MATCO TOOLS

MD60b

CodeAdvisor™
DIGITAL CODE READER

• Operating Instructions • Safety Information

FEATURES AND BENEFITS

The easiest and best way to troubleshoot 1996 and newer OBD2 vehicles.
Links to all OBD2 protocols to decode "Check Engine" light problems.
Retrieves generic and manufacturer specific codes.
Displays Freeze Frame Data.

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SAFETY FIRST!

This manual describes common test procedures used by experienced service technicians. Many test procedures require precautions to avoid accidents that can result in personal injury, and/or damage to your vehicle or test equipment. Always read your vehicle's service manual and follow its safety precautions before and during any test or service procedure. **ALWAYS** observe the following general safety precautions:

When an engine is running, it produces carbon monoxide, a toxic and poisonous gas. To prevent serious injury or death from carbon monoxide poisoning, operate the vehicle **ONLY** in a **well-ventilated** area.

To protect your eyes from propelled objects as well as hot or caustic liquids, **always** wear **approved** safety eye protection.

When an engine is running, many parts (such as the coolant fan, pulleys, fan belt etc.) turn at high speed. To avoid serious injury, always be aware of moving parts. Keep a safe distance from these parts as well as other potentially moving objects.

Engine parts become very hot when the engine is running. To prevent severe burns, avoid contact with hot engine parts.

Before starting an engine for testing or trouble-shooting, make sure the parking brake is engaged. Put the transmission in **park** (for automatic transmission) or **neutral** (for manual transmission). Block the drive wheels with suitable blocks.

Connecting or disconnecting test equipment when the ignition is **ON** can damage test equipment and the vehicle's electronic components. Turn the ignition **OFF** before connecting the Code Reader to or disconnecting the Code Reader from the vehicle's Data Link Connector (DLC).

To prevent damage to the on-board computer when taking vehicle electrical measurements, always use a digital multimeter with at least 10 MegOhms of impedance.

The vehicle's battery produces highly flammable hydrogen gas. To prevent an explosion, keep all sparks, heated items and open flames away from the battery.

Don't wear loose clothing or jewelry when working on an engine. Loose clothing can become caught in the fan, pulleys, belts, etc. Jewelry is highly conductive, and can cause a severe burn if it makes contact between a power source and ground.

CONTROLS AND INDICATORS

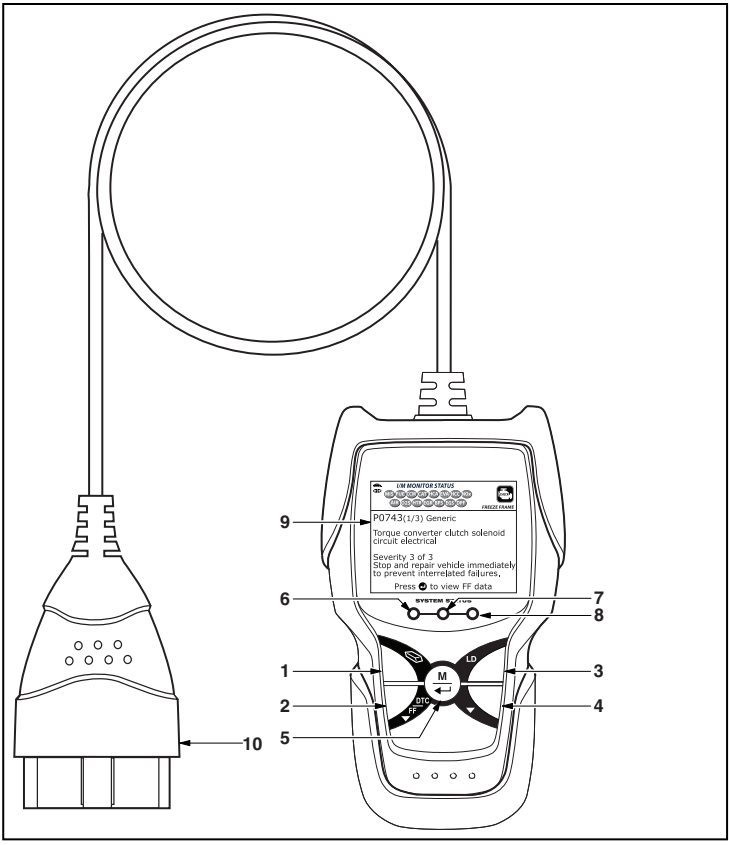


Figure 1. Controls and Indicators

See Figure 1 for the locations of items 1 through 9, below.

1. **ERASE button** - Erases Diagnostic Trouble Codes (DTCs) and "Freeze Frame" data from your vehicle's computer, and resets Monitor status.
2. **DTC/FF button** – Displays the OBD2 DTC View screen and/or scrolls the LCD display to view DTCs.
3. **LD button** – When pressed while linked to a vehicle, places the Scan Tool in Live Data mode.
4. **▼ DOWN button** - When in MENU mode, scrolls down through the menu options. When LINKED to a vehicle, scrolls down through the current display screen to display any additional data.

5. **MENU/ENTER button** - Press and hold to display the Main Menu. When in Menu mode, press to confirm the selected option or value. When viewing the "Priority" code, press to view Freeze Frame data.
6. **GREEN LED** - Indicates that all engine systems are running normally (all Monitors on the vehicle are active and performing their diagnostic testing, and no DTCs are present).
7. **YELLOW LED** - Indicates there is a possible problem. A "Pending" DTC is present and/or some of the vehicle's emission monitors have not run their diagnostic testing.
8. **RED LED** - Indicates there is a problem in one or more of the vehicle's systems. The red LED is also used to show that DTC(s) are present. DTCs are shown on the Scan Tool's LCD display. In this case, the Malfunction Indicator ("Check Engine") lamp on the vehicle's instrument panel will light steady on.
9. **Display** - Displays test results, Scan Tool functions and Monitor status information. See DISPLAY FUNCTIONS, below, for details.
10. **CABLE** - Connects the Scan Tool to the vehicle's Data Link Connector (DLC).

DISPLAY FUNCTIONS

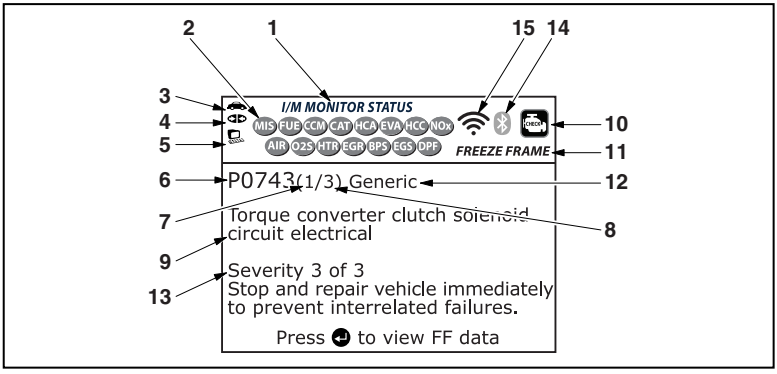


Figure 2. Display Functions

See Figure 2 for the locations of items 1 through 15, below.

1. **I/M MONITOR STATUS field** - Identifies the I/M Monitor status area.
2. **Monitor icons** - Indicate which Monitors are supported by the vehicle under test, and whether or not the associated Monitor has run its diagnostic testing (Monitor status).
   - A solid green icon indicates the Monitor has completed both "Since DTCs Cleared" and "This Driving Cycle" testing.
   - A flashing red icon indicates the Monitor has not completed "Since DTCs Cleared" testing.

- A flashing green/gray icon indicates the Monitor has not completed "This Driving Cycle" testing.
- A flashing red/gray icon indicates the Monitor has been disable for "This Driving Cycle."

3. **Vehicle icon** - When visible, indicates that the scan tool is being powered through the vehicle's DLC connector.
4. **Link icon** - When visible, indicates the scan tool is communicating with the vehicle's computer.
5. **Computer icon** - When visible, indicates the scan tool is linked to a personal computer.
6. **DTC Display Area** - Displays the Diagnostic Trouble Code (DTC) number. Each fault is assigned a code number that is specific to that fault. The DTC number is color-coded as follows:
   - **RED** - Indicates the currently displayed DTC is a STORED or PERMANENT DTC.
   - **YELLOW** - Indicates the currently displayed DTC is a PENDING DTC.
   - **GREEN** - In cases where no codes are retrieved, a "No DTCs are presently stored in the vehicle's computer" message is shown in green.
7. **Code Number Sequence** - The scan tool assigns a sequence number to each DTC that is present in the computer's memory, starting with "1." This number indicates which code is currently displayed. Code number "1" is always the highest priority code, and the one for which "Freeze Frame" data has been stored.

If "1" is a "Pending" code, there may or may not be "Freeze Frame" data stored in memory.

8. **Code Enumerator** - Indicates the total number of codes retrieved from the vehicle's computer.
9. **Test Data Display Area** - Displays DTC definitions, Freeze Frame data and other pertinent test information messages.
10. **SYSTEM icon** - Indicates the system with which the code is associated:

    MIL icon

11. **FREEZE FRAME icon** - Indicates that there is Freeze Frame data from "Priority Code" (Code #1) stored in the vehicle's computer memory.
12. **Code type** - Indicates the type of code being displayed; **Generic Stored**, **Generic Pending**, **Generic permanent**, etc.
13. **Severity** - Indicates the level of severity for the priority code (code number "1"), as follows:

    1 - Service should be scheduled and repairs made when convenient. This DTC typically has no immediate threat to essential system components in the short term.

2 - Repair immediately if drivability issues are present. Threat to essential system components if not repaired as soon as possible.

3 - Stop and repair vehicle immediately to prevent interrelated failures. Harmful and damaging to essential system components.

14. **Bluetooth icon** – Indicates communication status with a compatible mobile application (please visit matco.carscan.com for more information). A solid blue icon indicates an active Bluetooth connection has been established. A solid grey icon indicates Bluetooth is not connected.

15. **WiFi icon** – Indicates WiFi communication status. When ON, indicates the scan tool is linked to a WiFi network. When OFF, indicates there is no WiFi connection.

INITIAL ADJUSTMENTS

The first time the unit is connected to a vehicle, you must select the desired display language (English, French or Spanish), unit of measurement (USA or Metric) and Smog Check or I/M Program Location as follows:

1. Select the desired display language, then press **MENU/ENTER** ↵.

- The Select Unit screen displays.

2. Select the desired unit of measurement, then press **MENU/ENTER** ↵.

- The Select Smog Check or I/M Program Location screen displays.

3. Select the appropriate location from the options provided, then press **MENU/ENTER** ↵. If you *do not* wish to specify a Select Smog Check or I/M Program Location at this time, select **Exit**, then press **MENU/ENTER** ↵.

- The Version Information screen displays briefly, then the Scan Tool begins communication with the vehicle.

After the initial language, unit of measurement and Smog Check or I/M Program Location selections are performed, these, as well as other settings, can be changed as desired. Proceed to Additional Functions on page 33 for further instructions.

COMPUTER ENGINE CONTROLS

The Introduction of Electronic Engine Controls

Electronic Computer Control Systems make it possible for vehicle manufacturers to comply with the tougher emissions and fuel efficiency standards mandated by State and Federal Governments.

As a result of increased air pollution (smog) in large cities, such as Los Angeles, the California Air Resources Board (**CARB**) and the Environmental Protection Agency (**EPA**) set new regulations and air pollution standards to deal with the problem. To further complicate matters, the energy crisis of the early 1970s caused a sharp increase in fuel prices over a short period. As a result, vehicle manufacturers were not only required to comply with the new emissions standards, they also had to make their vehicles more fuel-efficient. Most vehicles were required to meet a miles-per-gallon (MPG) standard set by the U.S. Federal Government.

Precise fuel delivery and spark timing are needed to reduce vehicle emissions. Mechanical engine controls in use at the time (such as ignition points, mechanical spark advance and the carburetor) responded too slowly to driving conditions to properly control fuel delivery and spark timing. This made it difficult for vehicle manufacturers to meet the new standards.

A new Engine Control System had to be designed and integrated with the engine controls to meet the stricter standards. The new system had to:

- Respond instantly to supply the proper mixture of air and fuel for any driving condition (idle, cruising, low-speed driving, high-speed driving, etc.).
- Calculate instantly the best time to “ignite” the air/fuel mixture for maximum engine efficiency.
- Perform both these tasks without affecting vehicle performance or fuel economy.

Vehicle Computer Control Systems can perform millions of calculations each second. This makes them an ideal substitute for the slower mechanical engine controls. By switching from mechanical to electronic engine controls, vehicle manufacturers are able to control fuel delivery and spark timing more precisely. Some newer Computer Control Systems also provide control over other vehicle functions, such as transmission, brakes, charging, body, and suspension systems.

The Basic Engine Computer Control System

The Computer Control System consists of an on-board computer and several related control devices (sensors, switches, and actuators).

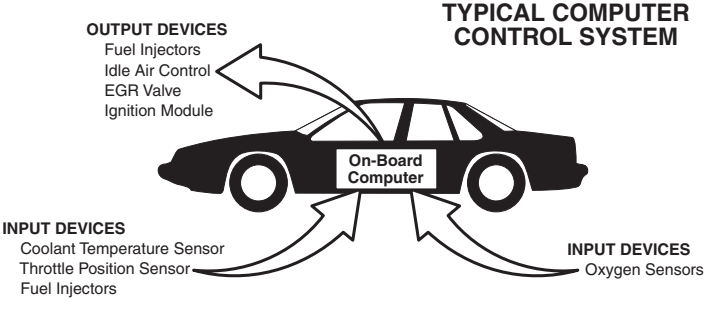
The on-board computer is the heart of the Computer Control System. The computer contains several programs with preset reference values for air/fuel ratio, spark or ignition timing, injector pulse width, engine speed, etc. Separate values are provided for various driving conditions, such as idle, low speed driving, high-speed driving, low load, or high load. The preset reference values represent the ideal air/fuel mixture, spark timing, transmission gear selection, etc., for any driving condition. These values are programmed by the vehicle manufacturer, and are specific to each vehicle model.

Most on-board computers are located inside the vehicle behind the dashboard, under the passenger's or driver's seat, or behind the right kick panel. However, some manufacturers may still position it in the engine compartment.

Vehicle sensors, switches, and actuators are located throughout the engine, and are connected by electrical wiring to the on-board computer. These devices include oxygen sensors, coolant temperature sensors, throttle position sensors, fuel injectors, etc. Sensors and switches are **input devices**. They provide signals representing current engine operating conditions to the computer. Actuators are **output devices**. They perform actions in response to commands received from the computer.

The on-board computer receives information inputs from sensors and switches located throughout the engine. These devices monitor critical engine conditions such as coolant temperature, engine speed, engine load, throttle position, air/fuel ratio etc.

The computer compares the values received from these sensors with its preset reference values, and makes corrective actions as needed so that the sensor values always match the preset reference values for the current driving condition. The computer makes adjustments by commanding other devices such as the fuel injectors, idle air control, EGR valve or Ignition Module to perform these actions.



Vehicle operating conditions are constantly changing. The computer continuously makes adjustments or corrections (especially to the air/fuel mixture and spark timing) to keep all the engine systems operating within the preset reference values.

On-Board Diagnostics - First Generation (OBD1)

With the exception of some 1994 and 1995 vehicles, most vehicles from 1982 to 1995 are equipped with some type of first generation On-Board Diagnostics.

Beginning in 1988, California's Air Resources Board (**CARB**), and later the Environmental Protection Agency (**EPA**) required vehicle manufacturers to include a self-diagnostic program in their on-board computers. The program would be capable of identifying emissions-related faults in a system. The first generation of Onboard Diagnostics came to be known as **OBD1**.

OBD1 is a set of self-testing and diagnostic instructions programmed into the vehicle's on-board computer. The programs are specifically designed to detect failures in the sensors, actuators, switches and wiring of the various vehicle emissions-related systems. If the computer detects a failure in any of these components or systems, it lights an indicator on the dashboard to alert the driver. The indicator lights **only** when an emissions-related problem is detected.

The computer also assigns a numeric code for each specific problem that it detects, and stores these codes in its memory for later retrieval. These codes can be retrieved from the computer's memory with the use of a "Code Reader" or a "Scan Tool."

On-Board Diagnostics - Second Generation (OBD2)

The OBD2 System is an enhancement of the OBD1 System.

In addition to performing all the functions of the OBD1 System, the OBD2 System has been enhanced with new Diagnostic Programs. These programs closely monitor the functions of various emissions-related components and systems (as well as other systems) and make this information readily available (with the proper equipment) to the technician for evaluation.

The California Air Resources Board (**CARB**) conducted studies on OBD1 equipped vehicles. The information that was gathered from these studies showed the following:

- A large number of vehicles had deteriorating or degraded emissions-related components. These components were causing an increase in emissions.

- Because OBD1 systems only detect failed components, the degraded components were not setting codes.
- Some emissions problems related to degraded components only occur when the vehicle is being driven under a load. The emission checks being conducted at the time were not performed under simulated driving conditions. As a result, a significant number of vehicles with degraded components were passing Emissions Tests.
- Codes, code definitions, diagnostic connectors, communication protocols and emissions terminology were different for each manufacturer. This caused confusion for the technicians working on different make and model vehicles.

To address the problems made evident by this study, CARB and the EPA passed new laws and standardization requirements. These laws required that vehicle manufacturers to equip their new vehicles with devices capable of meeting all of the new emissions standards and regulations. It was also decided that an enhanced on-board diagnostic system, capable of addressing all of these problems, was needed. This new system is known **as "On-Board Diagnostics Generation Two (OBD2)**." The primary objective of the OBD2 system is to comply with the latest regulations and emissions standards established by CARB and the EPA.

The Main Objectives of the OBD2 System are:

- To detect degraded and/or failed emissions-related components or systems that could cause tailpipe emissions to exceed by 1.5 times the Federal Test Procedure (FTP) standard.
- To expand emissions-related system monitoring. This includes a set of computer run diagnostics called Monitors. Monitors perform diagnostics and testing to verify that all emissions-related components and/or systems are operating correctly and within the manufacturer's specifications.
- To use a standardized Diagnostic Link Connector (DLC) in all vehicles. (Before OBD2, DLCs were of different shapes and sizes.)
- To standardize the code numbers, code definitions and language used to describe faults. (Before OBD2, each vehicle manufacturer used their own code numbers, code definitions and language to describe the same faults.)
- To expand the operation of the Malfunction Indicator Lamp (MIL).
- To standardize communication procedures and protocols between the diagnostic equipment (Scan Tools, Code Readers, etc.) and the vehicle's on-board computer.

OBD2 Terminology

The following terms and their definitions are related to OBD2 systems. Read and reference this list as needed to aid in the understanding of OBD2 systems.

- **Powertrain Control Module (PCM)** - The PCM is the OBD2 accepted term for the vehicle's "on-board computer." In addition to controlling the engine management and emissions systems, the PCM also participates in controlling the powertrain (transmission) operation. Most PCMs also have the ability to communicate with other computers on the vehicle (ABS, ride control, body, etc.).
- **Monitor** - Monitors are "diagnostic routines" programmed into the PCM. The PCM utilizes these programs to run diagnostic tests, and to monitor operation of the vehicle's emissions-related components or systems to ensure they are operating correctly and within the vehicle's manufacturer specifications. Currently, up to fifteen Monitors are used in OBD2 systems. Additional Monitors will be added as the OBD2 system is further developed.

Not all vehicles support all fifteen Monitors.

- **Enabling Criteria** - Each Monitor is designed to test and monitor the operation of a specific part of the vehicle's emissions system (EGR system, oxygen sensor, catalytic converter, etc.). A specific set of "conditions" or "driving procedures" must be met before the computer can command a Monitor to run tests on its related system. These "conditions" are known as "**Enabling Criteria**." The requirements and procedures vary for each Monitor. Some Monitors only require the ignition key to be turned "**On**" for them to run and complete their diagnostic testing. Others may require a set of complex procedures, such as, starting the vehicle when cold, bringing it to operating temperature, and driving the vehicle under specific conditions before the Monitor can run and complete its diagnostic testing.
- **Monitor Has/Has Not Run** - The terms "Monitor has run" or "Monitor has not run" are used throughout this manual. "**Monitor <u>has</u> run**," means the PCM **has** commanded a particular Monitor to perform the required diagnostic testing on a system to ensure the system is operating correctly (within factory specifications). The term "**Monitor <u>has not</u> run**" means the PCM **has not** yet commanded a particular Monitor to perform diagnostic testing on its associated part of the emissions system.
- **Trip** - A Trip for a particular Monitor requires that the vehicle is being driven in such a way that all the required "Enabling Criteria" for the Monitor to run and complete its diagnostic testing are met. The "Trip Drive Cycle" for a particular Monitor begins when the ignition key is turned "**On**." It is successfully completed when all the "Enabling Criteria" for the Monitor to run and complete its diagnostic testing are met by the time the ignition key is turned "**Off**." Since each of the fifteen monitors is designed to run diagnostics and testing on a different part of the engine or emissions system, the "Trip Drive Cycle" needed for each individual Monitor to run and complete varies.

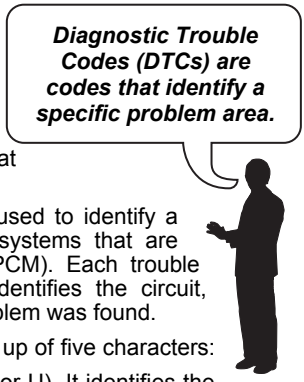
- **OBD2 Drive Cycle** - An OBD2 Drive Cycle is an extended set of driving procedures that takes into consideration the various types of driving conditions encountered in real life. These conditions may include starting the vehicle when it is cold, driving the vehicle at a steady speed (cruising), accelerating, etc. An OBD2 Drive Cycle begins when the ignition key is turned "On" (when cold) and ends when the vehicle has been driven in such a way as to have all the "Enabling Criteria" met for all its applicable Monitors. Only those trips that provide the Enabling Criteria for all Monitors applicable to the vehicle to run and complete their individual diagnostic tests qualify as an OBD2 Drive Cycle. OBD2 Drive Cycle requirements vary from one model of vehicle to another. Vehicle manufacturers set these procedures. Consult your vehicle's service manual for OBD2 Drive Cycle procedures.

Do not confuse a "Trip" Drive Cycle with an OBD2 Drive Cycle. A "Trip" Drive Cycle provides the "Enabling Criteria" for one specific Monitor to run and complete its diagnostic testing. An OBD2 Drive Cycle must meet the "Enabling Criteria" for all Monitors on a particular vehicle to run and complete their diagnostic testing.

- **Warm-up Cycle** - Vehicle operation after an engine off period where engine temperature rises at least 40°F (22°C) from its temperature before starting, and reaches at least 160°F (70°C). The PCM uses warm-up cycles as a counter to automatically erase a specific code and related data from its memory. When no faults related to the original problem are detected within a specified number of warm-up cycles, the code is erased automatically.

DIAGNOSTIC TROUBLE CODES (DTCs)

Diagnostic Trouble Codes (DTCs) are meant to guide you to the proper service procedure in the vehicle's service manual. **DO NOT** replace parts based only on DTCs without first consulting the vehicle's service manual for proper testing procedures for that particular system, circuit or component.



DTCs are alphanumeric codes that are used to identify a problem that is present in any of the systems that are monitored by the on-board computer (PCM). Each trouble code has an assigned message that identifies the circuit, component or system area where the problem was found.

OBD2 diagnostic trouble codes are made up of five characters:

- The 1st character is a **letter** (B, C, P or U). It identifies the "main system" where the fault occurred (Body, Chassis, Powertrain, or Network).
- The 2nd character is a **numeric digit** (0 thru 3). It identifies the "type" of code (Generic or Manufacturer-Specific).

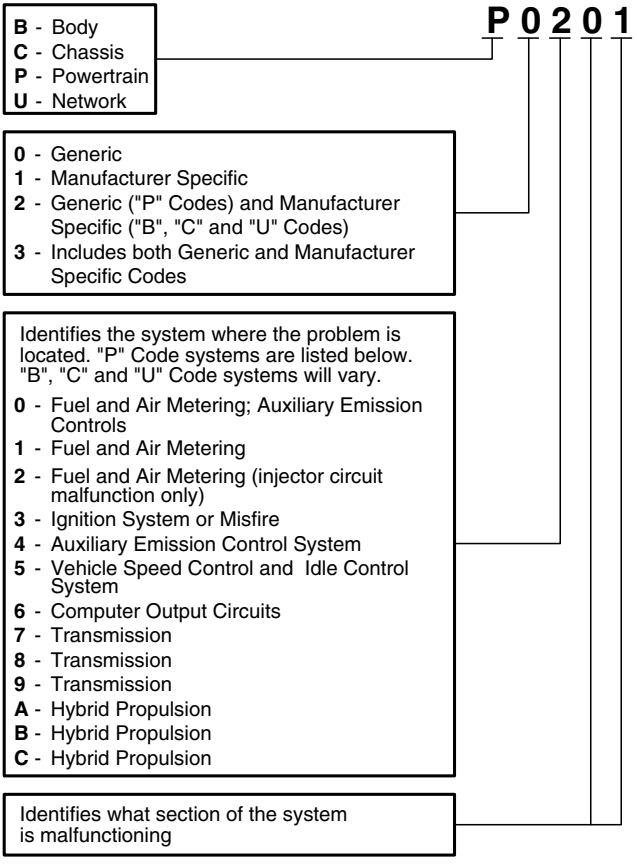
***Generic DTCs** are codes that are used by all vehicle manufacturers. The standards for generic DTCs, as well as their definitions, are set by the Society of Automotive Engineers (SAE).*

Manufacturer-Specific DTCs *are codes that are controlled by the vehicle manufacturers. The Federal Government does not require vehicle manufacturers to go beyond the standardized generic DTCs in order to comply with the new OBD2 emissions standards. However, manufacturers are free to expand beyond the standardized codes to make their systems easier to diagnose.*

- The 3rd character is a **letter** or a **numeric digit** (0 thru 9, A thru F). It identifies the specific system or sub-system where the problem is located.
- The 4th and 5th characters are **letters** or **numeric digits** (0 thru 9, A thru F). They identify the section of the system that is malfunctioning.

OBD2 DTC EXAMPLE

P0201 - Injector Circuit Malfunction, Cylinder 1



DTCs and MIL Status

When the vehicle's on-board computer detects a failure in an emissions-related component or system, the computer's internal diagnostic program assigns a diagnostic trouble code (DTC) that points to the system (and subsystem) where the fault was found. The diagnostic program saves the code in the computer's memory. It records a "Freeze Frame" of conditions present when the fault was found, and lights the Malfunction Indicator Lamp (MIL). Some faults require detection for two trips in a row before the MIL is turned on.

The "Malfunction Indicator Lamp" (MIL) is the accepted term used to describe the lamp on the dashboard that lights to warn the driver that an emissions-related fault has been found. Some manufacturers may still call this lamp a "Check Engine" or "Service Engine Soon" light.

There are two types of DTCs used for emissions-related faults: Type "A" and Type "B." Type "A" codes are "One-Trip" codes; Type "B" DTCs are usually Two-Trip DTCs.

When a **Type "A"** DTC is found on the First Trip, the following events take place:

- The computer commands the MIL "On" when the failure is first found.
- If the failure causes a severe misfire that may cause damage to the catalytic converter, the MIL "flashes" **once per second**. The MIL continues to flash as long as the condition exists. If the condition that caused the MIL to flash is no longer present, the MIL will light "steady" On.
- A DTC is saved in the computer's memory for later retrieval.
- A "Freeze Frame" of the conditions present in the engine or emissions system when the MIL was ordered "On" is saved in the computer's memory for later retrieval. This information shows fuel system status (closed loop or open loop), engine load, coolant temperature, fuel trim value, MAP vacuum, engine RPM and DTC priority.

When a **Type "B"** DTC is found on the First Trip, the following events take place:

- The computer sets a Pending DTC, but the MIL is not ordered "On." "Freeze Frame" data may or may not be saved at this time depending on manufacturer. The Pending DTC is saved in the computer's memory for later retrieval.
- If the failure **is found** on the second consecutive trip, the MIL is ordered "On." "Freeze Frame" data is saved in the computer's memory.
- If the failure **is not found** on the second Trip, the Pending DTC is erased from the computer's memory.

The MIL will stay lit for both Type "A" and Type "B" codes until one of the following conditions occurs:

- If the conditions that caused the MIL to light are no longer present for the next three trips in a row, the computer automatically turns the MIL "Off" if no other emissions-related faults are present. However, the DTCs remain in the computer's memory as a history code for 40 warm-up cycles (80 warm-up cycles for fuel and misfire faults). The DTCs are automatically erased if the fault that caused them to be set is not detected again during that period.
- Misfire and fuel system faults require three trips with "similar conditions" before the MIL is turned "Off." These are trips where the engine load, RPM and temperature are similar to the conditions present when the fault was first found.

After the MIL has been turned off, DTCs and Freeze Frame data stay in the computer's memory.

- Erasing the DTCs from the computer's memory can also turn off the MIL. See ERASING DIAGNOSTIC TROUBLE CODES (DTCs) on page 28, before erasing codes from the computer's memory. If a Diagnostic Tool or Scan Tool is used to erase the codes, Freeze Frame data will also be erased.

OBD2 MONITORS

To ensure the correct operation of the various emissions-related components and systems, a diagnostic program was developed and installed in the vehicle's on-board computer. The program has several procedures and diagnostic strategies. Each procedure or diagnostic strategy is made to monitor the operation of, and run diagnostic tests on, a specific emissions-related component or system. These tests ensure the system is running correctly and is within the manufacturer's specifications. On OBD2 systems, these procedures and diagnostic strategies are called "Monitors."

Currently, fifteen Monitors are supported by OBD2 systems. Additional monitors may be added as a result of Government regulations as the OBD2 system grows and matures. Not all vehicles support all fifteen Monitors. Additionally, some Monitors are supported by "spark ignition" vehicles only, while others are supported by "compression ignition" vehicles only.

Monitor operation is either "**Continuous**" or "**Non-Continuous**," depending on the specific monitor.

Continuous Monitors

Three of these Monitors are designed to constantly monitor their associated components and/or systems for proper operation. Continuous Monitors run constantly when the engine is running. The Continuous Monitors are:

CCM Comprehensive Component Monitor (CCM)

MIS Misfire Monitor

FUE Fuel System Monitor

Non-Continuous Monitors

The other twelve Monitors are "non-continuous" Monitors. "Non-continuous" Monitors perform and complete their testing once per trip. The "non-continuous" Monitors are:

O2S Oxygen Sensor Monitor

HTR Oxygen Sensor Heater Monitor

CAT Catalyst Monitor

HCA Heated Catalyst Monitor

EGR EGR System Monitor

EVA EVAP System Monitor

AIR Secondary Air System Monitor

The following Monitors became standard beginning in 2010. The majority of vehicles produced before this time will not support these Monitors

HCC NMHC Monitor

NOx NOx Adsorber Monitor

BPS Boost Pressure System Monitor

EGS Exhaust Gas Sensor Monitor

DPF PM Filter Monitor

The following provides a brief explanation of the function of each Monitor:

CCM **Comprehensive Component Monitor (CCM)** - This Monitor continuously checks all inputs and outputs from sensors, actuators, switches and other devices that provide a signal to the computer. The Monitor checks for shorts, opens, out of range value, functionality and "rationality."

Rationality: Each input signal is compared against all other inputs and against information in the computer's memory to see if it makes sense under the current operating conditions. Example: The signal from the throttle position sensor indicates the vehicle is in a wide-open throttle condition, but the vehicle is really at idle, and the idle condition is confirmed by the signals from all other sensors. Based on the input data, the computer determines that the signal from the throttle position sensor is not rational (does not make sense when compared to the other inputs). In this case, the signal would fail the rationality test.

The CCM is supported by both "spark ignition" vehicles and "compression ignition" vehicles. The CCM may be either a "One-Trip" or a "Two-Trip" Monitor, depending on the component.

Fuel System Monitor - This Monitor uses a Fuel System Correction program, called Fuel Trim, inside the on-board computer. Fuel Trim is a set of positive and negative values that represent adding or subtracting fuel from the engine. This program is used to correct for a lean (too much air/not enough fuel) or rich (too much fuel/not enough air) air-fuel mixture. The program is designed to add or subtract fuel, as needed, up to a certain percent. If the correction needed is too large and exceeds the time and percent allowed by the program, a fault is indicated by the computer.

The Fuel System Monitor is supported by both “spark ignition” vehicles and “compression ignition” vehicles. The Fuel System Monitor may be a “One-Trip” or “Two-Trip” Monitor, depending on the severity of the problem.

Misfire Monitor - This Monitor continuously checks for engine misfires. A misfire occurs when the air-fuel mixture in the cylinder does not ignite. The misfire Monitor uses changes in crankshaft speed to sense an engine misfire. When a cylinder misfires, it no longer contributes to the speed of the engine, and engine speed decreases each time the affected cylinder(s) misfire. The misfire Monitor is designed to sense engine speed fluctuations and determine from which cylinder(s) the misfire is coming, as well as how bad the misfire is. There are three types of engine misfires, Types 1, 2, and 3.

- Type 1 and Type 3 misfires are two-trip monitor faults. If a fault is sensed on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The MIL is not commanded on at this time. If the fault is found again on the second trip, under similar conditions of engine speed, load and temperature, the computer commands the MIL “On,” and the code is saved in its long term memory.
- Type 2 misfires are the most severe type of misfire. When a Type 2 misfire is sensed on the first trip, the computer commands the MIL to light when the misfire is sensed. If the computer determines that a Type 2 misfire is severe , and may cause catalytic converter damage, it commands the MIL to “flash” once per second as soon as the misfire is sensed. When the misfire is no longer present, the MIL reverts to steady “On” condition.

The Misfire Monitor is supported by both “spark ignition” vehicles and “compression ignition” vehicles.

Catalyst Monitor - The catalytic converter is a device that is installed downstream of the exhaust manifold. It helps to oxidize (burn) the unburned fuel (hydrocarbons) and partially burned fuel (carbon monoxide) left over from the combustion process. To accomplish this, heat and catalyst materials inside the converter react with the exhaust gases to burn the remaining fuel. Some materials inside the catalytic converter also have the ability to store oxygen, and release it as needed to oxidize hydrocarbons and carbon monoxide. In the process, it reduces vehicle emissions by converting the polluting gases into carbon dioxide and water.

The computer checks the efficiency of the catalytic converter by monitoring the oxygen sensors used by the system. One sensor is located before (upstream of) the converter; the other is located after (downstream

of) the converter. If the catalytic converter loses its ability to store oxygen, the downstream sensor signal voltage becomes almost the same as the upstream sensor signal. In this case, the monitor fails the test.

The Catalyst Monitor is supported by "spark ignition" vehicles only. The Catalyst Monitor is a "Two-Trip" Monitor. If a fault is found on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The computer does not command the MIL on at this time. If the fault is sensed again on the second trip, the computer commands the MIL "On" and saves the code in its long-term memory.

Heated Catalyst Monitor - Operation of the "heated" catalytic converter is similar to the catalytic converter. The main difference is that a heater is added to bring the catalytic converter to its operating temperature more quickly. This helps reduce emissions by reducing the converter's down time when the engine is cold. The Heated Catalyst Monitor performs the same diagnostic tests as the catalyst Monitor, and also tests the catalytic converter's heater for proper operation.

The Heated Catalyst Monitor is supported by "spark ignition" vehicles only. This Monitor is also a "Two-Trip" Monitor.

Exhaust Gas Recirculation (EGR) Monitor - The Exhaust Gas Recirculation (EGR) system helps reduce the formation of Oxides of Nitrogen during combustion. Temperatures above 2500°F cause nitrogen and oxygen to combine and form Oxides of Nitrogen in the combustion chamber. To reduce the formation of Oxides of Nitrogen, combustion temperatures must be kept below 2500°F. The EGR system recirculates small amounts of exhaust gas back into the intake manifold, where it is mixed with the incoming air/fuel mixture. This reduces combustion temperatures by up to 500°F. The computer determines when, for how long, and how much exhaust gas is recirculated back to the intake manifold. The EGR Monitor performs EGR system function tests at preset times during vehicle operation.

The EGR Monitor is supported by both "spark ignition" vehicles and "compression ignition" vehicles. The EGR Monitor is a "Two-Trip" Monitor. If a fault is found on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The computer does not command the MIL on at this time. If the fault is sensed again on the second trip, the computer commands the MIL "On," and saves the code in its long-term memory.

Evaporative System (EVAP) Monitor - OBD2 vehicles are equipped with a fuel Evaporative system (EVAP) that helps prevent fuel vapors from evaporating into the air. The EVAP system carries fumes from the fuel tank to the engine where they are burned during combustion. The EVAP system may consist of a charcoal canister, fuel tank cap, purge solenoid, vent solenoid, flow monitor, leak detector and connecting tubes, lines and hoses.

Fumes are carried from the fuel tank to the charcoal canister by hoses or tubes. The fumes are stored in the charcoal canister. The computer controls the flow of fuel vapors from the charcoal canister to the engine

via a purge solenoid. The computer energizes or de-energizes the purge solenoid (depending on solenoid design). The purge solenoid opens a valve to allow engine vacuum to draw the fuel vapors from the canister into the engine where the vapors are burned. The EVAP Monitor checks for proper fuel vapor flow to the engine, and pressurizes the system to test for leaks. The computer runs this Monitor once per trip.

The EVAP Monitor is supported by "spark ignition" vehicles only. The EVAP Monitor is a "Two-Trip" Monitor. If a fault is found on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The computer does not command the MIL on at this time. If the fault is sensed again on the second trip, the PCM commands the MIL "On," and saves the code in its long-term memory.

Oxygen Sensor Heater Monitor - The Oxygen Sensor Heater Monitor tests the operation of the oxygen sensor's heater. There are two modes of operation on a computer-controlled vehicle: "open-loop" and "closed-loop." The vehicle operates in open-loop when the engine is cold, before it reaches normal operating temperature. The vehicle also goes to open-loop mode at other times, such as heavy load and full throttle conditions. When the vehicle is running in open-loop, the oxygen sensor signal is ignored by the computer for air/fuel mixture corrections. Engine efficiency during open-loop operation is very low, and results in the production of more vehicle emissions.

Closed-loop operation is the best condition for both vehicle emissions and vehicle operation. When the vehicle is operating in closed-loop, the computer uses the oxygen sensor signal for air/fuel mixture corrections.

In order for the computer to enter closed-loop operation, the oxygen sensor must reach a temperature of at least 600°F. The oxygen sensor heater helps the oxygen sensor reach and maintain its minimum operating temperature (600°F) more quickly, to bring the vehicle into closed-loop operation as soon as possible.

The Oxygen Sensor Heater Monitor is supported by "spark ignition" vehicles only. The Oxygen Sensor Heater Monitor is a "Two-Trip" Monitor. If a fault is found on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The computer does not command the MIL on at this time. If the fault is sensed again on the second trip, the computer commands the MIL "On," and saves the code in its long-term memory.

Oxygen Sensor Monitor - The Oxygen Sensor monitors how much oxygen is in the vehicle's exhaust. It generates a varying voltage of up to one volt, based on how much oxygen is in the exhaust gas, and sends the signal to the computer. The computer uses this signal to make corrections to the air/fuel mixture. If the exhaust gas has a large amount of oxygen (a lean air/fuel mixture), the oxygen sensor generates a "low" voltage signal. If the exhaust gas has very little oxygen (a rich mixture condition), the oxygen sensor generates a "high" voltage signal. A 450mV signal indicates the most efficient, and least polluting, air/fuel ratio of 14.7 parts of air to one part of fuel.

The oxygen sensor must reach a temperature of at least 600-650°F, and the engine must reach normal operating temperature, for the

computer to enter into closed-loop operation. The oxygen sensor only functions when the computer is in closed-loop. A properly operating oxygen sensor reacts quickly to any change in oxygen content in the exhaust stream. A faulty oxygen sensor reacts slowly, or its voltage signal is weak or missing.

The Oxygen Sensor Monitor is supported by "spark ignition" vehicles only. The Oxygen Sensor Monitor is a "Two-Trip" monitor. If a fault is found on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The computer does not command the MIL on at this time. If the fault is sensed again on the second trip, the computer commands the MIL "On," and saves the code in its long-term memory.

Secondary Air System Monitor - When a cold engine is first started, it runs in open-loop mode. During open-loop operation, the engine usually runs rich. A vehicle running rich wastes fuel and creates increased emissions, such as carbon monoxide and some hydrocarbons. A Secondary Air System injects air into the exhaust stream to aid catalytic converter operation:

1. It supplies the catalytic converter with the oxygen it needs to oxidize the carbon monoxide and hydrocarbons left over from the combustion process during engine warm-up.
2. The extra oxygen injected into the exhaust stream also helps the catalytic converter reach operating temperature more quickly during warm-up periods. The catalytic converter must heat to operating temperature to work properly.

The Secondary Air System Monitor checks for component integrity and system operation, and tests for faults in the system. The computer runs this Monitor once per trip.

The Secondary Air System Monitor is a "Two-Trip" monitor. If a fault is found on the first trip, the computer temporarily saves this fault in its memory as a Pending Code. The computer does not command the MIL on at this time. If the fault is sensed again on the second trip, the computer commands the MIL "On," and saves the code in its long-term memory.

Non-Methane Hydrocarbon Catalyst (**NMHC) Monitor** - The non-methane hydrocarbon catalyst is a type of catalytic converter. It helps to remove non-methane hydrocarbons (NMH) left over from the combustion process from the exhaust stream. To accomplish this, heat and catalyst materials react with the exhaust gases to convert NMH to less harmful compounds. The computer checks the efficiency of the catalyst by monitoring the quantity of NMH in the exhaust stream. The monitor also verifies that sufficient temperature is present to aid in particulate matter (PM) filter regeneration.

The NMHC Monitor is supported by "compression ignition" vehicles only. The NMHC Monitor is a "Two-Trip" Monitor. If a fault is found on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The computer does not command the MIL on at this time.

If the fault is sensed again on the second trip, the computer commands the MIL "On," and saves the code in its long-term memory.

NOx Aftertreatment Monitor - NOx aftertreatment is based on a catalytic converter support that has been coated with a special washcoat containing zeolites. NOx Aftertreatment is designed to reduce oxides of nitrogen emitted in the exhaust stream. The zeolite acts as a molecular "sponge" to trap the NO and NO2 molecules in the exhaust stream. In some implementations, injection of a reactant before the aftertreatment purges it. NO2 in particular is unstable, and will join with hydrocarbons to produce H2O and N2. The NOx Aftertreatment Monitor monitors the function of the NOx aftertreatment to ensure that tailpipe emissions remain within acceptable limits.

The NOx Aftertreatment Monitor is supported by "compression ignition" vehicles only. The NOx Aftertreatment Monitor is a "Two-Trip" Monitor. If a fault is found on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The computer does not command the MIL on at this time. If the fault is sensed again on the second trip, the computer commands the MIL "On," and saves the code in its long-term memory.

Boost Pressure System Monitor - The boost pressure system serves to increase the pressure produced inside the intake manifold to a level greater than atmospheric pressure. This increase in pressure helps to ensure compete combustion of the air-fuel mixture. The Boost Pressure System Monitor checks for component integrity and system operation, and tests for faults in the system. The computer runs this Monitor once per trip.

The Boost Pressure System Monitor is supported by "compression ignition" vehicles only. The Boost Pressure System Monitor is a "Two-Trip" Monitor. If a fault is found on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The computer does not command the MIL on at this time. If the fault is sensed again on the second trip, the computer commands the MIL "On," and saves the code in its long-term memory.

Exhaust Gas Sensor Monitor - The exhaust gas sensor is used by a number of systems/monitors to determine the content of the exhaust stream. The computer checks for component integrity, system operation, and tests for faults in the system, as well as feedback faults that may affect other emission control systems.

The Exhaust Gas Sensor Monitor is supported by "compression ignition" vehicles only. The Exhaust Gas Sensor Monitor is a "Two-Trip" Monitor. If a fault is found on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The computer does not command the MIL on at this time. If the fault is sensed again on the second trip, the computer commands the MIL "On," and saves the code in its long-term memory.

PM Filter Monitor - The particulate matter (PM) filter removes particulate matter from the exhaust stream by filtration. The filter has a honeycomb structure similar to a catalyst substrate, but with the channels blocked at alternate ends. This forces the exhaust gas to flow through the walls between the channels, filtering the particulate matter out. The filters are self-cleaning by periodic modification of the exhaust gas concentration in order to burn off the trapped particles (oxidizing the particles to form CO2 and water). The computer monitors the efficiency of the filter in trapping particulate matter, as well as the ability of the filter to regenerate (self-clean).

The PM Filter Monitor is supported by “compression ignition” vehicles only. The PM Filter Monitor is a “Two-Trip” Monitor. If a fault is found on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The computer does not command the MIL on at this time. If the fault is sensed again on the second trip, the computer commands the MIL “On,” and saves the code in its long-term memory.

OBD2 Reference Table

The table below lists current OBD2 Monitors, and indicates the following for each Monitor:

A. Monitor Type (how often does the Monitor run; Continuous or Once per trip)

B. Number of trips needed, with a fault present, to set a pending DTC

C. Number of consecutive trips needed, with a fault present, to command the MIL “On” and store a DTC

D. Number of trips needed, with no faults present, to erase a Pending DTC

E. Number and type of trips or drive cycles needed, with no faults present, to turn off the MIL

F. Number of warm-up periods needed to erase the DTC from the computer’s memory after the MIL is turned off

Name of Monitor	A	B	C	D	E	F
Comprehensive Component Monitor	Continuous	1	2	1	3	40
Misfire Monitor (Type 1 and 3)	Continuous	1	2	1	3 - similar conditions	80
Misfire Monitor (Type 2)	Continuous		1		3 - similar conditions	80
Fuel System Monitor	Continuous	1	1 or 2	1	3 - similar conditions	80
Catalytic Converter Monitor	Once per trip	1	2	1	3 trips	40
Oxygen Sensor Monitor	Once per trip	1	2	1	3 trips	40
Oxygen Sensor Heater Monitor	Once per trip	1	2	1	3 trips	40
Exhaust Gas Recirculation (EGR) Monitor	Once per trip	1	2	1	3 trips	40
Evaporative Emissions Controls Monitor	Once per trip	1	2	1	3 trips	40
Secondary Air System (AIR) Monitor	Once per trip	1	2	1	3 trips	40
NMHC Monitor	Once per trip	1	2	1	3 trips	40
Nox Adsorber Monitor	Once per trip	1	2	1	3 trips	40
Boost Pressure System Monitor	Once per trip	1	2	1	3 trips	40
Exhaust Gas Sensor Monitor	Once per trip	1	2	1	3 trips	40
PM Filter Monitor	Once per trip	1	2	1	3 trips	40

CODE RETRIEVAL PROCEDURE

Retrieving and using Diagnostic Trouble Codes (DTCs) for troubleshooting vehicle operation is only one part of an overall diagnostic strategy.

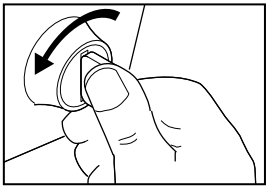
Never replace a part based only on the DTC definition. Each DTC has a set of testing procedures, instructions and flow charts that must be followed to confirm the location of the problem. Always refer to the vehicle's service manual for detailed testing instructions.

Check your vehicle thoroughly before performing any test.

***ALWAYS** observe safety precautions whenever working on a vehicle.*

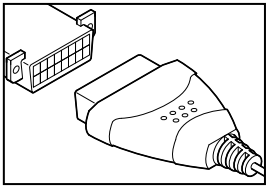
1. Turn the ignition off.

2. Locate the vehicle's 16-pin Data Link Connector (DLC).



Some DLCs have a plastic cover that must be removed before connecting the Scan Tool.

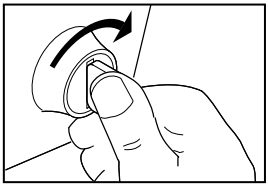
If the Scan Tool is ON, turn it OFF BEFORE connecting to the DLC.



3. Connect the Scan Tool to the vehicle's DLC. The cable connector is keyed and will only fit one way.

- If you have problems connecting the cable connector to the DLC, rotate the connector 180°.

  If you still have problems, check the DLC on the vehicle and on the Scan Tool.



4. Turn the ignition on. **DO NOT** start the engine.

5. When the Scan Tool is properly connected to the vehicle's DLC, the Scan Tool will automatically turn ON.

- If the unit does not power on automatically, it may indicate there is no power present at the vehicle's DLC connector. Check the fuse panel and replace any burned-out fuses.
- If replacing the fuse(s) does not correct the problem, consult your vehicle's repair manual to identify the proper computer (PCM) fuse/circuit, and perform any necessary repairs before proceeding.

6. The Scan Tool automatically starts a check of the vehicle's computer to determine which type of communication protocol it is using. When the Scan Tool identifies the computer's communication protocol, a communication link is established.

A PROTOCOL is a set of rules and procedures for regulating data transmission between computers, and between testing equipment and computers. As of this writing, five different types of protocols (ISO 9141, Keyword 2000, J1850 PWM, J1850 VPW and CAN) are in use by vehicle manufacturers.

- If the Scan Tool fails to link to the vehicle's computer, a "Communication Error" message shows.
  - Ensure your vehicle is OBD2 compliant.
  - Verify the connection at the DLC, and verify the ignition is ON.
  - Turn the ignition OFF, wait 5 seconds, then back ON to reset the computer.
  - Press **DTC/FF** to continue.
- If the Scan Tool **cannot** link to the vehicle's computer after three attempts, the message "Contact Technical Support" displays.
  - Turn the ignition off, and disconnect the Scan Tool.
  - Contact Technical Support for assistance.

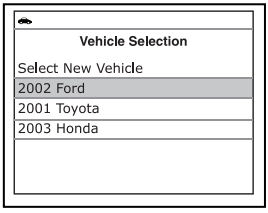
7. If the Scan Tool cannot determine the fuel type for the vehicle, the Fuel Type screen displays. Select the appropriate fuel type, **Gas** or **Diesel**, then press **MENU/ENTER** ↵.

8. If the Scan Tool can decode the Vehicle Identification Number (VIN) for the vehicle under test the Scan Tool **retrieves** and **displays** any Diagnostic Trouble Codes, Monitor Status and Freeze Frame Data retrieved from the vehicle's computer memory. Proceed to step **10**.

- If the Scan Tool **cannot** decode the Vehicle Identification Number (VIN) for the vehicle under test *and* all monitors supported by the vehicle have run and completed their diagnostic testing, the Scan Tool **retrieves** and **displays** any Diagnostic Trouble Codes, Monitor Status and Freeze Frame Data retrieved from the vehicle's computer memory. Proceed to step **10**.
- If the Scan Tool **cannot** decode the Vehicle Identification Number (VIN) for the vehicle under test *and* one or more of the monitors supported by the vehicle have not yet run and completed their diagnostic testing, the Select Vehicle screen displays. Proceed to step **9**.

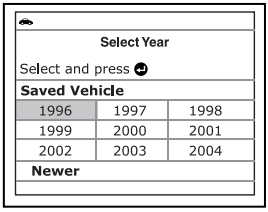
9. The Select Vehicle screen shows the three most recently tested vehicles.

- To select a previously tested vehicle, highlight the desired vehicle, then press **MENU/ENTER** ↵. Proceed to step **10**.



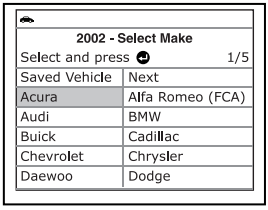
- To select a new vehicle, highlight **Select New Vehicle**, then press **MENU/ENTER** ↵.

  - The Select Year screen displays.



- Select the desired vehicle model year, then press **MENU/ENTER** ↵ to continue, or, select **Saved Vehicle** to return to the Select Vehicle screen and select a previously tested vehicle.

  - The Select Make screen displays.

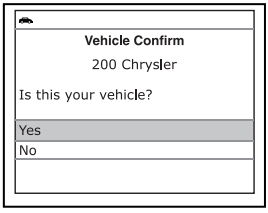


- Select the desired vehicle make, then press **MENU/ENTER** ↵ to continue.

  - The Confirm Vehicle screen displays.

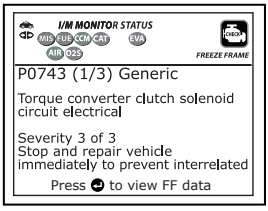
- If the information shown is correct for the vehicle under test, select **Yes**, then press **MENU/ENTER** ↵. Proceed to step **10**.

- If the information shown is not correct for the vehicle under test, or if you wish to reselect the vehicle, select **No**, then press **MENU/ENTER** ↵ to return to the Select Vehicle screen.



10. Refer to DISPLAY FUNCTIONS on page 3 for a description of display elements.

In the case of long code definitions, or when viewing Freeze Frame Data, a small arrow is shown in the upper/lower right-hand corner of the Scan Tool display area to indicate the presence of additional information.

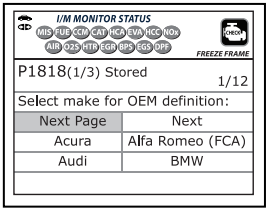


If a definition for the currently displayed code is not available, an advisory message shows.

- The Scan Tool will display a code only if codes are present. If no codes are present, the message “No Powertrain DTCs or Freeze Frame Data presently stored in the vehicle’s computer” displays.

- The Scan Tool is capable of retrieving and storing up to 32 codes in memory, for immediate or later viewing.

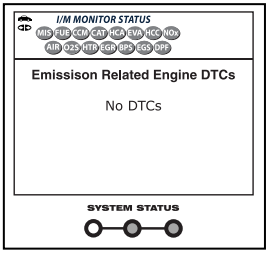
11. In cases where a "manufacturer specific" code (P1XXX, U1XXX, etc.) is displayed and the Scan Tool has not determined the vehicle make and model year (either by decoding the VIN or through manual selection), the Select Make for OEM Definition screen displays. Select the desired vehicle make to view the DTC definition for the vehicle under test.



12. Read and interpret Diagnostic Trouble Codes/system condition using the display and the green, yellow and red LEDs.

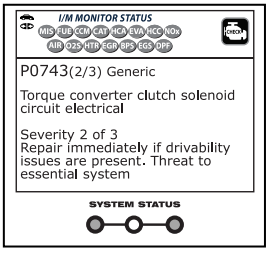
The green, yellow and red LEDs are used (with the LCD display) as visual aids to make it easier to determine engine system conditions.

- **Green LED** – Indicates that all engine systems are "OK" and operating normally. All monitors supported by the vehicle have run and performed their diagnostic testing, and no trouble codes are present. All Monitor icons will be solid.

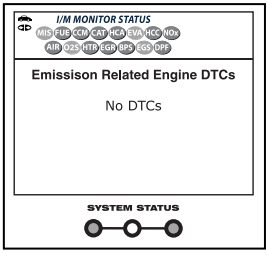


- **Yellow LED** - Indicates one of the following conditions:

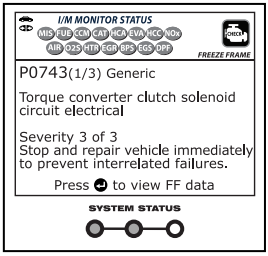
A. A PENDING CODE IS PRESENT – If the yellow LED is illuminated, it may indicate a Pending code is present. Check the display for confirmation. A Pending code is confirmed by the presence of a numeric code and the word PENDING.



B. MONITOR NOT RUN STATUS – If the display shows a zero (indicating there are no DTC's present in the vehicle's computer memory), but the yellow LED is illuminated, it may be an indication that some of the Monitors supported by the vehicle have not yet run and completed their diagnostic testing. Check the display for confirmation. All Monitor icons that are **blinking** have not yet run and completed their diagnostic testing; all Monitor icons that are **solid** have run and completed their diagnostic testing.



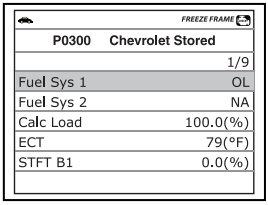
- **Red LED** - Indicates there is a problem with one or more of the vehicle's systems. The red LED is also used to show that DTC(s) are present. In this case, the Malfunction Indicator (Check Engine) lamp on the vehicle's instrument panel will light steady on.



- DTC's that start with "P0", "P2" and some "P3" are considered Generic (Universal). All Generic DTC definitions are the same on all OBD2 equipped vehicles. The Scan Tool automatically displays the code definitions (if available) for Generic DTC's.
- DTC's that start with "P1" and some "P3" are Manufacturer specific codes and their code definitions vary with each vehicle manufacturer.

13. If more than one DTC was retrieved, press and release **DTC/FF**, as necessary.

- Each time **DTC/FF** is pressed and released, the Scan Tool will scroll and display the next DTC in sequence until all DTCs in its memory have displayed.
- When the "Priority" code is shown on the Scan Tool's display, press **MENU/ENTER** ↵ to view Freeze Frame data.
- In OBD2 systems, when an emissions-related engine malfunction occurs that causes a DTC to set, a record or snapshot of engine conditions at the time that the malfunction occurred is also saved in the vehicle's computer memory. The record saved is called Freeze Frame data. Saved engine conditions include, but are not limited to: engine speed, open or closed loop operation, fuel system commands, coolant temperature, calculated load value, fuel pressure, vehicle speed, air flow rate, and intake manifold pressure.



*If more than one malfunction is present that causes more than one DTC to be set, only the code with the highest priority will contain Freeze Frame data. The code designated "**01**" on the Scan Tool display is referred to as the PRIORITY code, and Freeze Frame data always refers to this code. The priority code is also the one that has commanded the MIL on.*

14. Determine engine system(s) condition by viewing the display for any retrieved Diagnostic Trouble Codes, code definitions and Freeze Frame data, and interpreting the green, yellow and red LEDs.

- If DTC's were retrieved and you are going to perform the repairs yourself, proceed by consulting the Vehicle's Service Repair Manual for testing instructions, testing procedures, and flow charts related to retrieved code(s).

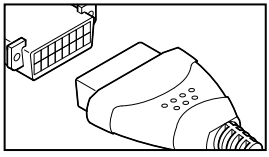
ERASING DIAGNOSTIC TROUBLE CODES (DTCs)

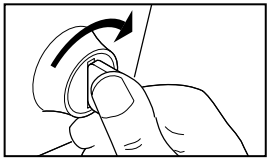
When the Scan Tool's ERASE function is used to erase DTCs from the vehicle's on-board computer, "Freeze Frame" data and manufacturer-specific enhanced data are also erased. "Permanent" DTCs ARE NOT erased by the ERASE function.

If you plan to take the vehicle to a Service Center for repair, **DO NOT** erase the codes from the vehicle's computer. If the codes are erased, valuable information that might help the technician troubleshoot the problem will also be erased.

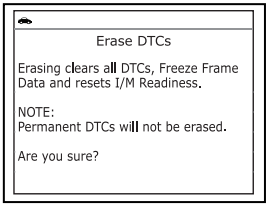
Erase DTCs from the computer's memory as follows:

When DTCs are erased, the I/M Readiness Monitor Status program resets status of all Monitors to a not run condition. To set all Monitors to a DONE status, an OBD2 Drive Cycle must be performed.



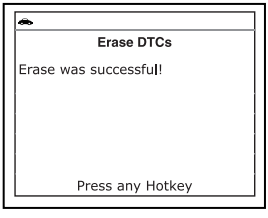


1. If not connected already, connect the Scan Tool to the vehicle's DLC, and turn the ignition "On." (If the Scan Tool is already connected and linked to the vehicle's computer, proceed directly to step 3. If not, continue to step 2.)
2. Perform the Code Retrieval procedure as described on page 23. Wait until the codes are displayed, then proceed to step 3.
3. Press and release **ERASE**. A confirmation message shows.
   - If you are sure you want to proceed, select **Yes**, then press **MENU/ENTER** ↵.
   - If you do not want to proceed, select **No**, then press **MENU/ENTER** ↵ to cancel the erase procedure.
4. If you chose to erase DTCs, a "One moment please…" message displays while the erase function is in progress.



*If the vehicle's engine is running, an advisory message shows. Turn the engine OFF, then turn the ignition back to ON. DO NOT start the engine. Press **MENU/ENTER** ↵ to continue.*

5. If the erase was successful, a confirmation message shows. The Scan Tool automatically relinks to the vehicle's computer after 3 seconds.



*If the erase was not successful and ECU error code $22 is present, an advisory message displays. Follow the instructions on the advisory message, then press **ERASE** to try again.*

6. If the erase was not successful, an advisory message shows indicating the erase request was sent to the vehicle's computer. The Scan Tool automatically relinks to the vehicle's computer after 3 seconds.

ABOUT REPAIRSOLUTIONS 2®

RepairSolutions 2® is a web-based service created to assist both Do-It-Yourself and Professional technicians in quickly and accurately diagnosing and repairing today's vehicles. RepairSolutions 2 allows you to view and save the diagnostic data retrieved from a vehicle's on-board computer(s) using your Code Reader. At the core of RepairSolutions 2 is an extensive knowledge database, developed by compiling and analyzing years worth of "real world" vehicle service data. RepairSolutions 2 builds on manufacturer-recommended diagnostic and repair information by providing verified, vehicle-specific fixes supplied by ASE technicians across the country. RepairSolutions 2 also provides access to an extensive knowledge database including:

- **Verified Fixes** – Find the most likely fixes reported and verified by ASE Technicians for the retrieved DTCs.
- **Repair Instructions** – View available repair instructions to properly perform the fix.
- **Video Tutorials** – Watch repair video tutorials for valuable repair tips.
- **Technical Service Bulletins** – Research known problems reported by vehicle manufacturers.
- **Safety Recalls** – Research known safety concerns applicable to a vehicle.

And much more. Please visit matco.carscan.com for additional information.

Hardware Requirements:

- Matco Scan Tool with Bluetooth/WiFi
- Android or iOS Smart Device

Accessing RepairSolutions 2®

1. Download and install the RepairSolutions 2® app from the App Store (for iOS devices) or Google Play (for Android devices).
2. Launch the RepairSolutions 2 app and log in to your account.
   - If you have not yet established an account, you must register for a FREE RepairSolutions 2 account before proceeding.
3. Connect the Code Reader to a vehicle and establish a Bluetooth or WiFi connection with your Smart Device (refer to CONNECTING TO BLUETOOTH / WIFI, below). Be sure your Smart Device is connected to an available WiFi network.
   - The RepairSolutions 2 app will store two WiFi configurations only.
4. Retrieve diagnostic data (refer to CODE RETRIEVAL PROCEDURE on page 23 for details).

5. The RepairSolutions 2 app automatically displays a report based on the retrieved diagnostic data.
   - If the Code Reader is not connected to WiFi or Bluetooth, vehicle data will not be saved.

CONNECTING TO BLUETOOTH / WIFI

Launch the RepairSolutions2 app an follow the prompts to establish Bluetooth and (optionally) WiFi connections, as follows:

1. Launch the RepairSolutions2 app. Select **Wifi Tools Settings** from the menu. Power on your Code Reader, then select from the list of available devices.
2. When Bluetooth pairing is complete, a confirmation screen displays. Click **Continue**.
   - If a Bluetooth connection cannot be established, an advisory message displays. Tap **Try Again** to repeat the pairing process.
3. Follow the on-screen prompts to connect to an available WiFi network.
   - You can automatically connect to the network your Smart Device is currently connected to, or you can manually connect to another available network.
   - Note that only 2.4GHz networks are supported.
   - If you do not wish to connect to a WiFi network at this time, tap **SKIP**.
4. When WiFi pairing is complete, a confirmation screen displays. Click **Continue** to view the “Setup Complete” message, then click **Continue** to enter RepairSolutions2.
   - If a WiFi connection cannot be established, an advisory message displays. Tap **Try Again** to repeat the pairing process.

The Scan Tool is a special tool that communicates with the vehicle's computer. The Scan Tool lets you view and/or "capture" (record) "real-time" Live Data. This information includes values (volts, rpm, temperature, speed etc.) and system status information (open loop, closed loop, fuel system status, etc.) generated by the various vehicle sensors, switches and actuators.

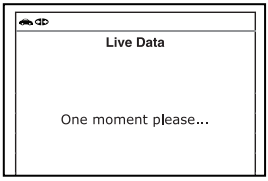
In effect the Scan Tool lets you view, in "real time", the same signal values generated by the sensors, actuators, switches and/or vehicle system status information used by the vehicle's computer when calculating and conducting system adjustments and corrections.

The real time (Live Data) vehicle operating information (values/status) that the computer supplies to the Scan Tool for each sensor, actuator, switch, etc. is called Parameter Identification (PID) Data.

Each PID (sensor, actuator switch, status, etc.) has a set of operating characteristics and features (parameters) that serve to identify it. The Scan Tool displays this information for each sensor, actuator, switch or status that is supported by the vehicle under test.

***WARNING**: If the vehicle must be driven in order to perform a troubleshooting procedure, **ALWAYS** have a second person help you. One person should drive the vehicle while the other person observes the Scan Tool data. Trying to drive and operate the Scan Tool at the same time is dangerous, and could cause a serious traffic accident.*

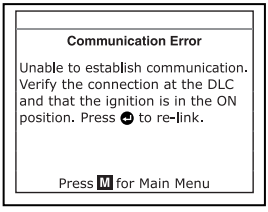
VIEWING LIVE DATA

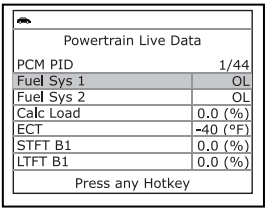


1. While linked to the vehicle, start the engine, then press and release the **LD** button.

2. A “One moment please . . .” message displays while the Scan Tool establishes communication with the vehicle.

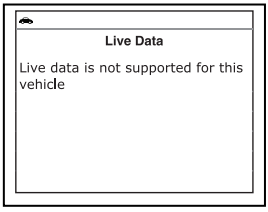
- If the Scan Tool fails to establish communication with the vehicle, a “Communication Error” message is shown on the Scan Tool’s display.
  - Ensure your vehicle is OBD2 compliant.
  - Verify the connection at the DLC, and verify the ignition is ON.
  - Turn the ignition OFF, wait 5 seconds, then back ON to reset the computer.
  - Press the **MENU/ENTER** ↵ button to continue.





3. Real-time Live Data (PID) information supported by the vehicle under test displays.

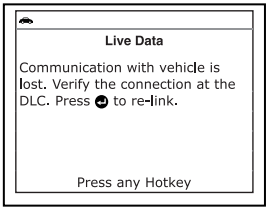
- If Live Data is not supported by the vehicle under test, an advisory message displays. Press the **MENU/ENTER** ↵ button to return to the Main Menu. Live Data is not available for your vehicle.



Remember, what you are viewing is "real-time" Live Data. The values (volts, rpm, temperature, vehicle speed, system status etc) for the various PIDS displayed may change as the vehicle's operating conditions change.

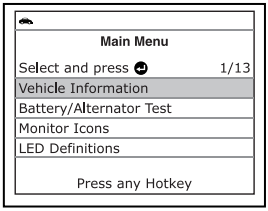
4. A vehicle usually supports several PIDs, however, only a limited amount of PID data can be displayed on the screen at one time. If additional PID data is available, a small arrow will be shown on the display. Use the **DOWN** ▼ button to scroll up or down to view all available PID data.

- If communication with the vehicle is lost while viewing Live Data, a Communication Lost" message shows on the Scan Tool's display.



5. If you experience vehicle problems, view and/or compare the Live Data (PID) information displayed on the Scan Tool to specifications in the vehicle's repair manual.

In addition to retrieving Diagnostic Trouble Codes (DTCs), you can use the scan tool to perform additional diagnostic tests, to view diagnostic and vehicle information stored in your vehicle's on-board computer, and to configure the scan tool for your particular needs. Additional tests and related functions are accessed through the Main Menu. The following functions are available:

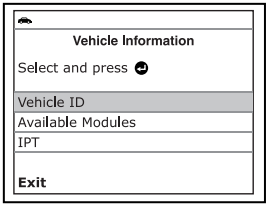


- **Vehicle Information** – Displays the Vehicle Info menu, which lets you retrieve and view reference information for the vehicle under test.
- **Battery/Alternator Test** – Performs a check of the vehicle's battery and alternator system to ensure the system is operating within acceptable limits.
- **Monitor Icons** – Shows the full names for the **I/M MONITOR STATUS** icons.
- **LED Definitions** – Provides descriptions of the meaning of the Scan Tool **SYSTEM STATUS** LEDs.
- **Language Selection** – sets the display language for the Scan Tool to English, French or Spanish.
- **Adjust Brightness** – Adjusts the brightness of the display screen.
- **Audible Tone** – Turns the Scan Tool's audible tone "o" and "off." When turned "on," a tone sounds each time a button is pressed.
- **Footer** – Turns the navigational "footers" at the bottom of most display screens "on" and "off."
- **Hotkey Legend** – Shows functional descriptions for the Scan Tool's hotkeys.
- **Unit of Measurement** – Sets the unit of measurement for the Scan Tool's display to USA or Metric.
- **Firmware Version** – Displays the Scan Tool's firmware version.
- **Smog Check of I/M Program Location** – Sets the Smog Check or I/M Program location for the vehicle under test.
- **Monitor Icons Status** – Provides descriptions of the meaning of the I/M Monitor Status icon indications.

To access the Main Menu:

- Press **MENU/ENTER ↵.**
  - The Main Menu displays.

VIEWING VEHICLE INFORMATION



The Scan Tool offers three options for retrieving reference information for the vehicle under test; **Vehicle ID**, **Available Modules** and **IPT** (In-use Performance Tracking).

Retrieving Vehicle ID Information

The Vehicle ID function is applicable to model year 2000 and newer OBD2-compliant vehicles.

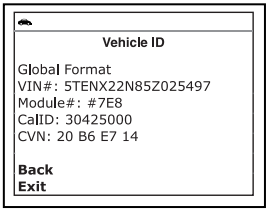
The Scan Tool can retrieve a list of information (provided by the vehicle manufacturer), unique to the vehicle under test, from the vehicle's on-board computer. This information may include:

- The vehicle's VIN number
- The control module identification number
- The vehicle's calibration ID(s). These IDs uniquely identify the software version(s) for the vehicle's control module(s).
- The Vehicle's Calibration Verification Number(s) (CVNs) required by ODB2 regulations. CVNs are used to determine if emission-related calibrations for the vehicle under test have been changed. One or more CVNs may be returned by the vehicle's computer.

1. Select **Vehicle Information** from the Main Menu, then press **MENU/ENTER** ↵.
   - The Vehicle Information menu displays.
2. Select **Vehicle ID**, then press **MENU/ENTER** ↵.

*The first time the **Vehicle ID** function is used, it may take several minutes to retrieve the information from the vehicle's computer.*

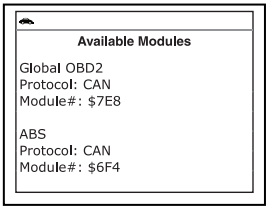
3. When the retrieval process is completed, the vehicle ID information displays.
4. When you have finished viewing the retrieved vehicle ID information, choose **Back** and press **MENU/ENTER** ↵ to return to the Vehicle Information menu, or, choose **Exit** and press **MENU/ENTER** ↵ to display the Main Menu.



Viewing Available Modules

The Scan Tool can retrieve a list of modules supported by the vehicle under test.

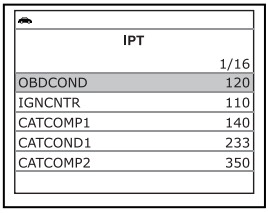
1. Select **Vehicle Information** from the Main Menu, then press **MENU/ENTER** ↵.
   - The Vehicle Information menu displays.
2. Select **Available Modules**, then press **MENU/ENTER** ↵.
3. When the retrieval process is completed, a complete list of modules supported by the vehicle under test displays.



4. When you have finished viewing the list of available modules, choose **Back** and press **MENU/ENTER** ↵ to return to the Vehicle Information menu, or, choose **Exit** and press **MENU/ENTER** ↵ to display the Main Menu.

Viewing In-use Performance Tracking (IPT)

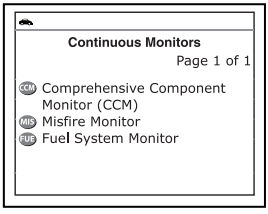
The Scan Tool can retrieve In-use Performance Tracking (IPT) statistics for monitors supported by the vehicle under test. Two values are returned for each monitor; the number of times that all conditions necessary for a specific monitor to detect a malfunction have been encountered (XXXCOND), and the number of times that the vehicle has been operated under the specific conditions for the monitor (XXXCOMP). Statistics are also provided for the number of times the vehicle has been operated in OBD monitoring conditions (OBDCOND), and the number of times the vehicle's engine has been started (IGNCNTR).



1. Select **Vehicle Information** from the Main Menu, then press **MENU/ENTER** ↵.
   - The Vehicle Information menu displays.
2. Select **IPT**, then press **MENU/ENTER** ↵.
3. When the retrieval process is completed, the In-use Performance Tracking statistics for the vehicle under test display.
   - If In-use Performance Tracking is not available for your vehicle, an advisory message shows on the diagnostic tool's display. Press and hold **MENU/ENTER** ↵ to return to the Main Menu.
4. When you have finished viewing the statistics, choose **Back** and press **MENU/ENTER** ↵ to return to the Vehicle Information menu, or, choose **Exit** and press **MENU/ENTER** ↵ to display the Main Menu.

VIEWING MONITOR ICON DESCRIPTIONS

The **I/M MONITOR STATUS** icons on the Scan Tool's LCD display provide an indication of the "Completed / Not Complete" status for all I/M Monitors supported by the vehicle under test. The **Monitor Icons** function displays the full name for each Monitor icon.



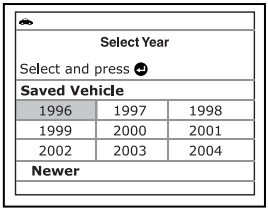
1. From the Main Menu, select **Monitor Icons**, then press **MENU/ENTER** ↵.
   - The Monitor Icons screen displays.
   - The screen shows a list of the 15 Monitor icons, along with the full name for each icon. Use the **DOWN** ▼ button, as necessary, to scroll the list.
2. When you have finished viewing the Monitor icon descriptions, press **MENU/ENTER** ↵ to return to the Main Menu.

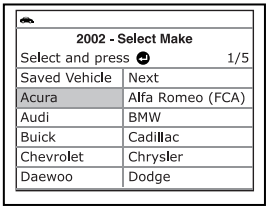
BATTERY/ALTERNATOR TEST

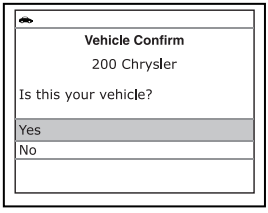
The Scan Tool can perform a check of the vehicle's battery and alternator system to ensure the system is operating within acceptable limits. You can perform a battery check only, or an alternator system (battery and alternator) check.

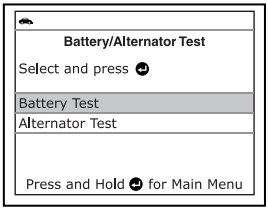
To access the Battery/Alternator Test menu:

1. Press **MENU/ENTER** ↵.
   - The Main Menu displays.
2. Select **Battery/Alternator Test**, then press **MENU/ENTER** ↵.
   - In cases where the Scan Tool has not determined the vehicle make and model year (either by decoding the VIN or through manual selection during code retrieval), the Select Vehicle screen displays. The Select Vehicle screen shows the three most recently tested vehicles.
   - To select a previously tested vehicle, highlight the desired vehicle, then press **MENU/ENTER** ↵. Proceed to step **2**.
   - To select a new vehicle, highlight **Select New Vehicle**, then press **MENU/ENTER** ↵.
     - The Select Year screen displays.
   - Select the desired vehicle model year, then press **MENU/ENTER** ↵ to continue, or, select **Saved Vehicle** to return to the Select Vehicle screen and select a previously tested vehicle.
     - The Select Make screen displays.
   - Select the desired vehicle make, then press **MENU/ENTER** ↵ to continue.
     - The Confirm Vehicle screen displays.
   - If the information shown is correct for the vehicle under test, select **Yes**, then press **MENU/ENTER** ↵. Proceed to step **3**.
   - If the information shown is not correct for the vehicle under test, or if you wish to reselect the vehicle, select **No**, then press **MENU/ENTER** ↵ to return to the Select Vehicle screen.
3. A "One moment please . . ." message displays while the request is processed.
   - The Battery/Alternator Test Menu displays.

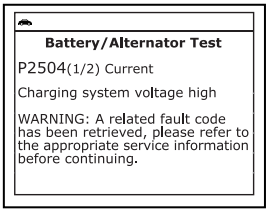








If the Scan Tool detects that a DTC related to the vehicle's battery or charging system is present in the vehicle's computer, a "Warning" message displays. Perform the necessary service procedures to correct the malfunction before performing any battery/ alternator test.



To perform a battery check ONLY:

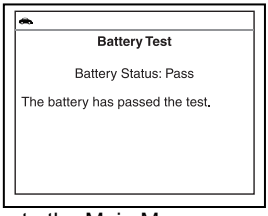
1. Select **Battery Test** from the Battery/Alternator Test Menu, then press **MENU/ENTER** ↵.
   - An "instructional" message displays, showing the procedures to prepare the vehicle for the battery check.
2. Prepare the vehicle for the battery check:
   - Turn the engine off.
   - Place the transmission in PARK or NEUTRAL, and set the parking brake.
   - Make a visual check of the battery's condition. If the battery terminals are corroded or other damage is present, clean or replace the battery as appropriate.
   - For "unsealed" batteries, make sure the water level in each cell is above the battery plates.
   - Turn the ignition on. **DO NOT** start the engine.
3. Select **Next**, then press **MENU/ENTER** ↵ to proceed.

   *If the engine is running, an advisory message shows. Turn the engine off, then turn the ignition on. **DO NOT** start the engine. Press **MENU/ENTER** ↵ to continue.*
   - An "instructional" message displays.
4. Turn the vehicle's headlights on. Select **Next**, then press **MENU/ENTER** ↵ to proceed.
   - An "instructional" message displays.
5. Turn the vehicle's headlights off. Select **Next**, then press **MENU/ENTER** ↵ to proceed.
   - A "countdown" message shows while the battery check is in process.
   - If battery voltage is *less than* 12.1 volts, an advisory message shows. Press **MENU/ENTER** ↵ to return to the Main Menu. Turn the ignition off and disconnect the Scan Tool from the vehicle. Fully charge the battery, then repeat the battery check.
   - If battery voltage is *greater than* 12.1 volts, an "instructional" message shows.

6. Start the vehicle's engine. Allow the engine to run for several seconds, then turn the engine off.

   *If the Scan Tool did not detect "cranking status" for the vehicle's engine, an advisory message shows. Select **Next**, then press **MENU/ENTER** ↵ to repeat the battery check, or, press **MENU/ENTER** ↵ to return to the Main Menu.*

7. When the battery check is complete, a results screen displays the battery status. The System Status LEDs provide a PASS/FAIL indication, as follows:
   - Green = Good
   - Yellow = Normal
   - Red = Warning/Bad

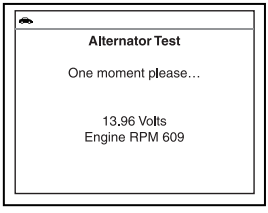


8. Press and hold **MENU/ENTER** ↵ to return to the Main Menu.

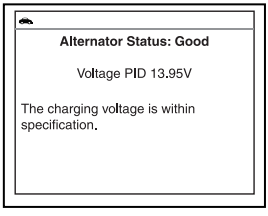
To perform a charging system check:

*DO NOT perform the **Alternator Test** on Smart Alternator, Hybrid or Electric vehicles.*

1. Select **Alternator Test** from the Battery/Alternator Test Menu, then press **MENU/ENTER** ↵.
   - An "instructional" message shows.
2. Set the parking brake. Start and warm the engine to normal operating temperature. Turn on the headlights. Press **MENU/ENTER** ↵ to proceed.
   - An "instructional" message shows.
3. Press the accelerator pedal to raise engine speed to 2000 RPM minimum, and maintain the engine speed.
   - When engine speed is within the required range, the alternator test begins. A progress screen shows.
   - When the "countdown" timer expires, an "instructional" message shows.



4. Turn the vehicle's headlights off, and return the engine to idle speed.
   - A "One moment please…" message displays while the test results are retrieved.
5. When the alternator check is complete, a results screen shows charging system voltage and indicates whether or not the charging system is within acceptable limits. The System Status LEDs provide a PASS/FAIL indication, as follows:
   - Green = System within limits
   - Yellow = Over charging or under charging



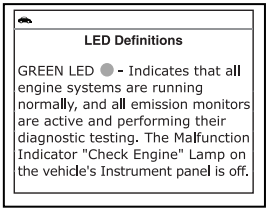
- Red = Excessive over charging or under charging
- If the alternator voltage is less than 9 V, the red, yellow and green SYSTEM STATUS LEDs will flash on and off.

6. Press **MENU/ENTER** ↵ to return to the Main Menu.

VIEWING LED DEFINITIONS

The **SYSTEM STATUS** LEDs on the scan tool provide a visual indication of the I/M Readiness status of the vehicle under test. The **LED Definitions** function provides a description of the meanings of the green, yellow and red **SYSTEM STATUS** LEDs.

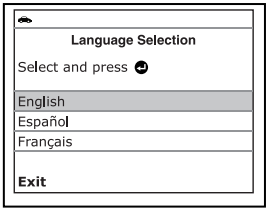
7. From the Main Menu, select **LED Definitions**, then press **MENU/ENTER** ↵.
   - The LED Definitions screen displays.
   - The screen provides a description of the meanings of the green, yellow and red **SYSTEM STATUS** LEDs.



8. When you have finished viewing the LED meanings, press **MENU/ENTER** ↵ to return to the Main Menu.

SELECTING THE DISPLAY LANGUAGE

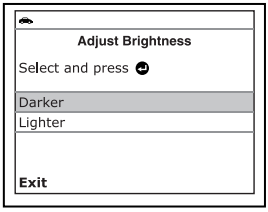
1. Select **Language Selection** in the Main Menu, then press **MENU/ENTER** ↵.
   - The Language Selection screen displays.
2. Select the desired display language, then press **MENU/ENTER** ↵ to save your changes.



*To return to the Main Menu without making changes, select **Exit**, then press **MENU/ENTER** ↵.*

ADJUSTING DISPLAY BRIGHTNESS

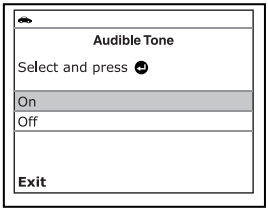
1. Select **Adjust Brightness** in the Main Menu, then press **MENU/ENTER** ↵.
   - The Adjust Brightness screen displays.
2. Select **Darker** or **Lighter**, as desired, then press **MENU/ENTER** ↵.
3. Repeat steps **1** and **2** as needed until the desired brightness is obtained.



*To return to the Main Menu without making changes, select **Exit**, then press **MENU/ENTER** ↵.*

ENABLING/DISABLING THE AUDIBLE TONE

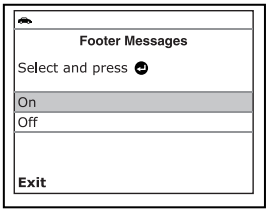
1. Select **Audible Tone** in the Main Menu, then press **MENU/ENTER** ↵.
   - The Audible Tone screen displays.
2. Select **On** or **Off** as desired, then press **MENU/ENTER** ↵ to save your changes.



*To return to the Main Menu without making changes, select **Exit**, then press **MENU/ENTER** ↵.*

ENABLING/DISABLING NAVIGATIONAL FOOTERS

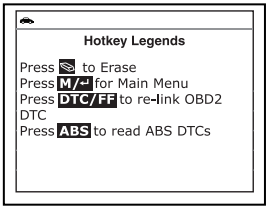
1. Select **Footer** in the Main Menu, then press **MENU/ENTER** ↵.
   - The Footer screen displays.
2. Select **On** of **Off** as desired, then press **MENU/ENTER** ↵ to save your changes.



*To return to the Main Menu without making changes, select **Exit**, then press **MENU/ENTER** ↵.*

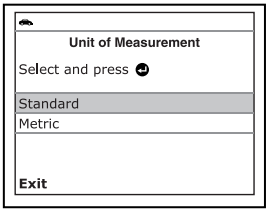
VIEWING THE HOTKEY LEGEND

1. Select **Hotkey Legend** in the Main Menu, then press **MENU/ENTER** ↵.
   - The Hotkey Legends screen displays.
   - The screen shows a functional description of each of the scan tool's hotkeys.
2. When you have finished viewing the Hotkey Legend, press **MENU/ENTER** ↵.



SETTING THE UNIT OF MEASUREMENT

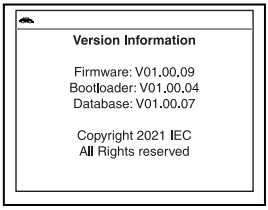
1. Select **Unit of Measurement** in the Main Menu, then press **MENU/ENTER** ↵.
   - The Unit of Measurement screen displays.
2. Select the desired unit of measurement, then press **MENU/ENTER** ↵ to save your changes.



*To return to the Main Menu without making changes, select **Exit**, then press **MENU/ENTER** ↵.*

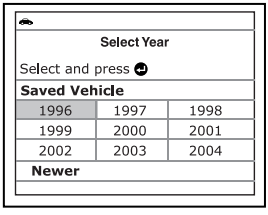
VIEWING THE FIRMWARE VERSION

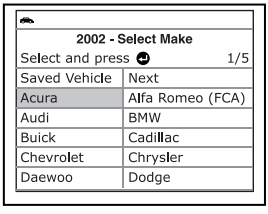
1. Select **Firmware Version** in the Main Menu, then press **MENU/ENTER** ↵.
   - The Firmware Version screen displays.
   - The screen shows the Scan Tool's current firmware version, bootloader version and database version.
2. Press **MENU/ENTER** ↵ to return to the Main Menu.

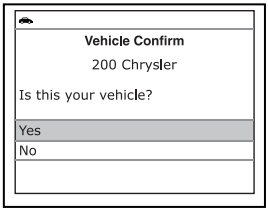


SELECTING THE SMOG CHECK OR I/M PROGRAM LOCATION

1. Select **Smog Check or I/M Program Location** in the Main Menu, then press **MENU/ENTER** ↵.
   - In cases where the Scan Tool has not determined the vehicle make and model year (either by decoding the VIN or through manual selection during code retrieval), the Select Vehicle screen displays. The Select Vehicle screen shows the three most recently tested vehicles.
   - To select a previously tested vehicle, highlight the desired vehicle, then press **MENU/ENTER** ↵. Proceed to step **2**.
   - To select a new vehicle, highlight **Select New Vehicle**, then press **MENU/ENTER** ↵.
     - The Select Year screen displays.
   - Select the desired vehicle model year, then press **MENU/ENTER** ↵ to continue, or, select **Saved Vehicle** to return to the Select Vehicle screen and select a previously tested vehicle.
     - The Select Make screen displays.
   - Select the desired vehicle make, then press **MENU/ENTER** ↵ to continue.
     - The Confirm Vehicle screen displays.
   - If the information shown is correct for the vehicle under test, select **Yes**, then press **MENU/ENTER** ↵. Proceed to step **3**.

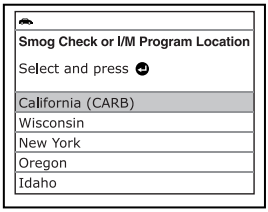






- If the information shown is not correct for the vehicle under test, or if you wish to reselect the vehicle, select **No**, then press **MENU/ENTER** ↵ to return to the Select Vehicle screen.

2. The Smog Check or I/M Program Location screen displays.



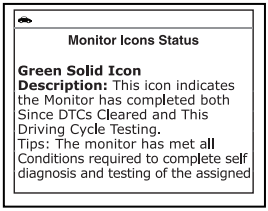
3. Select the appropriate location from the options provided, then press **MENU/ENTER** ↵.

*To return to the Main Menu without making changes, select Exit, then press **MENU/ENTER** ↵.*

VIEWING MONITOR ICON STATUS DEFINITIONS

1. Select **Monitor Icons Status** in the Main Menu, then press **MENU/ENTER** ↵.

- The Monitor Icons Status screen displays.
- The screen provides a description of the meanings of the Monitor icon status indications.



2. When you have finished viewing the Monitor icon status definitions, press **MENU/ENTER** ↵ to return to the Main Menu.

LIMITED TWO YEAR WARRANTY

The Manufacturer warrants to the original purchaser that this unit is free of defects in materials and workmanship under normal use and maintenance for a period of two (2) years from the date of original purchase.

If the unit fails within the two (2) year period, it will be repaired or replaced, at the Manufacturer's option, at no charge, when returned prepaid to the Service Center with Proof of Purchase. The sales receipt may be used for this purpose. Installation labor is not covered under this warranty. All replacement parts, whether new or remanufactured, assume as their warranty period only the remaining time of this warranty.

This warranty does not apply to damage caused by improper use, accident, abuse, improper voltage, service, fire, flood, lightning, or other acts of God, or if the product was altered or repaired by anyone other than the Manufacturer's Service Center.

The Manufacturer, under no circumstances shall be liable for any consequential damages for breach of any written warranty of this unit. This warranty gives you specific legal rights, and you may also have rights, which vary from state to state. This manual is copyrighted with all rights reserved. No portion of this document may be copied or reproduced by any means without the express written permission of the Manufacturer. THIS WARRANTY IS NOT TRANSFERABLE. For service, send via U.P.S. (if possible) prepaid to Manufacturer. Allow 3-4 weeks for service/repair.

SERVICE PROCEDURES

If you have any questions, require technical support or information on UPDATES and OPTIONAL ACCESSORIES, please contact your local store, distributor or the Service Center.

USA & Canada:

(877) 336-2826 (6:00 AM-6:00 PM PST, Monday through Saturday)

All others: (714) 241-6802 (6:00 AM-6:00 PM PST, Monday through Saturday)

FAX: (714) 241-3979 (24 hr.)

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