

GENERAL INFORMATION

How To Use The Engine Performance Section - 1989 & Newer Models

HOW TO USE THE ENGINE PERFORMANCE SECTION

Congratulations, you have purchased the most advanced automotive repair and service information available. This information can help you, as a professional automotive technician, to maintain top vehicle performance, and correct driveability problems on today's high-tech vehicles.

For your convenience and ease in use, all of our engine performance service and repair information is consistently organized by manufacturer, using a progressive diagnostic/workflow approach. Due to the differences in how each manufacturer approaches diagnosis and repair, once started and inside of an article, that manufacturer may drive the workflow in a direction other than what is outlined here.

The progressive diagnostic/workflow of our data is as follows:

- **APPLICATION** to identify vehicle and system usage.
- **EMISSION APPLICATION** to identify emission system usage.
- **SPECIFICATIONS** to quickly find an engine performance service specification.
- **ADJUSTMENTS** to perform engine performance related routine adjustments.
- **THEORY & OPERATION** to familiarize yourself with new systems and technologies.
- **BASIC DIAGNOSTIC PROCEDURES** located under **TESTING & DIAGNOSTICS**, also referred to as **BASIC TESTING**, is used for performing a basic vehicle inspection and is also the starting point for diagnosis of a "no-start" condition.
- **SELF-DIAGNOSTICS** located under **TESTING & DIAGNOSTICS**, also referred to as **TESTS W/CODES**, is where manufacturer specific procedures for retrieving, identifying and diagnosing DTCs (trouble codes) retained in a control modules memory are located.
- **TROUBLE SHOOTING - NO CODES** located under **TESTING & DIAGNOSTICS**, also referred to as **TESTS W/O CODES**, is where an engine performance problem that does not set a DTC can be potentially isolated through either a **SYMPTOM** or **INTERMITTENTS** duplication procedure.
- **SYSTEM & COMPONENT TESTING** located under **TESTING & DIAGNOSTICS**, also referred to as **SYSTEM/COMPONENT TESTS**, once directed to this article, specific system and component tests can be performed to help isolate faulty component/system prior to replacement.
- **PIN VOLTAGE CHARTS** provide supplemental information to help determine correct control module input and output signals. Pin charts may also be referred to as **PID** charts by some manufacturers.
- **SENSOR RANGE CHARTS** help determine if a sensor is out of calibration. In some cases an out-of-calibration sensor will not set a DTC (trouble code), resulting in difficult to diagnose driveability symptoms.
- **VACUUM DIAGRAMS** help determine correct routing of vacuum hoses when reinstalling components or performing emission inspections.
- **REMOVE, OVERHAUL & INSTALL** provides procedures necessary for removing and installing engine performance related components.

- **WIRING DIAGRAMS** can be used to identify circuits, terminals, wire colors and components referenced in testing procedures. **NEW COLOR WIRING DIAGRAMS** (system diagrams) provide an easy method of identifying and tracing circuits.

APPLICATION

INTRODUCTION/ENGINE/VIN ID

Here you will find out how to identify an engine by its Vehicle Identification Number (VIN). The manufacturer's **MODEL COVERAGE** chart lists each model and engine option, the fuel system, ignition system and engine code. Engine serial number locations are also shown here, as well as the VIN code breakdown. Using model lookup in conjunction with VIN and engine ID will identify application information necessary for servicing vehicle and ordering parts.

EMISSION APPLICATIONS

EMISSION APPLICATION TABLES

Here you will find a chart listing what emission control devices apply to each model. This can be helpful when performing government-required emissions inspections. For quick reference, major emission systems and devices are listed in bold type in the emission table. Sub components are listed in light type.

SPECIFICATIONS

SERVICE & ADJUSTMENT SPECIFICATIONS

If you want a specification quickly, this is the place to look. Instead of hunting through a long article, we've separated out the important specifications and arranged them into easy-to-use tables in a centralized location. You can find valuable information like spark plug wire resistance, valve clearance, timing, firing orders, etc.

ADJUSTMENT

ON-VEHICLE ADJUSTMENTS

The **ON-VEHICLE ADJUSTMENTS** article contains the type of information that was previously thought of as **TUNE-UP** information. Procedures for checking and adjusting valves, base ignition timing and idle speed are found in this section. Use this section in conjunction with **SERVICE & ADJUSTMENT SPECIFICATIONS** for performing routine maintenance. Also, if you have a driveability problem, ensure all on-vehicle adjustments are within specification before attempting further diagnosis.

THEORY & OPERATION

This article covers basic **THEORY & OPERATION** of engine performance-related systems and components. Before diagnosing vehicles or new systems with which you are not completely familiar, read this article.

TESTING & DIAGNOSTICS

BASIC DIAGNOSTIC PROCEDURES/BASIC TESTING

The procedures listed in this article can help you avoid skipping a simple step early, like checking base timing, which could be costly in both time and money later. This is also a potential starting point for diagnosis of a "no-start" condition. If all systems check out okay here, proceed to SELF-DIAGNOSTICS/TESTS W/CODES or TROUBLE SHOOTING - NO CODES/TESTS W/O CODES article.

SELF-DIAGNOSTICS/TESTS W/CODES

Use this information to retrieve and interpret Diagnostic Trouble Codes (DTCs) accessed from the vehicle's self-diagnostic system. Once information is retrieved, manufacturer diagnostic procedures are given to help pinpoint and repair computer system/component faults. Also included are steps for clearing trouble codes once these faults are repaired. If there is a driveability symptom with no trouble codes set, proceed to TROUBLE SHOOTING - NO CODES/TESTS W/O CODES article.

TROUBLE SHOOTING - NO CODES/TESTS W/O CODES

This is where to go when you have a problem that does not set a trouble code. It can help determine cause of problem using driveability symptoms and intermittent testing procedures. Procedures in this information should lead you to a specific component or system test.

SYSTEM & COMPONENT TESTING

Here you will find various tests for engine performance systems and their components, such as air induction (turbochargers and superchargers), fuel control, ignition control and emission systems.

PIN VOLTAGE CHARTS

These are supplied (when available from manufacturer) to quicken the diagnostic process. By checking pin voltages at the Powertrain Control Module (PCM), you can determine if the PCM is receiving and/or transmitting proper voltage signals. Pin charts may also be referred to as PID charts by some manufacturers.

SENSOR RANGE CHARTS

SENSOR OPERATING RANGE CHARTS

These are supplied (when available from manufacturer) to determine if a sensor is out of calibration. An out-of-calibration sensor may not set a trouble code, but it may cause driveability problems.

VACUUM DIAGRAMS

Here we give you underhood views or schematics of vacuum-hose routing which can help you find incorrectly routed hoses. Remember, a vacuum leak or incorrectly routed vacuum hose on computer-controlled vehicle can cause many driveability problems.

REMOVAL, OVERHAUL & INSTALLATION

After you've diagnosed the problem, this is where to go for the nuts-and-bolts of the job. Here you'll find procedures and specifications for removing, overhauling (if available) and installing components.

WIRING DIAGRAMS - ENGINE PERFORMANCE

NOTE: Mitchell's "system" wiring diagrams have been recently enhanced to include **COLORS**. This will enable you to more easily trace a circuit from its source to its destination, without losing your circuit due to parallel or intersecting lines. Using these diagrams, you can easily identify and trace component circuits, to help locate shorts and opens in circuits. These diagrams can also help you understand how individual circuits function within a system.

2002 & EARLIER

On 2002 and earlier models, once ENGINE PERFORMANCE is selected as the service category, the expanded menu will display a WIRING DIAGRAMS - ENGINE PERFORMANCE heading. Once the wiring diagrams article is selected, select the engine performance wiring diagrams for your lookup model.

2003 & LATER

On models newer than 2002, we have moved all wiring diagrams under a centralized first level model-specific lookup titled WIRING DIAGRAMS-ALL. When selected, SYSTEM WIRING DIAGRAMS article will display in the center panel. This article contains all available wiring diagrams related to the selected vehicle. These same wiring diagrams can also be found under the ELECTRICAL/WIRING DIAGRAMS heading.

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