

SECTION 1

GENERAL INFORMATION

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ALL NEW GENERAL MOTORS VEHICLES ARE CERTIFIED BY THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY AS CONFORMING TO THE REQUIREMENTS OF THE REGULATIONS FOR THE CONTROL OF AIR POLLUTION FROM NEW MOTOR VEHICLES. THIS CERTIFICATION IS CONTINGENT ON CERTAIN ADJUSTMENTS BEING SET TO FACTORY STANDARDS. IN MOST CASES, THESE ADJUSTMENT POINTS EITHER HAVE BEEN PERMANENTLY SEALED AND/OR MADE INACCESSIBLE TO PREVENT INDISCRIMINATE OR ROUTINE ADJUSTMENT IN THE FIELD. FOR THIS REASON, THE FACTORY PROCEDURE FOR TEMPORARILY REMOVING PLUGS, CAPS, ETC., FOR PURPOSES OF SERVICING THE PRODUCT, MUST BE STRICTLY FOLLOWED AND, WHEREVER PRACTICABLE, RETURNED TO THE ORIGINAL INTENT OF THE DESIGN.

NOTICE: Before performing any welding, disconnect negative battery cable and any control module connectors. Damage may occur to control module or to other system components.

GENERAL DESCRIPTION

FUEL AND EMISSIONS CONTROL

A control module is designed to maintain exhaust emissions levels at federal standards while providing good driveability and fuel efficiency. The functions of the system are based on data gathered by sensors and switches located throughout the vehicle. The control module maintains control over fuel delivery and other system components, while monitoring the system for faulty operation with its diagnostic capabilities. This diagnostic capability is complemented by the diagnostic procedures contained in this manual. The control module language for communicating the source of the malfunction is a system of diagnostic trouble codes.

When it finds a problem, it lights a Malfunction Indicator Lamp (MIL) "Service Engine Soon" on the instrument panel and a Diagnostic Trouble Code (DTC) will be stored in the control module memory. This does not mean that the engine should be stopped right away, but that the cause of the light coming "ON" should be checked as soon as reasonable possible.

It is important to review the system sections and control module wiring diagrams for a specific engine to determine what is controlled by the control module and what systems are non-control module controlled. Abbreviations which are used in driveability and emissions are listed in "Abbreviations," SECTION 14.

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VEHICLE EMISSIONS CONTROL INFORMATION LABEL

The Vehicle Emissions Control Information label contains important emission specifications and procedures. On the upper left corner is exhaust emission information. Refer to Figure 1-1 for further break out clarification. Also, there is an illustrated emission components and a vacuum hose schematic. This label is located in the engine compartment of every vehicle. If the label has been removed, a replacement label can be ordered from General Motors Service Parts Operation (GMSPO). Refer to the standard Parts Catalog.

MAINTENANCE SCHEDULE

Refer to "Maintenance and Lubrication," SECTION 0B of the proper Light Duty Truck Service Manual or in the vehicle glove box for the maintenance service. Proper schedule maintenance should be performed to retain emission control performance.

BLOCKING DRIVE WHEELS

The vehicle drive wheels should always be blocked with parking brake firmly set while checking system.

VISUAL/PHYSICAL UNDERHOOD INSPECTION

One of the most important checks that must be done as part of any diagnostic procedure is a careful visual/physical underhood inspection. This can often lead to fixing a problem without further steps. Inspect all vacuum hoses for correct routing, pinches, cuts, or disconnects. Be sure to inspect hoses that are difficult to see beneath the air cleaner, compressor, generator, etc. Inspect all the wires in the engine compartment for correct and good connections, burned or chafed spots, pinched wires, or contact with sharp edges or hot exhaust manifolds. This visual/physical inspection is very important. It must be done carefully and thoroughly. Refer to component locations at end of this section.

BASIC KNOWLEDGE AND TOOLS REQUIRED

To use this manual most effectively, a general understanding of basic electrical circuits and circuit testing tools is required. You should be familiar with wiring diagrams, the meaning of voltage, ohms, amps, the basic theories of electricity, and understand what happens in an open or shorted wire.

To perform system diagnosis, the use of the Tech 1 Diagnostic computer or equivalent scan tool is required. A tachometer, test light, ohmmeter, digital voltmeter with 10 megohms impedance, vacuum gauge, and jumper wires are also required. Please become acquainted with the tools and their use before attempting to diagnose a vehicle. Special tools which are required for system service and the ones described above are illustrated in "Special Tools," SECTION 13.

WHAT THIS MANUAL CONTAINS

The Diesel Fuel and Emissions service manual has been developed to describe the function and operation of the control module control system that controls the driveability and emissions of the vehicle. Emphasis is placed on the diagnosis and repair of problems related to the system.

The diagnostic charts and functional checks for each system are found in "Diagnosis" of each section.

The "Fuel and Emissions" service manual is divided into sections, each dealing with diagnosis and repair. These sections can be summarized as follows.

Section 2: Driveability Symptoms

This section assists in the diagnosis of intermittent problems or problems which don't result in the storing of Diagnostic Trouble Codes (DTCs). It is arranged by symptoms of poor driveability and emissions and lists probable causes of the problems.

Section 3: Control Module System

This is an electronically controlled exhaust emission system that uses a control module to control fuel delivery, injection timing, turbo boost and exhaust recirculation.

This section deals with the diagnosis and repair of each control module system with the use of a Tech 1 scan tool.

This section contains:

- Description and Details of Basic Operation.
- On-Board Diagnostic System Check. This must be the first step of any diagnostic procedure.
- Functional Checks/Diagnostic Charts.
- Diagnostic Trouble Code (DTC) Tree Charts with facing pages containing circuit diagrams, circuit operation information, and helpful diagnostic aids.
- Wiring Diagrams.
- Control Module Connector Terminal End View and Terminal Definitions.
- On-Vehicle Service.
- Part Names and Group Numbers.

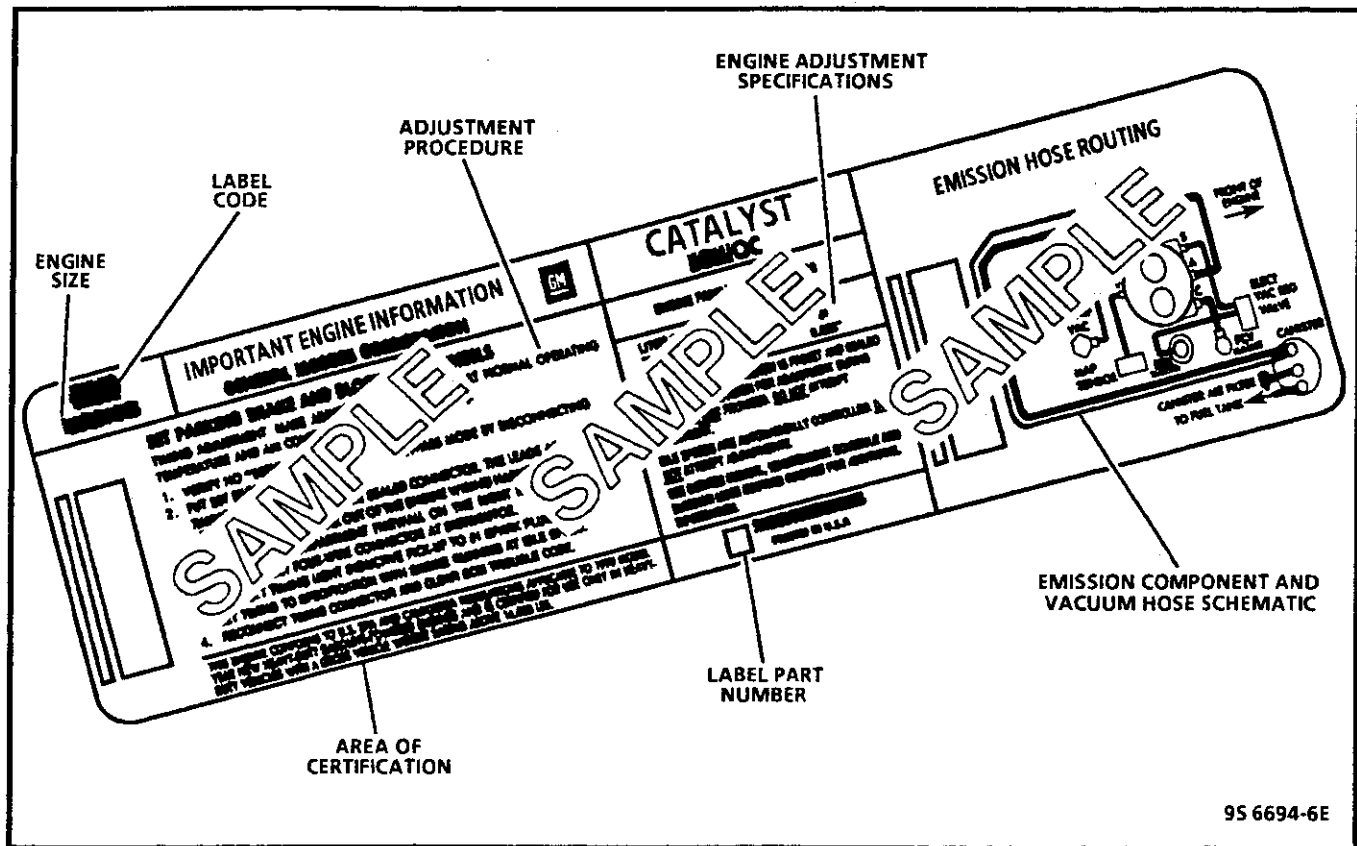


Figure 1-1 - Vehicle Emission Control Information Label

Section 4: Fuel System

The fuel system is controlled by a Powertrain Control Module (PCM) located in the passenger compartment. The basic function of the fuel system is to control fuel delivery to the engine under all operating conditions. Fuel is delivered to the injector nozzels by a fuel injection pump.

This section describes in detail the fuel system.

This section contains:

- Description and Details of Operation.
- Diagnosis and Repair of the Fuel System.
- Fuel Pressure Test Procedure.
- On-Vehicle Service.
- Part Names and Group Numbers.

Section 7: Glow Plug System

The glow plug system is used to assist in providing the heat required to begin combustion during engine starting at cold ambient temperatures. This system is used on all diesel engines and is controlled by the control module.

This section contains:

- Description and Details of Operation.
- Diagnosis Including System Check Chart.
- On-Vehicle Service.
- Part Names and Group Numbers.

Section 9: Exhaust Gas Recirculation (EGR) System

The EGR system uses a valve to feed a small amount of exhaust gas back into the intake manifold to control formation of NO_x. This system is used only on engines that require the system to meet emission standards, and is controlled by the control module.

This section contains:

- Description and Details of Operation.
- Diagnosis Including System Check Chart.
- On-Vehicle Service.
- Part Names and Group Numbers.

Section 10: Transmission Controls

The electronic 4L60E/4L80E transmission is controlled by the Powertrain Control Module (PCM), which controls all transmission and torque converter operations. Refer to SECTION 7A in the appropriate service manual.

This section contains:

- Description and Details of Operation.
- Diagnosis Including Functional Check.
- On-Vehicle Service.
- Part Names and Group Numbers.

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Section 11: Crankcase Ventilation System

The crankcase ventilation system used on diesel engines is designed to reduce the crankcase pressure at idle. The lower pressure reduces engine oil leaks.

This section contains:

- Description and Details of Operation.
- Diagnosis Including Functional Check.
- On-Vehicle Service.
- Part Names and Group Numbers.

Section 12: Air Intake System

The air intake system directs air through the air cleaner to the intake manifold. This system is not controlled by the control module.

This section contains:

- Description and Details of operation including the Air Cleaner.
- Diagnosis including functional check.
- On-Vehicle Service.
- Part Names and Group Numbers.

Section 13: Special Tools

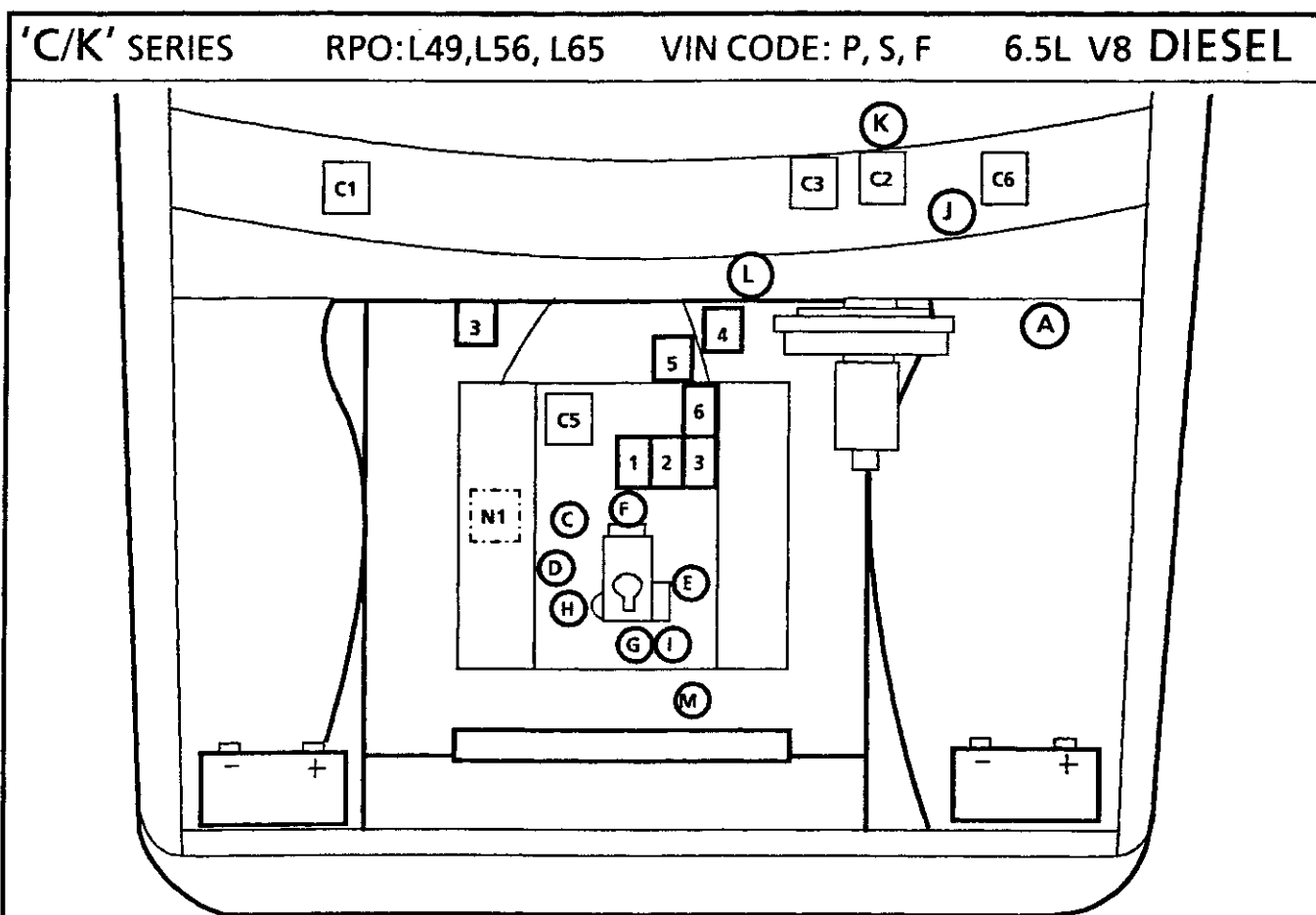
This section lists and briefly describes the use of the special tools required for diagnosis and repair of the diesel fuel and emission systems.

Section 14: Abbreviations and Glossary of Terms

This section list the abbreviations and acronyms used in this manual along with an explanation of each.

COMPONENT LOCATIONS

There are many components used to control fuel and emissions. Each system is described in a section which includes general description of the system, diagnosis and On-Vehicle Service. Component locations for all series vehicles and all engines are illustrated in the following figures. The "Component Location" views show all emission systems that may be used for the particular vehicle/engine combination. Not every vehicle requires all the systems or components shown, but only the ones needed to meet emission standards for the area of certification.



☐ **CONTROL MODULE SYSTEM**

- C1 Powertrain Control Module (PCM)
- C2 Data Link Connector (DLC)
- C3 Malfunction Indicator Lamp (MIL)
(Service Engine Soon)
- C5 PCM harness ground
- C6 Fuse block

☐ **PCM CONTROLLED COMPONENTS**

- 1 Boost solenoid
- 2 EGR solenoid
- 3 EGR vent solenoid
- 4 Transmission connector
- 5 Glow plug relay

☐ **PCM INFORMATION SENSORS**

- A EGR control pressure/BARO
- B Coolant Temp Sensor (ECT)
- C Intake Air Temp (IAT)
- D Boost sensor
- E Fuel solenoid driver
- F Fuel solenoid
- G High Resolution Sensor
- H Injection timing stepper motor
- I Engine shut off solenoid
- J Accelerator Pedal Position (APP) sensor
- K Cruise control
- L Output and vehicle speed sensors
- M Crankshaft position sensor

☐ **EMISSION COMPONENTS (NOT PCM CONTROLLED)**

- N1 Crankcase Depression Regulator (CDR)

Figure 1-2 - Component Locations - 6.5L Diesel

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