active, contact a Cummins Authorized Repair Location.

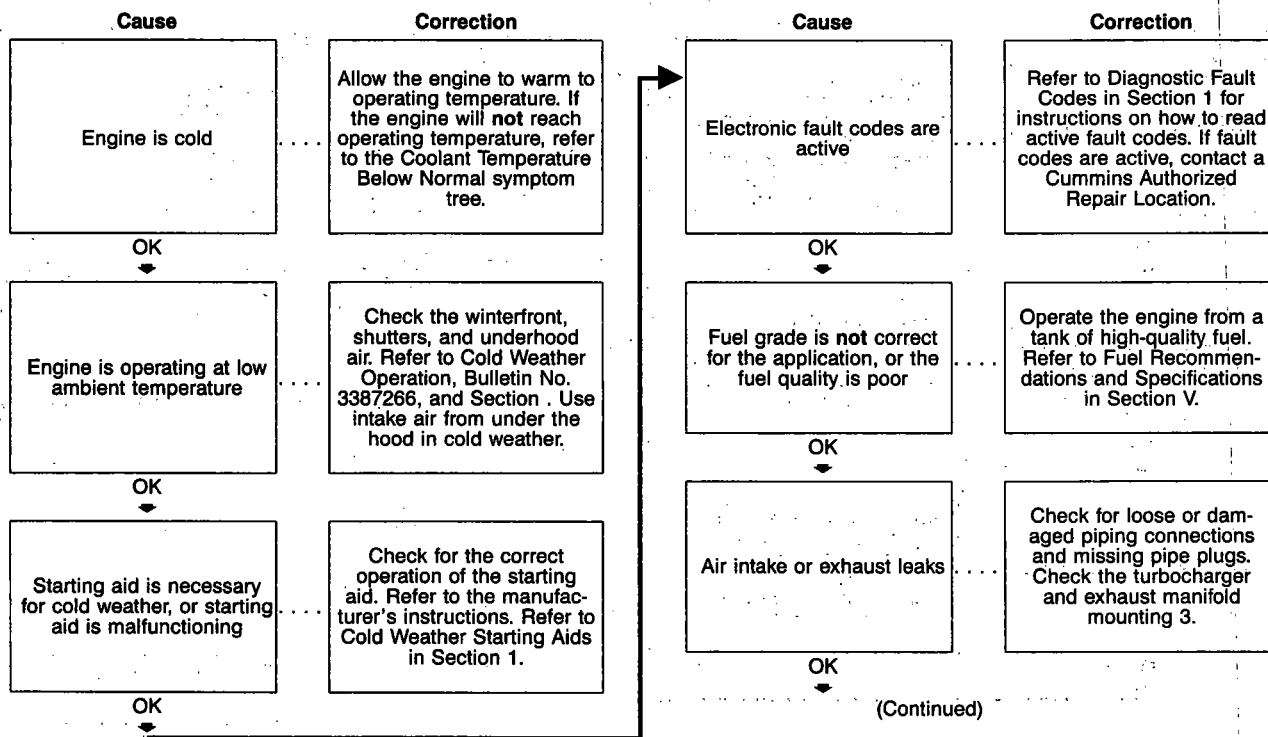
Lubricating Oil Sludge in the Crankcase Excessive



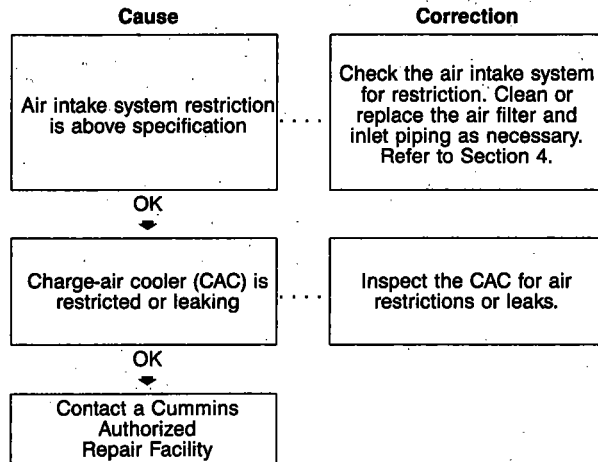
Smoke, Black — Excessive



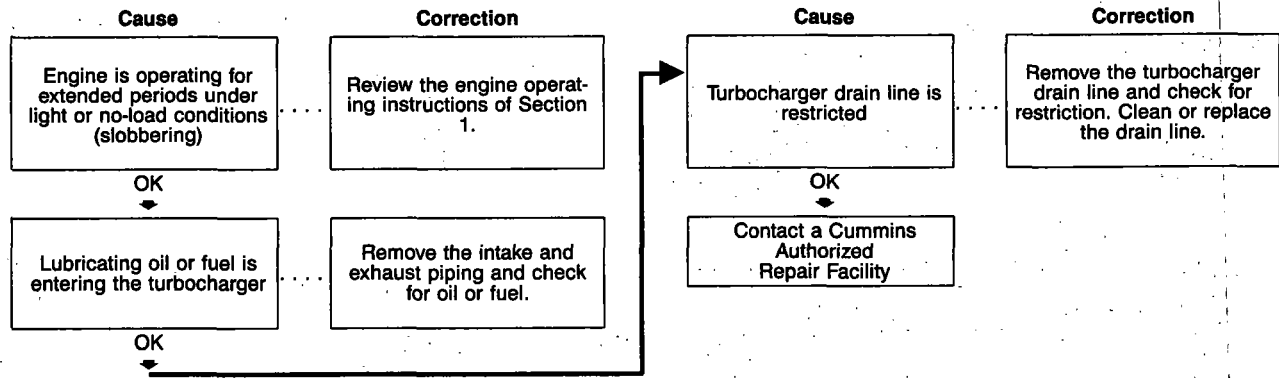
Smoke, White — Excessive



Smoke, White — Excessive (Continued)



Turbocharger Leaks Engine Oil or Fuel



NOTES

Section V - Maintenance Specifications

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Specifications

General Specifications

Horsepower	(Refer to engine dataplate)
ISC Engine Speed @ Maximum Power Output: Standard Rating (rpm)	2200
Bore and Stroke	114 mm [4.49 in] x 135 mm [5.32 in]
Displacement	8.3 liters [506 C.I.D.]
Compression Ratio	17:1
Firing Order	1-5-3-6-2-4
ISC Approximate Engine Weight (with standard accessories)	680 kg [1500 lb]
Crankshaft Rotation (viewed from the front of the engine)	Clockwise
Valve Clearance:	
Intake	0.3048 mm [0.012 in]
Exhaust	0.5588 mm [0.022 in]

NOTE: The ISC engine features a no-adjust overhead. The ISC valve train is designed such that adjustment of the valve lash is **not** required for normal service during the first 241,500 km [150,000 mi]. The valve train operates acceptably within the limits of 0.152 to 0.559 mm [0.006 to 0.022 in] intake valve lash and 0.381 to 0.813 mm [0.015 to 0.032 in] exhaust valve lash.

Fuel System

Engine Idle Speed	600 to 875 rpm
Maximum Lift Pump Inlet Restriction at Rated	102 mm Hg [4 in Hg]
Maximum Fuel Filter Outlet Restriction at Rated	254 mm Hg [10 in Hg]
Minimum Fuel Filter Inlet Pressure during Cranking	508 mm Hg [20 in Hg]
Maximum Fuel Drain Line Pressure	254 mm Hg [10 in Hg]
Maximum Fuel Inlet Temperature	71°C [160°F]
Minimum Engine Cranking Speed	150 rpm

Lubricating Oil System

Oil Pressure:	
At Low Idle (minimum allowable)	69 kPa [10 psig]
At Rated Speed (minimum allowable)	207 kPa [30 psig]
Regulated Pressure	517 kPa [75 psi]
Oil Capacity of Standard Engine:	
Standard Oil Pan	
Pan Only	18.9 liters [20 qt]
Total System Capacity	19.9 liters [21 qt]
Standard Oil Pan with Cylinder Block Stiffener Plate	
Pan Only	19.9 liters [21 qt]
Oil Pan Low to High:	
Standard Oil Pan	15.1 to 18.9 liters [16 to 20 qt]
Standard Oil Pan with Cylinder Block Stiffener Plate	16.1 to 19.9 liters [17 to 21 qt]

NOTE: Some applications have a slightly different oil pan capacity. Contact the local Cummins Distributor if there are any questions.

Cooling System

Coolant Capacity (engine only)	10.9 liters [11.5 qt]
Standard Modulating Thermostat - Range	84 to 91°C [184 to 195°F]
Maximum Allowable Operating Temperature	100°C [212°F]
Minimum Recommended Operating Temperature	70°C [158°F]
Minimum Recommended Pressure Cap	50 kPa [7 psi]

Air Intake System

Maximum Intake Restriction (clean air filter element)	254 mm H ₂ O [10.0 in H ₂ O]
Maximum Intake Restriction (dirty air filter element)	635 mm H ₂ O [25.0 in H ₂ O]

Exhaust System

Maximum Exhaust Back Pressure 76 mm Hg [3 in Hg]

Electrical System

Recommended Battery Capacity

System Voltage	Ambient Temperature			
	-18°C [0°F]		-29°C [-20°F]	
	Cold Cranking Amperes	Reserve Capacity (Minutes) ⁽¹⁾	Cold Cranking Amperes	Reserve Capacity (Minutes) ⁽¹⁾
12 VDC	1250	360	1875	360
24 VDC ⁽²⁾	625	180	900	180

1. The number of plates within a given battery size determines reserve capacity. Reserve capacity is the length of time for which a battery at 27°C [80°F] can supply 25 amperes at 10.5 volts or greater.
2. CCA ratings are based on two 12-VDC batteries in series.

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

Cummins/Fleetguard®/Nelson Filter Specifications

Fleetguard® is a subsidiary of Cummins Engine Company, Inc. Fleetguard® filters are developed through joint testing at Cummins and Fleetguard®. Fleetguard® filters are standard on new Cummins engines. Cummins Engine Company, Inc. recommends their use.

Fleetguard® products meet all Cummins Source Approval Test standards to provide the quality filtration necessary to achieve the engine's design life. If other brands are substituted, insist on products that the supplier has tested to meet Cummins high-quality standards.

Cummins can **not** be responsible for problems caused by nongenuine filters that do **not** meet Cummins performance or durability requirements.

Fuel Recommendations and Specifications

Fuel Recommendations

WARNING

Do not mix gasoline, alcohol, or gasohol with diesel fuel. This mixture can cause an explosion.

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 fuel injectors.

CAUTION

Lighter fuels can reduce fuel economy and can possibly damage the fuel injection pump.

Cummins Engine Company, Inc. recommends the use of ASTM No. 2D fuel. The use of No. 2D 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. 2D and No. 1D.

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 ISC Series engines.

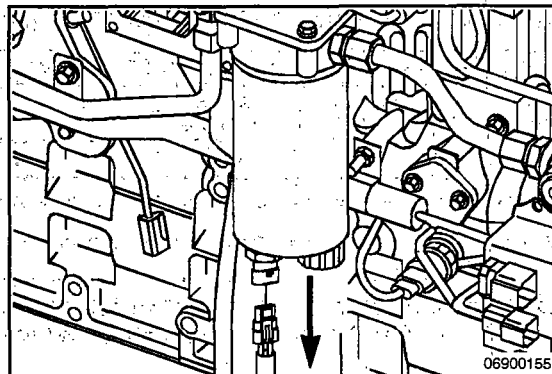
Acceptable Substitute Fuels - Cummins ISC Fuel System									
No. 1D Diesel(1)(2)	No. 2D Diesel	No. 1K Kerosene	Jet-A	Jet-A1	JP-5	JP-8	Jet-B	JP-4	CITE
OK	OK	OK	OK	OK	OK	OK	NOT OK	NOT OK	NOT OK
<p>1. Any adjustment to compensate for reduced performance with a fuel system using alternate fuel is not warrantable.</p> <p>2. Winter blend fuels, such as those found at commercial fuel dispensing outlets, are combinations of No. 1D and No. 2D diesel fuel and are acceptable.</p>									

Additional information for fuel recommendations and specifications can be found in Fuel for Cummins Engines, Bulletin No. 3379001. See the ordering information in the back of this manual.

Cummins/Fleetguard®/Nelson Filter Specifications

Fuel Filter

- Fuel-water separator with a water-in-fuel sensor used in single filter applications
- Spin-on filter (Fleetguard® Part No. FS1022) (Cummins Part No. 3944264, element)
- Reusable water-in-fuel assembly (Cummins Part No. 3944270)
- Efficiency rating **must** meet Cummins specifications for the Cummins accumulator pump system (CAPS) fuel system.



Lubricating Oil Recommendations and Specifications

New Engine Break-in Oils

△ CAUTION △

A sulfated ash limit of 1.85 percent has been placed on all engine lubricating oils recommended for use in Cummins engines. Higher ash oils can cause valve and/or piston damage and lead to excessive oil consumption.

△ CAUTION △

The use of a synthetic-based 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.

Special "break-in" engine lubricating oils are **not** recommended for new or rebuilt Cummins engines. Use the same type of oil during the "break-in" as 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.

Arctic Operation Engine Oil

If an engine is operated in ambient temperatures consistently below -23°C [-9°F], and there are no provisions to keep the engine warm when it is **not** in operation, use a synthetic CE/SF or higher API classification engine oil with adequate low-temperature properties such as 5W-20 or 5W-30.

The oil supplier is responsible for meeting the performance service specification represented with its product.

General Information

Midrange engines with 1999 U.S.A. certification will have 500-hour maximum oil drain intervals using CES20071 (CH-4) or better lubricating oil.

Non-U.S.A. certified engines will have 500-hour oil drain intervals using CES20071 (CH-4) or better lubricating oil.

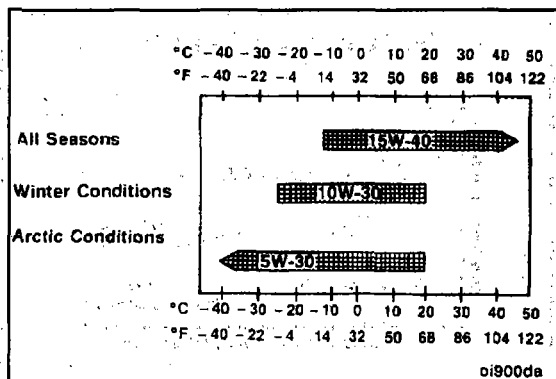
The use of quality engine lubricating oils, combined with appropriate oil drain and filter change intervals, are critical factors in maintaining engine performance and durability.

Cummins Engine Company, Inc. recommends the use of a high-quality SAE 15W-40 multiviscosity heavy-duty engine oil, such as Cummins Premium Blue®, that meets the requirements of Cummins Engineering Specification CES20071 or CES20076, or the American Petroleum Institute (API) performance classification CG-4 or CH-4.

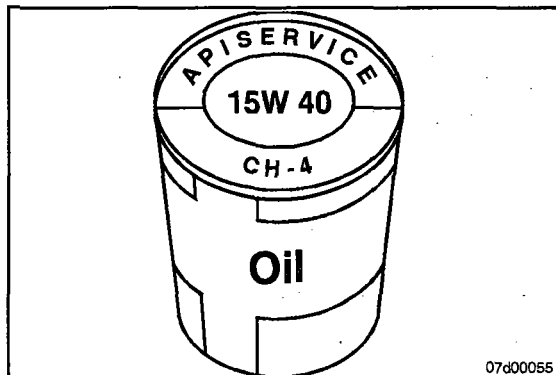
NOTE: In areas where CG-4 or CH-4 lubricating oils are **not** available, CES20075 or CF-4 can be used, but the lubricating oil change interval **must** be reduced to 12,070 km [7500 mi], or 250 hours or six months.

A sulfated ash limit of 1.0 mass percent is suggested for optimum valve and piston deposit and oil consumption control. The sulfated ash **must not** exceed 1.85 mass percent.

For further details and discussion of engine lubricating oils for Cummins engines, refer to Cummins Engine Oil Recommendations, Bulletin No. 3810340, or a Cummins Authorized Repair Facility.



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



The API service symbols are shown in the accompanying illustration. The upper half of the symbol displays the appropriate oil categories.

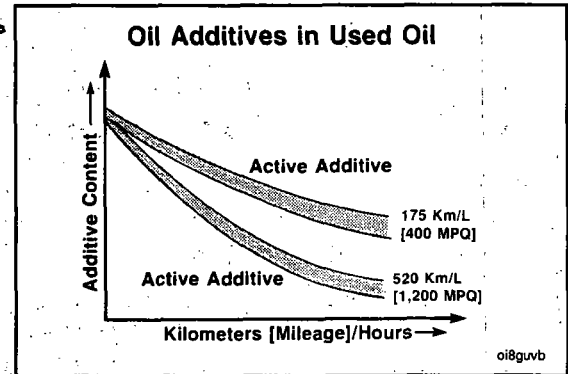
The lower half can contain a description of oil energy conserving features.

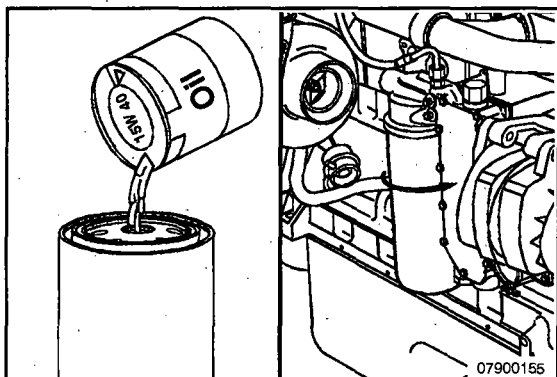
The center section identifies the SAE oil viscosity grade.

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 between oil and filter change intervals is normal. The amount of contamination will vary depending on the operation of the engine, kilometers or [miles] on the oil, fuel consumed, and new oil added.

Extending oil and filter change intervals beyond the recommendations will decrease engine life due to factors such as corrosion, deposits, and wear.

Refer to the Oil Drain Interval Chart in this section to determine which oil drain interval to use for an application.

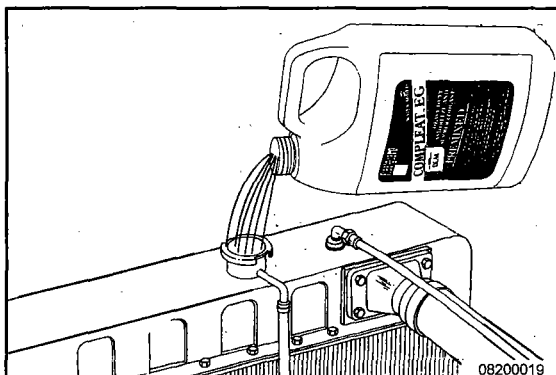




Cummins/Fleetguard®/Nelson Filter Specifications

Lubricating Oil Filters

- Fleetguard® Part No. LF9009
- Cummins Part No. 3401544.



Coolant Recommendations and Specifications

Fully Formulated Coolant/Antifreeze

Cummins Engine Company, Inc. recommends using either a 50/50 mixture of high-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.

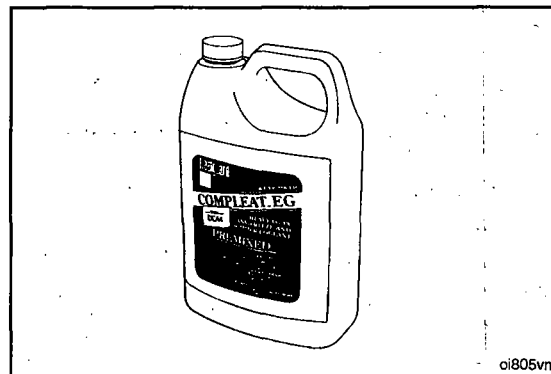
△ CAUTION △

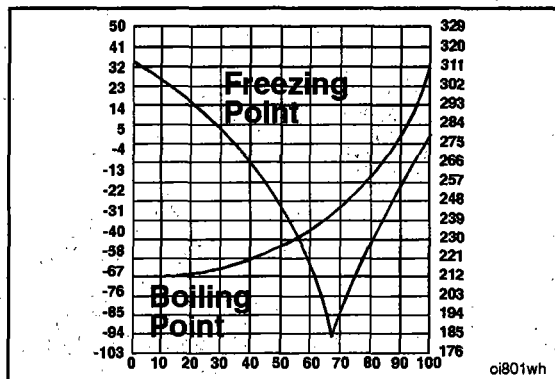
High-quality water is important for cooling system performance. Excessive levels of calcium and magnesium contribute to scaling problems, and excessive levels of chlorides and sulfates cause cooling system corrosion.

Cummins Engine Company, Inc. recommends using Fleetguard® Compleat. It is available in both glycol forms (ethylene and propylene) and complies with TMC standards.

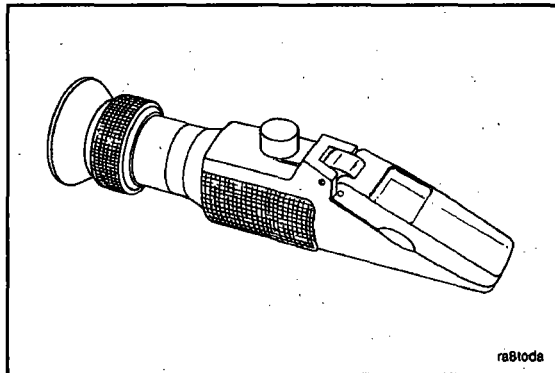
Water Quality	
Calcium Magnesium (Hardness)	Maximum 170 ppm as (CaCO ₃ + MgCO ₃)
Chloride	40 ppm as (Cl)
Sulfur	100 ppm as (SO ₄)

18200001



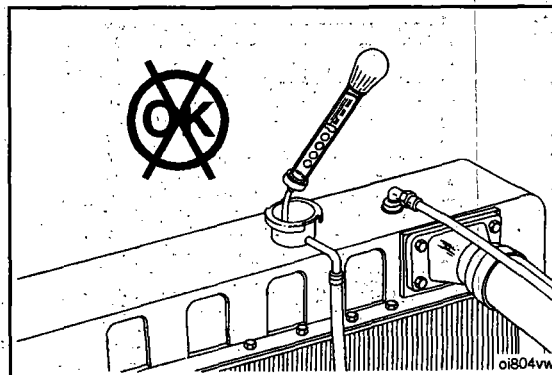


Fully formulated antifreeze **must** be mixed with high-quality water at a 50/50 ratio (40- to 60-percent working range). A 50/50 mixture of antifreeze and water has a -36°C [-33°F] freezing point and a 110°C [230°F] boiling point, which is adequate for North America. The actual lowest freezing point of ethylene glycol antifreeze is at 68 percent. Using higher concentrations of antifreeze will raise the freezing point of the solution and increase the possibility of a silicate gel problem.



A refractometer **must** be used to measure the freezing point of the coolant accurately.

Do not use a floating ball hydrometer. Use of a floating ball hydrometer can give an incorrect reading.



Specifications

Use a low-silicate antifreeze that meets ASTM4985 test (GM6038M specification) criteria.

Concentration

Antifreeze **must** be used in any climate for both freezing- and boiling-point protection. Cummins recommends a 50-percent concentration level (40- to 60-percent range) of ethylene glycol or propylene glycol in most climates. Antifreeze at 68-percent concentration provides the maximum freeze protection and **must never** be exceeded under any condition. Antifreeze protection decreases above 68 percent.

Ethylene Glycol

40% equals -23°C [-9°F]

50% equals -37°C [-35°F]

60% equals -54°C [-65°F]

68% equals -71°C [-96°F]

Propylene Glycol

40% equals -21°C [-6°F]

50% equals -33°C [-27°F]

60% equals -49°C [-56°F]

68% equals -63°C [-81°F]

Concentration Testing

Antifreeze concentration **must** be checked using a refractometer (such as Fleetguard® Part No. CC2800). "Floating-Ball"-type density testers or hydrometers are **not** accurate enough for use with heavy-duty diesel cooling systems.

Coolant Change Recommendation

The coolant **must** be drained and replaced every 2 years or 385,000 km [239,227 mi] to eliminate buildup of harmful chemicals.

Cooling System Additives

Supplemental Coolant Additives (SCA)

Supplemental coolant additives (SCA) are recommended for all Cummins cooling systems. Antifreeze alone does **not** provide sufficient protection for heavy-duty diesel engines.

DCA4

DCA4 is the recommended SCA for all Cummins engines. Other brands can be used if they provide adequate engine protection and do **not** cause seal or gasket degradation or corrosion/fouling.

SCA Concentration

The recommended concentration level of DCA4 is 1.5 units for every 3.7 liters [1 gal]. The DCA4 concentration **must never** exceed 3.0 units for every 3.7 liters [1 gal], nor fall below 1.2 units for every 3.7 liters [1 gal].

DCA4 Filter Change Interval

Supplemental coolant additives deplete during normal engine operation. Cummins recommends that the level be maintained by installation of a service coolant filter on the engine at every 10,000-km [6214 mi], 250-hours, or 3-month interval.

DCA4 Concentration Test

As noted above, the primary method is to maintain proper DCA4 concentration levels by changing the service coolant filter at every 10,000 km [6214 mi], 250 hours, or 3 months. Fleetguard® DCA4 "dipstick" test kit, Part No. CC2626, or Fleetguard® Monitor C™, Part No. CC2700, **must** be used if testing is deemed necessary due to one of the following reasons:

- Addition of untreated make-up coolant in excess of 5.7 liters [6 qt] between maintenance intervals
- Troubleshooting of cooling system problems in the fleet (such as corrosion or seal leakage)
- An optional program in some fleets to monitor SCA levels to determine if maintenance intervals are acceptable.

NOTE: The practice of using a test kit to determine when to add or change the coolant filter is specifically not recommended. No other test kit (such as Fleetguard® titration test kit, Part No. 3300846-S or 3825379-S) can be used on Cummins engines with DCA4.

DCA4 Unit Maintenance Guide

Fleetguard® Part No.	Cummins Part No.	DCA4 Units
DCA4 Liquid		
DCA 60L	3315459	4*
DCA4 Filter		
WF-2070	3318157	2
WF-2071	3315116	4
WF-2072	3318201	6
WF-2073	3315115	8
WF-2074	3316053	12
WF-2077	None	0
*If DCA 60L is used, do not use a coolant filter that contains coolant additives. The combination of liquid and filter coolant additives will result in overconcentration.		

DCA4 Maintenance Guide

Maintenance Intervals		
Total Cooling System Capacity	Initial Charge (B)	10,000 km [6000 mi], 250 Hours, or 3 Months
30 to 57 liters [8 to 15 gal]	WF-2074	WF-2070

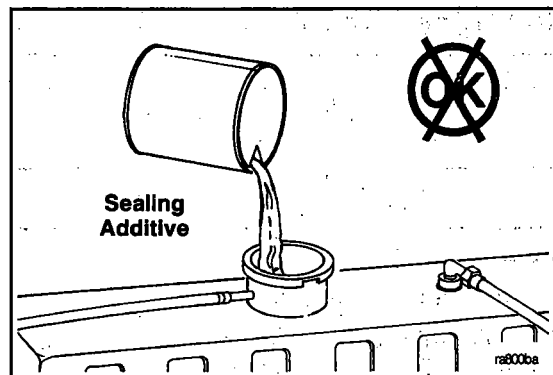
Notes:

- A. Consult the vehicle equipment manufacturer's maintenance information for the total cooling system capacity.
- B. After draining and replacing the coolant, install the initial per-charge coolant filter to provide the recommended level of DCA4 concentration.
- C. Change the coolant filter at regular intervals to protect the cooling system.
- D. Check the coolant additive concentration regularly. Check the cooling system using Fleetguard® DCA4 **only** with DCA4 coolant test kit, Part No.CC-2626.

Cooling System Sealing Additives

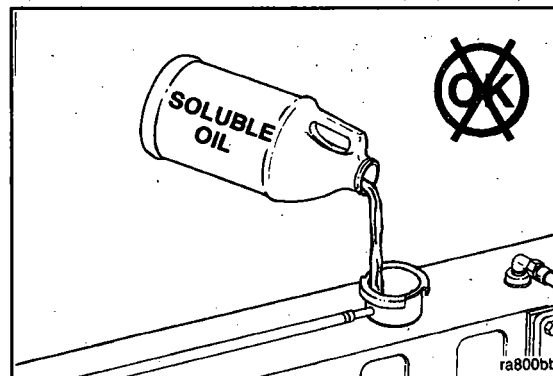
Do **not** use sealing additives in the cooling system. The use of sealing additives will

- Build up in coolant low-flow areas.
- Clog coolant filters
- Plug radiator and oil cooler
- Possibly damage water pump seal.

**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.



Drive Belt Tension

SAE Belt Size	Belt Tension Gauge Part No.		Belt Tension New		Belt Tension Range Used*	
	Click-type	Burroughs	N	lbf	N	lbf
0.380 in	3822524		620	140	270 to 490	60 to 110
0.440 in	3822524		620	140	270 to 490	60 to 110
1/2 in	3822524	ST-1138	620	140	270 to 490	60 to 110
11/16 in	3822524	ST-1138	620	140	270 to 490	60 to 110
3/4 in	3822524	ST-1138	620	140	270 to 490	60 to 110
7/8 in	3822524	ST-1138	620	140	270 to 490	60 to 110
4 rib	3822524	ST-1138	620	140	270 to 490	60 to 110
5 rib	3822524	ST-1138	670	150	270 to 530	60 to 120
6 rib	3822525	ST-1293	710	160	290 to 580	65 to 130
8 rib	3822525	ST-1293	890	200	360 to 710	80 to 160
10 rib	3822525	3823138	1110	250	440 to 890	100 to 200
12 rib	3822525	3823138	1330	300	530 to 1070	120 to 240
12 rib K section	3822525	3823138	1330	300	890 to 1070	200 to 240

NOTE: This chart does not apply to automatic belt tensioners.

* 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.

Engine Component Torque Values

Torque Table

Component	Wrench Size	Torque Value		
		N•m	ft-lb	in-lb
Aftercooler mounting	10 mm	24	18	
Aftercooler water hose clamp	8 mm	5		44
Alternator link (Delco 10-15 SI)	13 mm	24	18	
Alternator link (Delco 20-27 SI)	3/4 in	43	32	
Alternator mtg. bolt 10-15 SI	15 mm	43	32	
Alternator mtg. 27 SI	18 mm	77	57	
Alternator support (upper)	10 mm	24	18	
Belt tensioner flat bracket	Allen 5 mm	24	18	
Belt tensioner mounting	15 mm	43	32	
Crankshaft damper and pulley	15 mm	137	101	
Crossover clamp	5/16 in	5		44
Tee bolt type clamp	11 mm	8		71
Exhaust outlet pipe, v-band clamp	7/16 in	8		71
Fan bracket mounting	10 mm	24	18	

Component	Wrench Size	Torque Value		
		N•m	ft-lb	in-lb
Fan pulley	10 mm	24	18	
Fan pulley	13 mm	43	32	
Fuel filter	75 to 85 mm	Install as specified by filter manufacturer.		
Fuel filter adapter nut	24 mm	32	24	
Lubricating oil filter	75 to 85 mm	3/4 of a turn after contact		
Lubricating oil cooler assembly	10 mm	24	18	
Lubricating oil pan drain plug	17 mm	80	59	
Lubricating oil pan heater plug	27 mm	80	59	
Lubricating oil pressure regulator plug	19 mm	80	59	
Starter mounting	10 mm	43	32	
Thermostat housing	10 mm	24	18	
Water inlet connection	15 mm	43	32	
Water pump mounting	13 mm	24	18	
Rocker lever (valve) cover	15 mm	12		106
Water-in-fuel (WIF) sensor	19 mm	Hand-tighten		

Arctic Operation

General Information

CAUTION

The use of a synthetic-based 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.

If an engine is operated in ambient temperatures consistently below -23°C [-9°F], and there are no provisions to keep the engine warm when it is not in operation, use a synthetic CE/SF or higher API classification engine oil with adequate low-temperature properties such as 5W-20 or 5W-30.

The oil supplier is responsible for meeting the performance service specifications represented with its product.

Sealants

Use either the sealants listed below or sealants containing equivalent properties.

Item Description	Sealing Method
Pipe plugs	Precoated teflon or pipe sealer
Cups plugs	Loctite 277 or 11,264
O-rings	Lubriplate™ 105
Rear camshaft expansion plug	Precoated or Loctite 59,241 liquid teflon
Fuel block mounting studs	Loctite 609
Turbocharger drain in block	Loctite 277 or 11,264
Front seal in gear cover	Loctite 277 or 11,264
Rear seal in rear cover	No Sealant
Oil pan at T-joint	Three-Bond™ 1207C (Cummins Part No. 3823494)

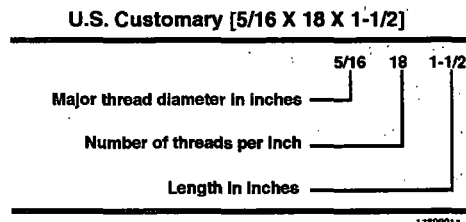
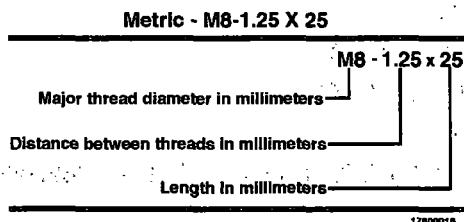
Capscrew Markings and Torque Values



When replacing capscrews, always use a capscrew of the same measurement and strength as the capscrew being replaced. Using the wrong capscrews can result in engine damage.

Metric capscrews and nuts are identified by the grade number stamped on the head of the capscrew or on the surface of the nuts. U.S. Customary capscrews are identified by radial lines stamped on the head of the capscrew.

The following examples indicate how capscrews are identified:



NOTES:

1. **Always** use the torque values listed in the following tables when specific torque values are **not** available.
2. Do **not** use the torque values in place of those specified in other sections of this manual.
3. The torque values in the table are based on the use of lubricated threads.
4. When the ft-lb value is less than 10, convert the ft-lb value to in-lb to obtain a better torque with an in-lb torque wrench. Example: 6 ft-lb equals 72 in-lb.

Capscrew Markings and Torque Values - Metric

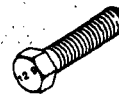
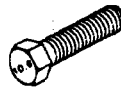
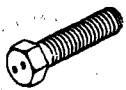
Commercial Steel Class

8.8

10.9




12.9

Capscrew Head Markings



Body Size	Torque				Torque				Torque				
	Cast Iron		Aluminum		Cast Iron		Aluminum		Cast Iron		Aluminum		
	Diameter												
	mm	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb
	6	9	5	7	4	13	10	7	4	14	9	7	4
	7	14	9	11	7	18	14	11	7	23	18	11	7
	8	23	17	18	14	33	25	18	14	40	29	18	14
	10	45	33	30	25	65	50	30	25	70	50	30	25
	12	80	60	55	40	115	85	55	40	125	95	55	40
	14	125	90	90	65	180	133	90	65	195	145	90	65
	16	195	140	140	100	280	200	140	100	290	210	140	100
	18	280	200	180	135	390	285	180	135	400	290	180	135
	20	400	290	—	—	550	400	—	—	—	—	—	—

Capscrew Markings and Torque Values - U.S. Customary

SAE Grade Number			5		8			
Capscrew Head Markings								
These are all SAE Grade 5 (3 line)								
								
Capscrew Torque - Grade 5 Capscrew					Capscrew Torque - Grade 8 Capscrew			
Capscrew Body Size	Cast Iron		Aluminum		Cast Iron		Aluminum	
	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb
1/4 - 20	9	7	8	6	15	11	8	6
1/4 - 28	12	9	9	7	18	13	9	7
5/16 - 18	20	15	16	12	30	22	16	12
5/16 - 24	23	17	19	14	33	24	19	14
3/8 - 16	40	30	25	20	55	40	25	20
3/8 - 24	40	30	35	25	60	45	35	25
7/16 - 14	60	45	45	35	90	65	45	35
7/16 - 20	65	50	55	40	95	70	55	40
1/2 - 13	95	70	75	55	130	95	75	55
1/2 - 20	100	75	80	60	150	110	80	60
9/16 - 12	135	100	110	80	190	140	110	80
9/16 - 18	150	110	115	85	210	155	115	85
5/8 - 11	180	135	150	110	255	190	150	110
5/8 - 18	210	155	160	120	290	215	160	120
3/4 - 10	325	240	255	190	460	340	255	190
3/4 - 16	365	270	285	210	515	380	285	210
7/8 - 9	490	360	380	280	745	550	380	280
7/8 - 14	530	390	420	310	825	610	420	310
1 - 8	720	530	570	420	1100	820	570	420
1 - 14	800	590	650	480	1200	890	650	480

NOTES

Section W - Warranty

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ISC Series Australia and New Zealand Automotive

Coverage

PRODUCTS WARRANTED

This warranty applies to new ISC series Engines sold by Cummins Engine Company, Inc., hereinafter "Cummins", and delivered to the first user on or after March 1, 1998, that are used in automotive on-highway applications in Australia and New Zealand.

COVERAGE

This warranty covers any failures of the Engine which result, under normal use and service, from a defect in material or factory workmanship (Warrantable Failure). This coverage begins with the sale of the Engine by Cummins and continues for two years, 402,338 kilometers (250,000 miles) or 6,250 hours of operation, whichever occurs first, from the date of delivery of the Engine to the first user.

This warranty is made to all Owners in the chain of distribution and Coverage continues to all subsequent Owners until the end of the period of Coverage.

Cummins Responsibilities

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, belts, hoses and other maintenance items that are not reusable due to a Warrantable Failure.

Cummins will pay for reasonable labor costs for Engine removal and reinstallation when necessary to repair a Warrantable Failure.

Cummins will pay reasonable costs for towing a vehicle disabled by a Warrantable Failure to the nearest authorized repair location. In lieu of towing expenses, Cummins will pay reasonable costs for mechanics to travel to and from the location of the vehicle, including meals, mileage and lodging, when the repair is performed at the site of the failure.

Owner Responsibilities

Owner is responsible for the operation and maintenance of the Engine as specified in the applicable Cummins Operations 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. Except for Engines disabled by Warrantable Failures, Owner must also deliver the Engine to the repair facility. Locations are listed in the Cummins International Sales and Service Directory.

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 a Warrantable Failure.

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, passenger delays, 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.

Starters, alternators, non-Cummins air compressors, power steering pumps and vacuum pumps are covered for six months or 50,000 miles (80,468 kilometers) of operation, whichever occurs first, from the date of delivery of the Engine to the first user. Non-Cummins fuel pumps are covered for the duration of the Base Engine Warranty period.

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.

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 supplied by Cummins are not covered beyond the first 24,140 kilometers (15,000 miles) or two years 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.

THIS WARRANTY IS THE SOLE WARRANTY 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.

Fire Apparatus/Crash Trucks United States and Canada Coverage

Products Warranted

This warranty applies to new diesel Engines sold by Cummins and delivered to the first user on or after September 15, 1996, that are used in fire apparatus truck and crash truck* applications in the United States** or Canada.

Base Engine Warranty

The Base Engine Warranty covers any failures of the Engine which result, under normal use and service, from a defect in material or factory workmanship (Warrantable Failure). This coverage begins with the sale of the engine by Cummins and continues for five years or 100,000 miles (160,935 kilometers), whichever occurs first, from the date of delivery of the Engine to the first user.

Additional coverage is outlined in the Emission Warranty section.

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 in the United States terminate concurrently with the expiration of the express warranties applicable to such products. 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

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, belts, hoses and other maintenance items that are not reusable due to the Warrantable Failure.

Cummins will pay for reasonable labor costs for Engine removal and reinstallation when necessary to repair a Warrantable Failure.

Cummins will pay reasonable costs for towing a vehicle disabled by a Warrantable Failure to the nearest authorized repair location. In lieu of the towing expense, Cummins will pay reasonable costs for mechanics to travel to and from the location of the vehicle, including meals, mileage, and lodging when the repair is performed at the site of the failure.

Owner Responsibilities

Owner is responsible for the operation and maintenance of the Engine as specified in Cummins Operation and Maintenance Manuals. 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. Except for Engines disabled by a Warrantable Failure, Owner must also deliver the Engine to the repair facility. Locations in the United States and Canada are listed in the Cummins United States and Canada Sales and Service Directory.

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.

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 and for "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.

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, torque converters, vacuum pumps, power steering pumps, fan drives and air compressors. Cummins branded alternators and starters are covered for the first two years from the date of delivery of the Engine to the first user, or the expiration of the Base Engine Warranty, whichever occurs first.

Failures resulting in excessive oil consumption are not covered beyond the duration of the coverage or 100,000 miles (160,935 kilometers) or 7000 hours from the date of delivery of the Engine to the first user, whichever of the three occurs first. 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 year from the date of delivery of the Engine to the first user or the duration of the warranty, 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.

THIS WARRANTY AND THE EMISSION WARRANTY SET FORTH HEREINAFTER 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 marketed by Cummins that are used in the United States** in vehicles designed for transporting persons or property on a street or highway. This warranty applies to Engines delivered to the ultimate purchaser on or after September 1, 1992.

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 material or factory workmanship which would cause it not to meet these regulations within the longer of the following periods: (A) Five years or 100,000 miles (160,935 kilometers) 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 material or factory 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 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.

Cummins is not responsible for non-Engine repairs, "downtime" expenses, cargo damage, fines, all applicable taxes, all business costs or other losses resulting from a Warrantable Failure.

CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

* Airport operated crash trucks and fire department operated trucks employed to respond to fires, hazardous material releases, rescue and other emergency-type situations.

** United States includes American Samoa, the Commonwealth of Northern Mariana Islands, Guam, Puerto Rico, and the U.S. Virgin Islands.

ISC Series U.S. and Canada Automotive

Coverage

Products Warranted

This warranty applies to new ISC series Engines sold by Cummins Engine Company, Inc., herein after 'Cummins', and delivered to the first user on or after March 1, 1998, that are used in automotive on-highway applications in the United States* or Canada with three exceptions. Cummins provides different warranty coverage for engines used in fire apparatus truck and crash truck, bus and coach, and recreational vehicle applications.

Base Engine Warranty

This warranty covers any failures of the Engine which result, under normal use and service, from defects in material or workmanship (Warrantable Failure). This coverage begins with the sale of the engine by Cummins and ends two years or 250,000 miles (402,338 kilometers) or 3,125 hours, whichever occurs first after the date of delivery of the Engine to the first user.

Additional coverage is outlined in the Emission Warranty section.

This warranty is 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

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, belts, hoses, and other maintenance items that are not reusable due to the Warrantable Failure.

Cummins will pay for reasonable labor costs for Engine removal and reinstallation when necessary to repair a Warrantable Failure.

Cummins will pay reasonable costs for towing a vehicle disabled by a Warrantable Failure to the nearest authorized repair station for the first year from the date of delivery of the Engine to the first user or the duration of the warranty, whichever occurs first. In lieu of the towing expense, Cummins will pay reasonable costs for mechanics to travel to and from the location of the vehicle, including meals, mileage, and lodging when the repair is performed at the site of the failure.

Owner Responsibilities

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. Except for Engines disabled by Warrantable Failures during the first year or the duration of the warranty, whichever occurs first, Owner must deliver the Engine to the repair facility. Locations in the United States and Canada are listed in the Cummins United States and Canada Sales and Service Directory.

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.

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 and for "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.

This warranty does not apply to accessories supplied by Cummins which bear the name of another company. This category includes, but is not limited to: alternators, starters, fans, air conditioning compressors, clutches, filters, transmissions, torque converters, vacuum pumps, power steering pumps, engine exhaust brakes, non-Cummins fan drives and air compressors.

Failures resulting in excessive oil consumption are covered for the duration of the coverage or 100,000 miles (160,935 kilometers) or 7000 hours from the date of delivery of the Engine to the first user, whichever of the three occurs first. 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 covered for the first year from the date of delivery of the Engine to the first user or the duration of the warranty, 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.

THIS WARRANTY AND THE EMISSION WARRANTY SET FORTH HEREINAFTER 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 ISC series Engines marketed by Cummins that are used in the United States* in vehicles designed for transporting persons or property on a street or highway. This warranty applies to Engines delivered to the ultimate purchaser on or after March 1, 1998.

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 100,000 miles (160,935 kilometers) 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 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.

Cummins is not responsible for non-Engine repairs, "downtime" expenses, cargo damage, fines, all applicable taxes, all business costs or other losses resulting from a Warrantable Failure.

CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

* United States includes American Samoa, the Commonwealth of Northern Mariana Islands, Guam, Puerto Rico, and the U.S. Virgin Islands.

All Bus Categories (Except U.S./Canada Diesel Powered School Buses) Worldwide

Coverage

Products Warranted

This warranty applies to new diesel, LPG, compressed or liquid natural gas fueled engines sold by Cummins and delivered to the first user on or after January 1, 1999, that are used in all bus categories, except (U.S./Canada diesel powered school buses) worldwide.

Base Engine Warranty

The Base Engine Warranty covers any failures of the Engine which result, under normal use and service, from a defect in material or factory workmanship (Warrantable Failure). This coverage begins with the sale of the engine by Cummins and continues for two years from the date of delivery of the Engine to the first user.

Extended Major Components Warranty

The Extended Major Components Warranty applies to all except B and ISB series Engines and covers Warrantable Failures of the engine cylinder block, camshaft, crankshaft, connecting rods and Cummins fan clutch (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 300,000 miles (482,805 kilometers) or 10,800 hours of operation, whichever occurs first, from the date of delivery of the Engine to the first user.

Emission Warranty

Additional coverage is outlined in the Emission Warranty on the back page.

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 in the United States terminate concurrently with the expiration of the express warranties applicable to such products. Some states or countries 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, belts, hoses and other maintenance items that are not reusable due to the Warrantable Failure.

Cummins will pay for reasonable labor costs for Engine removal and reinstallation when necessary to repair a Warrantable Failure.

Cummins will pay reasonable costs for towing a vehicle disabled by a Warrantable Failure to the nearest authorized repair location. In lieu of towing expenses, Cummins will pay reasonable costs for mechanics to travel to and from the location of the vehicle, including meals, mileage, and lodging, when the repair is performed at the site of the 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 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 the repair.

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 Manuals. 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. Except for Engines disabled by a Warrantable Failure during the Base Engine Warranty, the Owner must also deliver the Engine to the repair facility. Locations in the United States and Canada are listed in the Cummins United States and Canada 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 and for "downtime" expenses, passenger delays, fines, cargo damage, 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.

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, vacuum pumps, power steering pumps and air compressors.

Excessive oil consumption for B series engines is covered for the duration of the coverage or 100,000 miles (160,935 kilometers) or 7000 hours from the date of delivery of the Engine to the first user, whichever of the three occurs first. 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 covered for the first year from the date of delivery of the Engine to the first user.

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 AND THE EMISSION WARRANTY SET FORTH HEREINAFTER 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 or country to country.

Emission Warranty

Products Warranted

This emission warranty applies to new diesel, LPG, compressed or liquid natural gas fueled engines marketed by Cummins that are used in the United States in vehicles designed for transporting persons or property on a street or highway. This warranty applies to Engines delivered to the ultimate purchaser on or after January 1, 1999.*

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 material or factory workmanship which would cause it not to meet these regulations within the longer of the following periods: (A) Five years or 100,000 miles (160,935 kilometers) 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 material or factory 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 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.

Cummins is not responsible for non-Engine repairs, "downtime" expenses, cargo damage, fines, all applicable taxes, all business costs, and other losses resulting from a Warrantable Failure.

CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

* United States includes American Samoa, the Commonwealth of Northern Mariana Islands, Guam, Puerto Rico, and the U.S. Virgin Islands.

United States and Canada Diesel Engine School Bus

Coverage

Products Warranted

This warranty applies to new diesel Engines sold by Cummins Engine Company, Inc., hereafter "Cummins", and delivered to the first user on or after September 15, 1996, that are used in school bus* applications in the United States** or Canada.

Base Engine Warranty

The Base Engine Warranty covers any failures of the Engine which result, under normal use and service, from a defect in material or factory workmanship (Warrantable Failure). This coverage begins with the sale of the Engine by Cummins and continues for five years or 100,000 miles (160,935 kilometers), whichever occurs first, from the date of delivery of the Engine to the first user.

Extended Major Components Warranty

The Extended Major Components Warranty applies to all except B and ISB series Engines and covers Warrantable Failures of the engine cylinder block, camshaft, crankshaft, connecting rods and Cummins fan clutch (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 300,000 miles (482,805 kilometers), whichever occurs first, from the date of delivery of the Engine to the first user.

Emission Warranty

Additional coverage is outlined in the Emission Warranty on the back page.

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 in the United States terminate concurrently with the expiration of the express warranties applicable to such products. 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, belts, hoses and other maintenance items that are not reusable due to the Warrantable Failure.

Cummins will pay for reasonable labor costs for Engine removal and reinstallation when necessary to repair a Warrantable Failure.

Cummins will pay reasonable costs for towing a vehicle disabled by a Warrantable Failure to the nearest authorized repair location when necessary to make the repair for the first 2 years from the date of delivery of the Engine to the first user. In lieu of towing expenses, Cummins will pay reasonable costs for mechanics to travel to and from the location of the vehicle, including meals, mileage, and lodging, when the repair is performed at the site of the 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 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 the repair.

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. Except for Engines disabled by a Warrantable Failure during the first year from the date of delivery of the Engine to the first user, Owner must also deliver the Engine to the repair facility. Locations in the United States and Canada are listed in the Cummins United States and Canada 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 and for "downtime" expenses, passenger delays, 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.

This warranty does not apply to accessories which bear the name of another company. This category includes, but is not limited to: alternators, starters, fans, air conditioning compressors, clutches, filters, transmissions, torque converters, vacuum pumps, power steering pumps and air compressors. Cummins branded alternators and starters are covered for the first two years from the date of delivery of the Engine to the first user, or the expiration of the Base Engine Warranty, whichever occurs first.

Excessive oil consumption for B series Engines is covered for the duration of the coverage or 100,000 miles (160,935 kilometers) or 7000 hours from the date of delivery of the Engine to the first user, whichever of the three occurs first. 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 year from the date of delivery of the Engine to the first user or the expiration of the applicable Base Warranty, 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 AND THE EMISSION WARRANTY SET FORTH HEREINAFTER 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 marketed by Cummins that are used in the United States* in vehicles designed for transporting persons or property on a street or highway. 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 material or factory workmanship which would cause it not to meet these regulations within the longer of the following periods: (A) Five years or 100,000 miles (160,935 kilometers) 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 material or factory 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 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.

Cummins is not responsible for non-Engine repairs, "downtime" expenses, cargo damage, fines, all applicable taxes, all business costs or other losses resulting from a Warrantable Failure.

CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

* A vehicle used to transport students to and from school and school-related events. Vehicle must have warning lights and the words "SCHOOL BUS" written on the front and rear roof caps.

** Includes American Samoa, the Commonwealth of Northern Mariana Islands, Guam, Puerto Rico, and the U.S. Virgin Islands.

ISL, ISB, ISC, ISM, M11 & N14 Series Diesel Engines United States and Canada Recreational Vehicle

Coverage

Products Warranted

This warranty applies to new ISL, ISB, ISC, ISM, M11 and N14 series diesel Engines sold by Cummins Engine Company, Inc., hereafter "Cummins", and delivered to the first user on or after March 15, 1998, that are used in recreational vehicle* applications in the United States** or Canada.

Base Engine Warranty

The Base Engine Warranty covers any failures of the Engine which result, under normal use and service, from a defect in material or factory workmanship (Warrantable Failure). This coverage begins with the sale of the Engine by Cummins and continues for five years or 100,000 miles (160,935 kilometers), whichever occurs first, from the date of delivery of the Engine to the first user.

Emission Warranty

Additional coverage is outlined in the Emission Warranty on the back page.

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 in the United States terminate concurrently with the expiration of the express warranties applicable to such products. 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, belts, hoses and other maintenance items that are not reusable due to the Warrantable Failure.

Cummins will pay for reasonable labor costs for Engine removal and reinstallation when necessary to repair a Warrantable Failure.

Cummins will pay reasonable costs for towing a vehicle disabled by a Warrantable Failure to the nearest authorized repair location when necessary to make the repair for the first year from the date of delivery of the Engine to the first user. In lieu of towing expenses, Cummins will pay reasonable costs for mechanics to travel to and from the location of the vehicle, including meals, mileage, and lodging, when the repair is performed at the site of the failure.

Owner 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.

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. Except for Engines disabled by a Warrantable Failure during the first year from the date of delivery of the Engine to the first user, Owner must also deliver the Engine to the repair facility. Locations in the United States and Canada are listed in the Cummins United States and Canada 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 and for "downtime" expenses, passenger delays, 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.

This warranty does not apply to accessories which bear the name of another company. This category includes, but is not limited to: alternators, starters, fans, air conditioning compressors, clutches, filters, transmissions, torque converters, vacuum pumps, power steering pumps and air compressors. Cummins branded alternators and starters are covered for the first two years from the date of delivery of the Engine to the first user, or the expiration of the Base Engine Warranty, whichever occurs first.

Excessive oil consumption for B series Engines is covered for the duration of the coverage or 100,000 miles (160,935 km) or 7000 hours from the date of delivery of the Engine to the first user, whichever of the three occurs first. 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 12 months from the date of delivery of the Engine to the first user or the expiration of the applicable Base Warranty, 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 AND THE EMISSION WARRANTY SET FORTH HEREINAFTER 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 marketed by Cummins that are used in the United States* in vehicles designed for transporting persons or property on a street or highway. This warranty applies to Engines delivered to the ultimate purchaser on or after January 1, 1998.

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 material or factory workmanship which would cause it not to meet these regulations within the longer of the following periods: (A) Five years or 100,000 miles (160,935 kilometers) 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 material or factory 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 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.

Cummins is not responsible for non-Engine repairs, "downtime" expenses, cargo damage, fines, all applicable taxes, all business costs or other losses resulting from a Warrantable Failure.

CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

* A 'recreational vehicle' for this warranty is defined as a Class A Motorhome which is a vehicular unit built on a self-propelled motor vehicle chassis, primarily designed or altered to provide temporary living quarters for recreational, travel or camping use. The living unit has been entirely constructed on a bare, specially-designed motor vehicle chassis.

** Includes American Samoa, the Commonwealth of Northern Mariana Islands, Guam, Puerto Rico, and the U.S. Virgin Islands.

California Emission Control System Warranty, On-Highway

Products Warranted

This Emission Control System Warranty applies to heavy duty diesel engines (hereafter, engines) certified with the California Air Resources Board beginning with the year 1991, marketed by Cummins, and registered in California for use in automotive on-highway applications.

Your Warranty Rights and Obligations

The California Air Resources Board and Cummins Engine Company, Inc., are pleased to explain the emission control system warranty on your 1992 and subsequent model year heavy duty diesel engine. In California, new motor vehicle engines must be designed, built and equipped to meet the State's stringent anti-smog standards. Cummins must warrant the emission control system on your heavy duty diesel engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your heavy duty diesel engine.

Your emission control system may include parts such as the fuel injection system and engine electronic control module. Also included may be hoses, connectors and other emission-related assemblies.

If an emission-related part on your engine is found to have a defect in material or factory workmanship (Warrantable Condition), the part will be repaired or replaced by Cummins. This is your emission control system defects warranty.

Manufacturer's Warranty Coverage

This warranty coverage is provided for five years or 160,935 km [100,000 miles] or 3,000 hours of engine operation, whichever first occurs from the date of delivery of the engine to the first user.

Where a Warrantable Condition exists, Cummins will repair your engine at no cost to you including diagnosis, parts and labor.

Owner's Warranty Responsibilities

As the engine owner, you are responsible for the performance of the required maintenance listed in your Cummins Operation and Maintenance Manual. Cummins recommends that you retain all receipts covering maintenance on your engine, but Cummins cannot deny warranty solely for the lack of receipts or for your failure to substantiate the performance of all scheduled maintenance.

You are responsible for presenting your engine to a Cummins dealer as soon as a problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.

As the engine owner, you should also be aware that Cummins may deny you warranty coverage if your engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

If you have any questions regarding your warranty rights and responsibilities, you should contact Cummins Customer Relation Department at 1-800-343-7357 or the California Air Resources Board at 9528 Telstar Avenue, El Monte, CA 91731.

A warranted part which is scheduled for replacement as required maintenance is warranted up to the first scheduled replacement point.

Prior to the expiration of the applicable warranty, Owner must give notice of any warranted emission control failure to a Cummins distributor, authorized dealer or other repair location approved by Cummins and deliver the engine to such facility for repair. Repair locations are listed in Cummins United States and Canada Service Directory.

Owner is responsible for incidental costs such as: communication expenses, meals, lodging incurred by Owner or employees of Owner as a result of a Warrantable Condition.

Owner is responsible for "downtime" expenses, cargo damage, fines, all applicable taxes, all business costs, and other losses resulting from a Warrantable Condition.

CUMMINS IS NOT RESPONSIBLE FOR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES. INCIDENTAL OR CONSEQUENTIAL DAMAGES INCLUDE BUT ARE NOT LIMITED TO FINES, THEFT, VANDALISM OR COLLISIONS.

Coverage

This emission control system warranty applies only to the following emission control parts:

Fuel Pump

Static Timing
Delivery Valve
Injector Supply Line
ICV/Distributor Module

Intake Manifold

Charge Air Cooler

Exhaust Manifold

Oxidation Catalyst

Injectors

Calibration
Needle
Nozzle
Spring

Electronic Control System

Control Module
Boost Pressure Sensor
Coolant Temperature Sensor
Fuel Pressure Sensor

Turbocharger

Compressor Wheel
Turbine Wheel
Turbine Oil Seal
Wastegate Valve

Replacement Parts

Cummins recommends that any service parts used for maintenance, repair or replacement of emission control systems be new, genuine Cummins or Cummins approved rebuilt parts and assemblies, and that the engine be serviced by a Cummins distributor, authorized dealer or the repair location approved by Cummins. The owner may elect to have maintenance, replacement or repair of the emission control parts performed by a facility other than a Cummins distributor, an authorized dealer or a repair location approved by Cummins, and may elect to use parts other than new genuine Cummins or Cummins approved rebuilt parts and assemblies for such maintenance, replacement or repair;

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however, the cost of such service or parts and subsequent failures resulting from such service or parts will not be covered under this emission control system warranty, except for Emergency Repairs as described below.

Cummins Responsibilities

The warranty coverage begins when the engine is delivered to the ultimate purchaser.

Repairs and service will be performed by any Cummins distributor, authorized dealer or other repair location approved by Cummins using new, genuine Cummins or Cummins approved rebuilt parts and assemblies. Cummins will repair any of the emission control parts found by Cummins to be defective without charge for parts or labor (including diagnosis which results in determination that there has been a failure of a warranted emission control part).

Emergency Repairs

In the case of an emergency where a Cummins distributor, authorized dealer, or other repair location approved by Cummins is not available, repairs may be performed by any available repair location or by any individual using any replacement parts. A part not being available within 30 days or a repair not being complete within 30 days constitutes an emergency. Cummins will reimburse the Owner for expenses (including diagnosis), not to exceed the manufacturer's suggested retail price for all warranted parts replaced and labor charges based on the manufacturer's recommended time allowance for the warranty repair and the geographically appropriate hourly labor rate. Replaced parts and paid invoices must be presented at a Cummins authorized repair facility as a condition of reimbursement for emergency repairs not performed by a Cummins distributor, authorized dealer, or other repair location approved by Cummins.

Warranty 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 cooling, lubricating or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications to 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.

Cummins is not responsible for failures resulting from improper repair or the use of parts which are not genuine Cummins or Cummins approved parts.

Cummins is not responsible for the material and labor costs of emission control parts and assemblies replaced during Scheduled Maintenance of the engine as specified in Cummins Operation and Maintenance Manuals.

THIS WARRANTY, TOGETHER WITH THE EXPRESS COMMERCIAL WARRANTIES ARE THE SOLE WARRANTIES MADE BY CUMMINS. THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

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