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## Section i - Introduction

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## About the Manual

This manual contains information needed to correctly operate and maintain your engine as recommended by Case Corporation.

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

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

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

## How to Use the Manual

The manual is organized to provide an easy flow from problem identification to problem correction. A list of troubleshooting symptoms containing most common engine problems begins on Page TS-a in Section TS - Troubleshooting Symptoms. Complete the following steps to locate and correct the problem.

Refer to Section TS for a guide to troubleshooting your engine. Follow the directions given on Page TS-1 to locate and correct engine problems.

The Troubleshooting Symptoms Charts are based on the following assumption:

- The engine has been installed according to specifications.
- The easiest repairs are done first.
- Generic solutions to cover problems with the most common applications.

Refer to Section V for specifications recommended by Case Corporation for your engine. Specifications and torque values for each engine system are given in that section.

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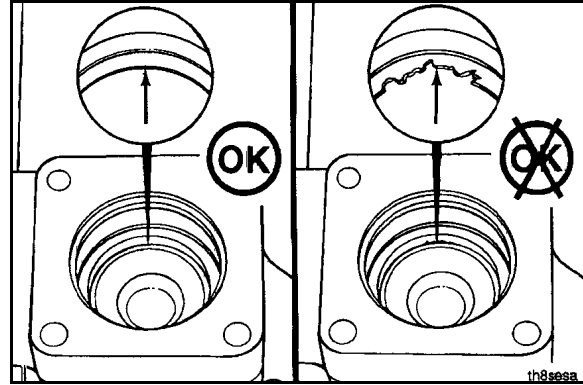
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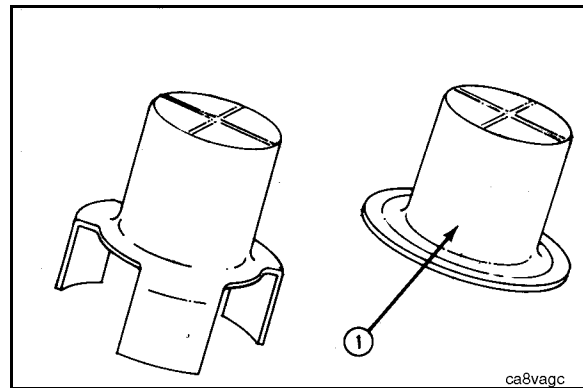
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## Illustrations

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** Case approved 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.

## General Repair Instructions

This engine incorporates the latest technology at the time it was manufactured; yet, it is designed to be repaired using normal repair practices performed to quality standards.

Case Corporation does not recommend or authorize any modifications or repairs to engines or components except for those detailed in Service Information. In particular, unauthorized repair to safety-related components can cause personal injury or death. Below is a partial listing of components classified as safety-related:

<b>Air Compressor</b>	<b>Flywheel Mounting Capscrews</b>
<b>Air Controls</b>	<b>Fuel Shutoff Assemblies</b>
<b>Air Shutoff Assemblies</b>	<b>Fuel Supply Tubes</b>
<b>Balance Weights</b>	<b>Lifting Brackets</b>
<b>Cooling Fan</b>	<b>Throttle Controls</b>
<b>Fan Hub Assembly</b>	<b>Turbocharger Compressor Casing</b>
<b>Fan Mounting Bracket(s)</b>	<b>Turbocharger Oil Drain Line(s)</b>
<b>Fan Mounting Capscrews</b>	<b>Turbocharger Oil Supply Line(s)</b>
<b>Fan Hub Spindle</b>	<b>Turbocharger Turbine Casing</b>
<b>Flywheel</b>	<b>Vibration Damper Mounting Capscrews</b>
<b>Flywheel Crankshaft Adapter</b>	

- **Follow all safety instructions noted in the procedures**
  - Follow the manufacturer's recommendations for cleaning solvents and other substances used during the repair of the engine. Some solvents and used engine oil have been identified by government agencies as toxic or carcinogenic. Avoid excessive breathing, injection and contact with such substances. **Always** use good safety practices with tools and equipment.
- **Provide a clean environment and follow the cleaning instructions specified in the procedures**
  - The engine and its components must be kept clean during any repair. Contamination of the engine or components will cause premature wear.
- **Perform the inspections specified in the procedures**
- **Replace all components or assemblies which are damaged or worn beyond the specifications**
- **Use Case approved service parts and assemblies**
  - The assembly instructions have been written to use again as many components and assemblies as possible. When it is necessary to replace a component or assembly, the procedure is based on the use of new Case approved components.
- **Follow the specified disassembly and assembly procedures to avoid damage to the components**

## General Cleaning Instructions

### Solvent and Acid Cleaning

Several solvent and acid-type cleaners can be used to clean the engine parts. Experience has shown that the best results can be obtained using a cleaner that can be heated to 90 to 95 degrees Celsius [180 to 200 degrees Fahrenheit]. A cleaning tank that provides a constant mixing and filtering of the cleaning solution will give the best results. **Case Corporation does not recommend any specific cleaners. Always** follow the cleaner manufacturer's instructions.

Remove all the gasket material, o-rings, and the deposits of sludge, carbon, etc., with a wire brush or scraper before putting the parts in a cleaning tank. Be careful **not** to damage any gasket surfaces. When possible, steam clean the parts before putting them in the cleaning tank.

#### **△ WARNING △**

**Acid is extremely dangerous and can damage the machinery. Always provide a tank of strong soda water as a neutralizing agent.**

Rinse all of the parts in hot water after cleaning. Dry completely with compressed air. Blow the rinse water from all of the capscrew holes and the oil drillings.

If the parts are **not** to be used immediately after cleaning, dip them in a suitable rustproofing compound. The rustproofing compound **must** be removed from the parts before installation on the engine.

### Steam Cleaning

Steam cleaning can be used to remove all types of dirt that can contaminate the cleaning tank. It is a good way to clean the oil drillings.

#### **△ WARNING △**

**Wear protective clothing to prevent personal injury from the high pressure and extreme heat.**

Do **not** steam clean the following parts:

- |                          |                    |
|--------------------------|--------------------|
| 1. Electrical Components | 4. Fuel Pump       |
| 2. Wiring                | 5. Belts and Hoses |
| 3. Injectors             | 6. Bearings        |

### Glass or Plastic Bead Cleaning

Glass or plastic bead cleaning can be used on many engine components to remove carbon deposits. The cleaning process is controlled by the size of the glass or plastic beads, the operating pressure, and the cleaning time.

#### **△ CAUTION △**

**Do not use glass or plastic bead cleaning on aluminum piston skirts. Do not use glass bead cleaning on aluminum ring grooves. Small particles of glass or plastic will embed in the aluminum and result in premature wear. Valves, turbocharger shafts, etc., can also be damaged. Follow the cleaning directions listed in the procedures.**

**NOTE:** Plastic bead blasting media can be used to clean aluminum ring grooves. Do not use any bead blasting media on pin bores or aluminum skirts.

Follow the equipment manufacturer's cleaning instructions. The following guidelines can be used to adapt to manufacturer's instructions:

1. Bead size:-Use U.S. size No. 16-20 for piston cleaning with plastic bead media.  
-Use U.S. size No. 70 for piston domes with glass media.  
-Use U.S. size No. 60 for general purpose cleaning with glass media.
2. Operating Pressure:  
-Glass: Use 620 kPa [90 psi] for general purpose cleaning.  
-Plastic: Use 270 kPa [40 psi] for piston cleaning.
3. Steam clean or wash the parts with solvent to remove all of the foreign material and glass or plastic beads after cleaning. Rinse with hot water. Dry with compressed air.
4. Do not contaminate the wash tanks with glass or plastic beads.

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## Section E - Engine Identification

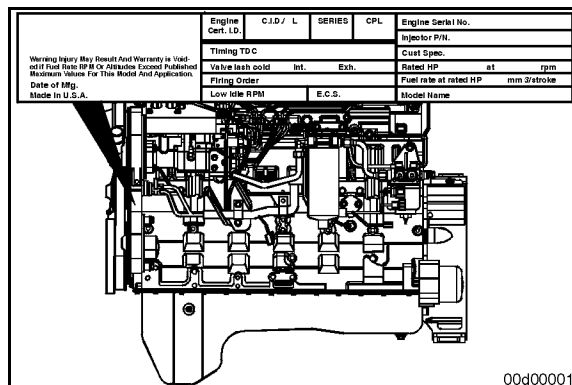
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# Engine Identification

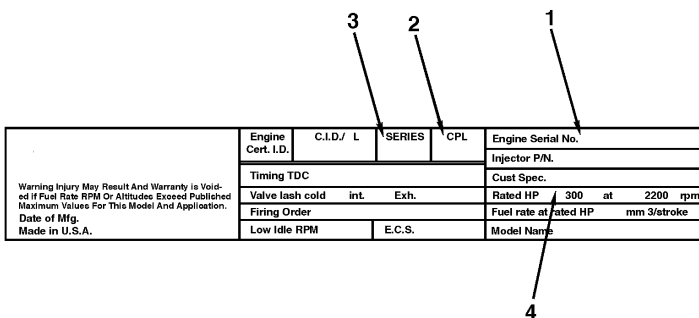
## Engine Dataplate

The engine dataplate shows specific information about your engine. The engine serial number (ESN) and Vehicle Parts List provide information for ordering parts and service needs. The engine dataplate must not be changed unless approved by Case Corporation.



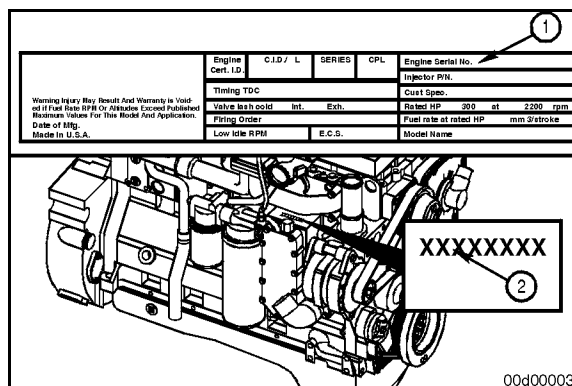
The dataplate is located on the top side of the gear housing. The information on the dataplate is mandatory when sourcing service parts.

1. Engine Serial Number (ESN)
2. Vehicle Parts List
3. Model
4. Horsepower and rpm rating

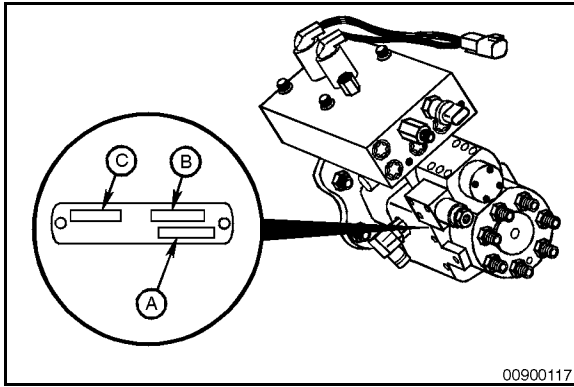


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**NOTE:** If the engine dataplate (1) is not readable, the engine serial number (ESN) (2) can be identified on the engine block on top of the lubricating oil cooler housing. Additional engine information is available by reading the Electronic Control Module (ECM) dataplate.



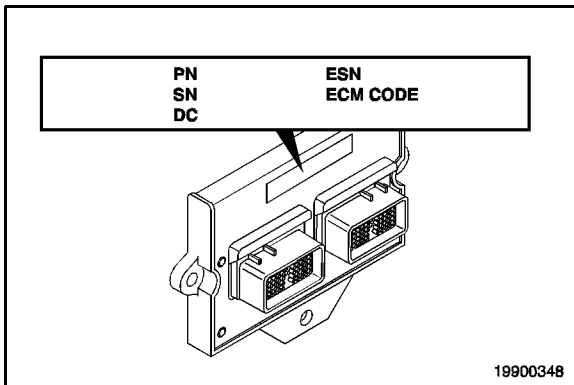
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### Fuel Injection Pump Dataplate

The CAPS fuel injection pump dataplate is located on the side of the injection pump. The dataplate contains the following information:

- A. Part Number
- B. Pump Serial Number
- C. Factory Code



### ECM Dataplate

The Electronic Control Module (ECM) dataplate shows information about your ECM, and how the ECM was programmed. The dataplate is located on the ECM above the ECM connectors.

The following information is available 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 indicating how the ECM is programmed.

## Specifications

### General Specifications

Horsepower.....	(Refer to engine dataplate)
Engine speed @ Maximum Power Output:	
Standard Rating (rpm) .....	2000
Bore and Stroke .....	114 mm [4.49 in] x 135 mm [5.32 in]
Displacement .....	8.3 liters [505 C.I.D.]
Compression Ratio .....	17:1
Firing Order.....	1-5-3-6-2-4
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:** Refer to the vehicle operators manual for the valve lash adjustment interval for the Case 24 valve 8.3 liter engine. 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.

### Air Intake System

Maximum Intake Restriction (Clean Air Filter Element) .....	254 mm H <sup>2</sup> O [10.0 in H <sup>2</sup> O]
Maximum Intake Restriction (Dirty Air Filter Element) .....	635 mm H <sup>2</sup> O [25.0 in H <sup>2</sup> O]

### 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 qts]
Total System Capacity .....	21 liters [22 qts]

**NOTE:** Some applications may use a slightly different oil pan capacity. Refer to the machine operators manual.

### Cooling System

Coolant Capacity (Engine Only).....	10.9 liters [11.5 qt]
Standard Modulating Thermostat- Range.....	84° to 91°C [180° to 195°F]
Maximum Allowable Operating Temperature .....	100°C [212°F]
Minimum Recommended Operating Temperature .....	70°C [158°F]
Minimum Recommended Pressure Cap .....	103 kPa [15 psi]

### Exhaust System

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

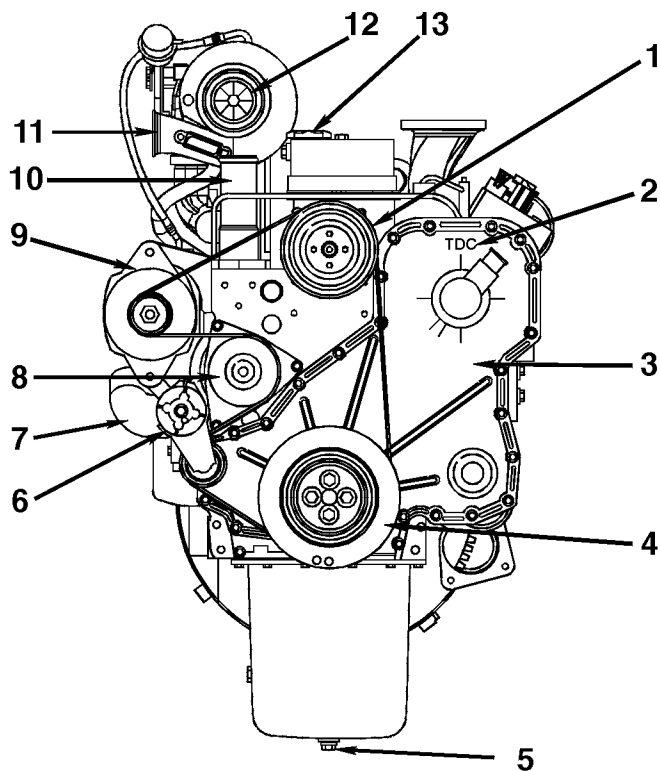
### Fuel System

Engine Idle Speed .....	850 to 950 rpm
Minimum Lift Pump Inlet Pressure at Rated (vacuum) .....	102 mm Hg [4 in Hg]
Maximum Fuel Filter Outlet Pressure at Rated (vacuum) .....	254 mm Hg [10 in Hg]
Minimum Fuel Filter Inlet Pressure during Cranking.....	508 mm Hg [20 in Hg]
Fuel Drain Line Maximum Pressure .....	254 mm Hg [10 in Hg]
Fuel Inlet Maximum Temperature .....	71°C [160°F]
Engine Minimum Cranking Speed .....	150 rpm

### Electrical System

For electrical specifications, refer to the Case 24 Valve, 8.3 Liter Engine Fuel Systems Troubleshooting and Repair Manual, Rac 7-88620.

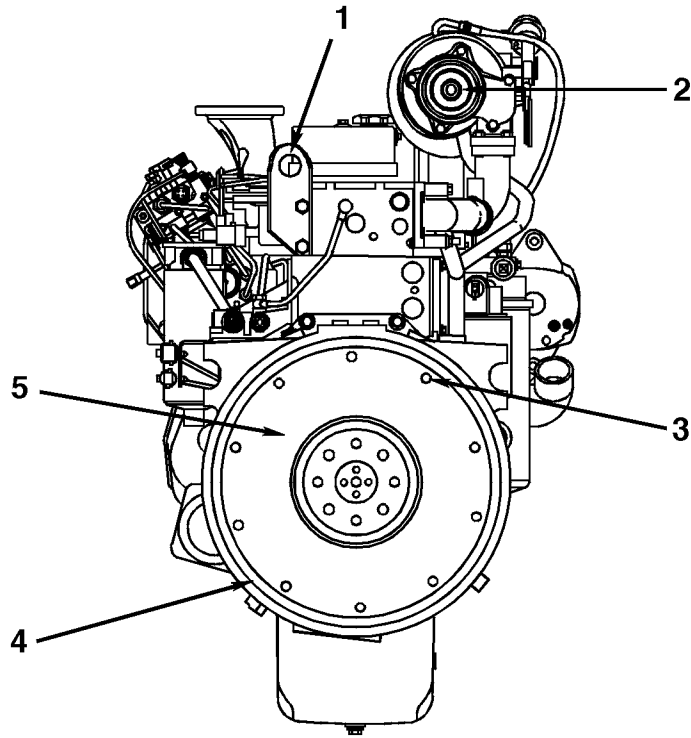
## Engine Views



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### Front View

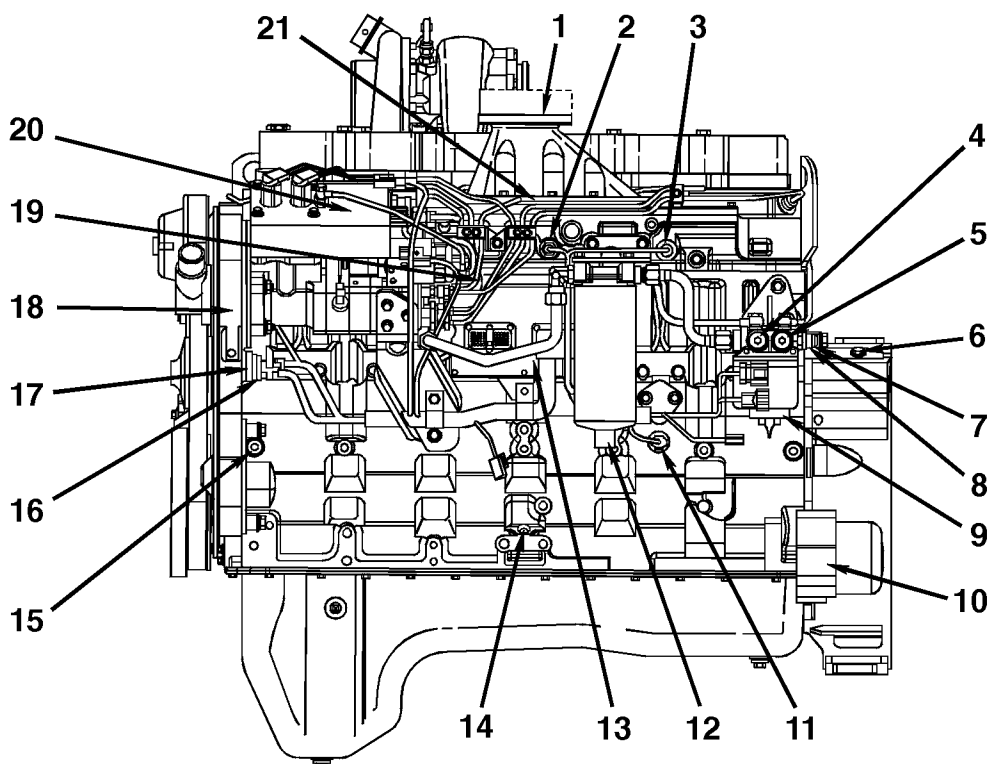
1. Fan Pulley
2. Top Dead Center Mark
3. Front Gear Cover
4. Vibration Damper
5. Engine Oil Pan Drain Plug
6. Automatic Belt Tensioner
7. Water Inlet
8. Water Pump
9. Alternator
10. Water Outlet
11. Turbocharger Air Outlet
12. Turbocharger Air Inlet
13. Engine Rocker Housing Oil Fill



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**Rear View**

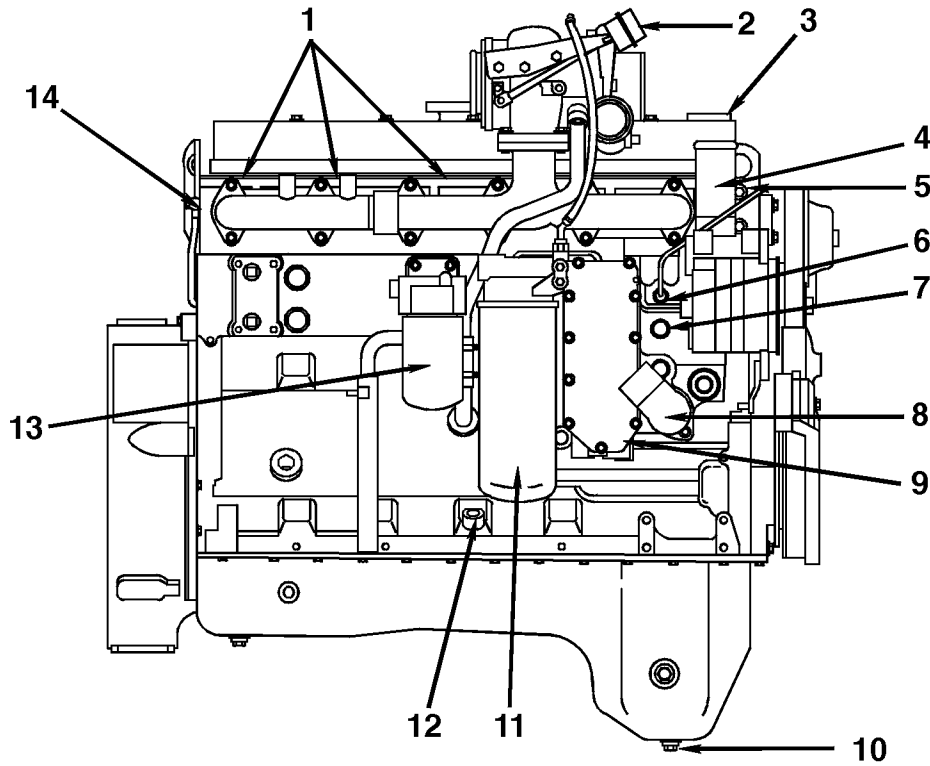
1. Rear Engine Lifting Bracket
2. Turbocharger Exhaust Outlet
3. Clutch Mounting Holes
4. Flywheel Housing
5. Flywheel



00900118

### 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
11. Engine 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)
17. Engine Speed Sensor (ESS)
18. Engine Dataplate
19. High Pressure Fuel Lines
20. CAPS Injection Pump
21. Intake Air Preheater



00900120

**Exhaust Side View**

1. 1/2 inch (NPTF) Coolant Taps
2. Turbocharger Wastegate Actuator
3. Oil Fill
4. Water Outlet
5. Front Engine Lifting Bracket
6. Coolant Temperature Sensor
7. Provision for Coolant Heater
8. Water Inlet
9. Lubricating Oil Cooler
10. Engine Oil Pan Drain Plug
11. Lubricating Oil Filter
12. Dipstick Location
13. Water Filter
14. Injector Drain Fuel Outlet

## Section TS - Troubleshooting Symptoms

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## Troubleshooting Procedures and Techniques

A thorough analysis of the customer's complaint is the key to successful troubleshooting. The more information known about a complaint, the faster and easier the problem can be solved.

The Troubleshooting Symptom Charts are organized so that a problem can be located and corrected by doing the easiest and most logical things first. Complete all steps in the sequence shown from top to bottom.

It is not possible to include all the solutions to problems that can occur; however, these charts are designed to stimulate a thought process that will lead to the cause and correction of the problem.

Follow these basic troubleshooting steps:

- Get all the facts concerning the complaint
- Analyze the problem thoroughly
- Relate the symptoms to the basic engine systems and components
- Consider any recent maintenance or repair action that can relate to the complaint
- Double-check before beginning any disassembly
- Solve the problem by using the symptom charts and doing the easiest things first
- Determine the cause of the problem and make a thorough repair
- After repairs have been made, operate the engine to make sure the cause of the complaint has been corrected

## Troubleshooting Symptoms Charts

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

### △ WARNING △

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



**Suggest:**

**For more complete manuals. Please go to the home page.**

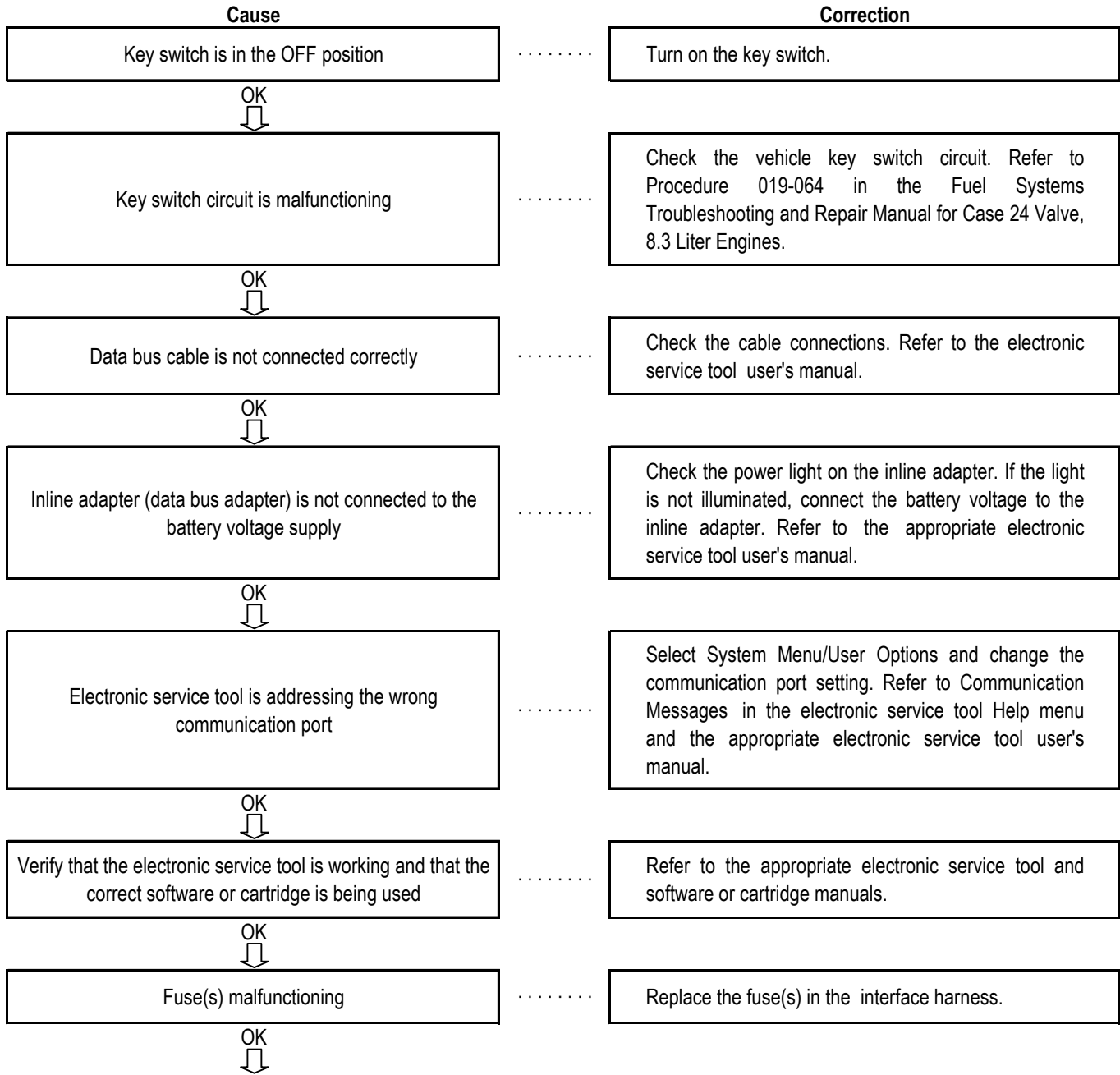
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## Communication Error Electronic Service Tool or Control Device

### This is symptom tree T016



(Continued)

## Communication Error -- Electronic Service Tool or Control Device (Continued)

Cause	Correction
Battery voltage supply to the electronic control (ECM) is low, interrupted, or open	Check the battery connections. Refer to Procedure 019-087 in the Fuel Systems Troubleshooting and Repair Manual for Case 24 Valve, 8.3 Liter Engines.
OK ↓	
Data bus circuit is malfunctioning	Check the data bus circuit. Refer to Procedure 019-028 in the Fuel Systems Troubleshooting and Repair Manual for Case 24 Valve, 8.3 Liter Engines.
OK ↓	
Electronic fault codes active or high counts of inactive fault codes	Refer to Section TF for fault code troubleshooting.
OK ↓	
Electronic Control Module (ECM) is not calibrated	Calibrate the ECM.
OK ↓	
J1939 control devices are interfering with the engine controls	Alternately disconnect all other J1939 control devices from the data bus circuit until communications or functionality is restored. Refer to the vehicle service manual to locate and repair J1939 control devices.
OK ↓	
Electronic service tool COM PORT has been interrupted or is malfunctioning	Refer to the appropriate electronic service tool and personal computer user's manuals.
OK ↓	
Moisture in the wiring harness connectors	Dry the connectors with an electronic connector cleaner.
OK ↓	
J1939 data bus shield is not grounded correctly	Repair the electrical ground for the data bus shield. Refer to the vehicle wiring diagram and service manual.
OK ↓	
Electronic Control Module (ECM) is malfunctioning	Replace the ECM. Refer to Procedure 019-031 in the Fuel Systems Troubleshooting and Repair Manual for Case 24 Valve, 8.3 Liter Engines.

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