3160d

DIGITAL
ABS & SRS
ScanTool

OWNER'S MANUAL

The Easiest And Best Way To Troubleshoot 1996 and Newer OBD2 Vehicles!

P2247 Generic
O2 sensor reference
voltage circuit/open
bank 2 sensor 1

SYSTEM STATUS

M

DTC
FF

LD

Table of Contents

WHAT IS OBD?

The Scan Tool is designed to work on all OBD2 compliant vehicles. All 1996 and newer vehicles (cars, light trucks and SUVs) sold in the United States are OBD2 compliant.

One of the most exciting improvements in the automobile industry was the addition of on-board diagnostics (OBD) on vehicles, or in more basic terms, the computer that activates the vehicle's "CHECK ENGINE" light. OBD1 was designed to monitor manufacturer-specific systems on vehicles built from 1981 to 1995. Then came the development of OBD2, which is on all 1996 cars and light trucks sold in the U.S. Like its predecessor, OBD2 was adopted as part of a government mandate to lower vehicle emissions. But what makes OBD2 unique is its universal application for all late model cars and trucks - domestic and import. This sophisticated program in the vehicle's main computer system is designed to detect failures in a range of systems, and can be accessed through a universal OBD2 port, which is usually found under the dashboard. For all OBD systems, if a problem is found, the computer turns on the "CHECK ENGINE" light to warn the driver, and sets a Diagnostic Trouble Code (DTC) to identify where the problem occurred. A special tool, such as the Scan Tool, is required to retrieve these codes, which consumers and professionals use as a starting point for repairs.

The Scan Tool provides the additional ability to retrieve *enhanced* DTCs from most Chrysler/Jeep, Ford/Mazda, GM/Izusu, Honda/Acura and Toyota/Lexus vehicles, as well as ABS and SRS DTCs, and vehicle information. The types of enhanced data available depends on the vehicle make.

You Can Do It!
EASY TO USE - EASY TO VIEW - EASY TO DEFINE

Easy To Use . . . .

- Connect the Scan Tool to the vehicle's test connector.

- Turn the ignition key "On."

- The tool will automatically link to the vehicle's computer.
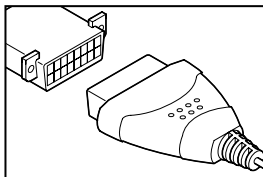
Easy To View . . . .

- The Scan Tool retrieves stored codes, Freeze Frame data and I/M Readiness Status.

- Codes, I/M Readiness Status and Freeze Frame data are displayed on the Tool's display screen. System Status is indicated by LED indicators.
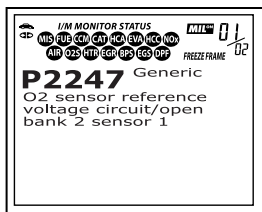
Easy To Define . . . .

- Read code definitions from the Scan Tool's display.

- View Freeze Frame data.

- View Live Data.

- View Anti-Lock Brake System (ABS) codes.

- • View Supplemental Restraint System (SRS) codes.
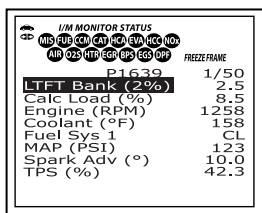
SAFETY FIRST!

> *To avoid personal injury, instrument damage and/or damage to your vehicle; do not use the Scan Tool before reading this manual.*

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 troubleshooting, 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 Tool to or disconnecting the Tool 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.

Fuel and battery vapors are highly flammable. To prevent an explosion, keep all sparks, heated items and open flames away from the battery and fuel / fuel vapors. DO NOT SMOKE NEAR THE VEHICLE DURING TESTING.

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.

VEHICLES COVERED

The Scan Tool is designed to work on all OBD2 compliant vehicles. All 1996 and newer vehicles (cars and light trucks) sold in the United States are OBD2 compliant.

👉 *Federal law requires that all 1996 and newer cars and light trucks sold in the United States must be OBD2 compliant; this includes all Domestic, Asian and European vehicles.*
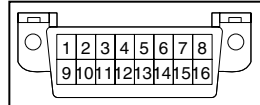
Some 1994 and 1995 vehicles are OBD2 compliant. To find out if a 1994 or 1995 vehicle is OBD2 compliant, check the following:

1. **The Vehicle Emissions Control Information (VECI) Label**. This label is located under the hood or by the radiator of most vehicles. If the vehicle is OBD2 compliant, the label will state "**OBD II Certified**."

VEHICLE EMISSION CONTROL INFORMATION

| **VEHICLE MANUFACTURER** | ENGINE FAMILY EFN2.6YBT2BA | OBD II CERTIFIED |
| | DISPLACEMENT 2.6L | |

THIS VEHICLE CONFORMS TO U.S. EPA AND STATE OF CALIFORNIA REGULATIONS APPLICABLE TO 1999 MODEL YEAR NEW TLEV PASSENGER CARS.

OBD II CERTIFIED

REFER TO SERVICE MANUAL FOR ADDITIONAL INFORMATION
TUNE-UP CONDITIONS: NORMAL OPERATING ENGINE TEMPERATURE, ACCESSORIES OFF, COOLING FAN OFF, TRANSMISSION IN NEUTRAL

EXHAUST EMISSIONS STANDARDS STANDARD CATEGORY
CERTIFICATION TLEV
IN-USE TLEV INTERMEDIATE

SPARK PLUG TYPE NGK BPRE-11 GAP: 1.1MM **CATALYST**

2. Government Regulations require that all OBD2 compliant vehicles **must** have a "common" sixteen-pin **Data Link Connector (DLC)**.

👉 *Some 1994 and 1995 vehicles have 16-pin connectors but are not OBD2 compliant. Only those vehicles with a Vehicle Emissions Control Label stating "OBD II Certified" are OBD2 compliant.*

Data Link Connector (DLC) Location

The 16-pin DLC is usually located under the instrument panel (dash), within 12 inches (300 mm) of center of the panel, on the driver's side of most vehicles. It should be easily accessible and visible from a kneeling position outside the vehicle with the door open.

NEAR CENTER OF DASH

BEHIND ASHTRAY
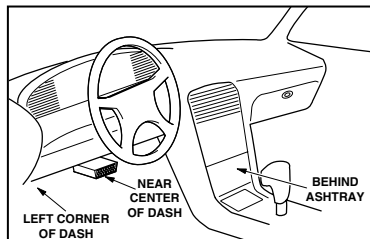
LEFT CORNER OF DASH

> *On some Asian and European vehicles the DLC is located behind the "ashtray" (the ashtray must be removed to access it) or on the far left corner of the dash. If the DLC cannot be located, consult the vehicle's service manual for the location.*

BATTERY REPLACEMENT

Replace batteries when the battery symbol ▭ is visible on display and/or the 3 LEDS are all lit and no other data is visible on screen.

1. Locate the battery cover on the back of the Scan Tool.

2. Slide the battery cover off (use your fingers).

3. Replace batteries with three AA-size batteries (for longer life, use Alkaline-type batteries).

4. Reinstall the battery cover on the back of the Scan Tool.

Adjustments After Battery Installation

The first time the Scan Tool is turned on, you must select the desired display language (English, French or Spanish) and unit of measurement (USA or metric) as follows:

1. Press the **POWER/LINK** ◁▷⏻ button to turn the Tool "ON."

- The Select Language screen displays.

2. Use the **UP** ⬘ and **DOWN** ⬗ buttons, as necessary, to highlight the desired display language.

```
Language/Idioma/
Langue
* English
* Español
* Français
```

3. When the desired display language is selected, press the **ENTER** ⏎ button to confirm your selection.

- The Select Unit screen displays.

```
        Select Unit
  Select and press ⏎

* USA
* Metric
```
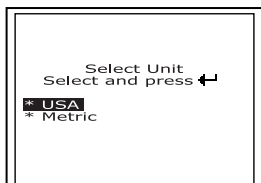
4. Use the **UP** ⬘ and **DOWN** ⬗ buttons, as necessary, to highlight the desired unit of measurement.

5. When the desired unit of measurement is selected, press the **ENTER** ⏎ button to confirm your selection.

> *After the initial language and unit of measurement selections are performed, these, as well as other settings, can be changed as desired. Proceed to ADJUSTMENTS AND SETTINGS on page 79 for further instructions.*

CONTROLS AND INDICATORS
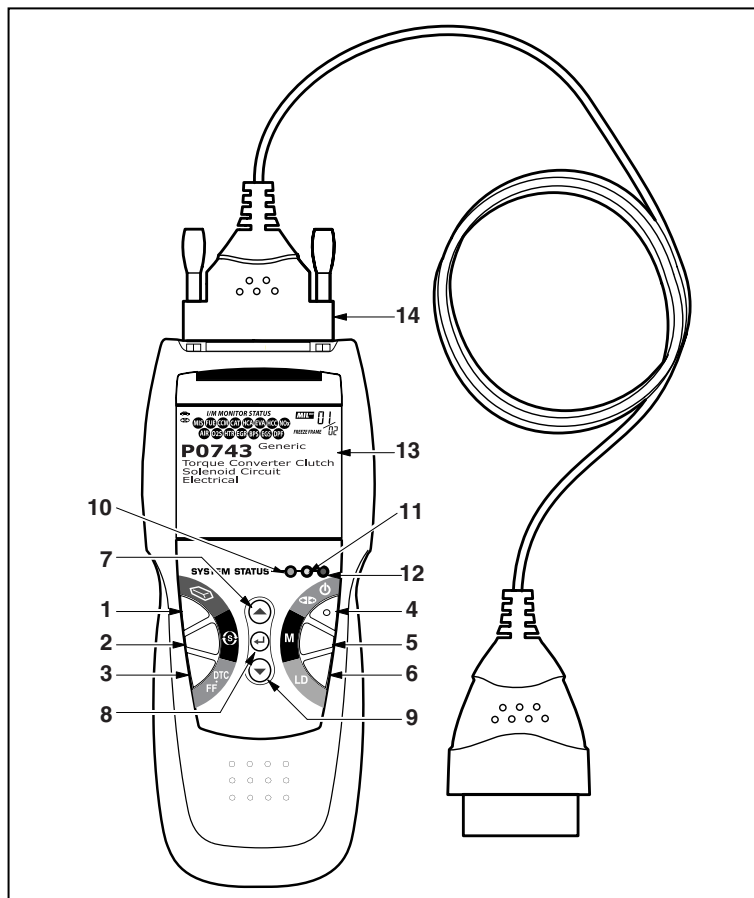
Figure 1. Controls and Indicators

See Figure 1 for the locations of items 1 through 14, below.

1. ⌷ **ERASE button** - Erases Diagnostic Trouble Codes (DTCs), and "Freeze Frame" data from your vehicle's computer, and resets Monitor status.

2. ⟨S⟩ **SYSTEM MENU** button – When pressed, displays the System Menu.

3. **DTC/FF button** - Displays the DTC View screen and/or scrolls the LCD display to view DTCs and Freeze Frame data.

4. **POWER/LINK button** - When the Scan Tool IS NOT connected to a vehicle, turns the Scan Tool "**On**" and "**Off**". When the Tool is connected to a vehicle, links the Scan Tool to the vehicle's PCM to retrieve diagnostic data from the computer's memory.

5. **M** button – When pressed, displays the Main Menu.

6. **LD button** – When pressed while linked to a vehicle, places the Scan Tool in Live Data mode.

7. **UP** button – When in MENU mode, scrolls UP through the menu and submenu selection options. When LINKED to a vehicle, scrolls UP through the current display screen to display any additional data.

8. **ENTER button** - When in MENU mode, confirms the selected option or value.

9. **DOWN button** - When in MENU mode, scrolls DOWN through the menu and submenu selection options. When LINKED to a vehicle, scrolls DOWN through the current display screen to display any additional data.

10. **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).

11. **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.

12. **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 Tool's display. In this case, the Malfunction Indicator ("Check Engine") lamp on the vehicle's instrument panel will light steady on.

13. **Display** - Displays settings Menu and submenus, test results, Scan Tool functions and Monitor status information. See **DISPLAY FUNCTIONS**, following, for more details.

14. **CABLE** - Connects the Tool to the vehicle's Data Link Connector (DLC).

DISPLAY FUNCTIONS
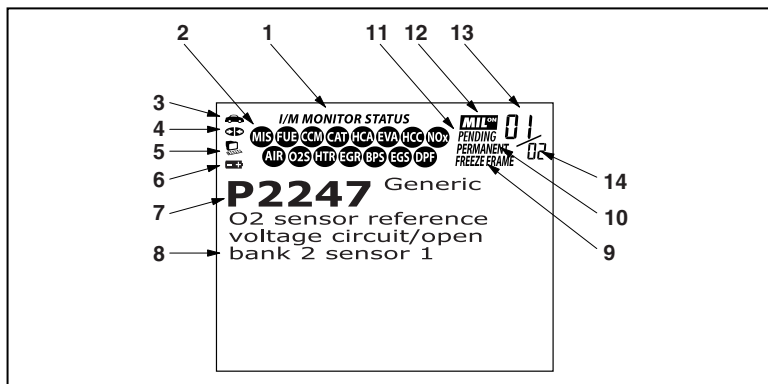
Figure 2. Display Functions

See Figure 2 for the locations of items 1 through 14, following.

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). When a Monitor icon is solid, it indicates that the associated Monitor has completed its diagnostic testing. When a Monitor icon is flashing, it indicates that the vehicle supports the associated Monitor, but the Monitor has not yet run its diagnostic testing.

3. **Vehicle icon** - Indicates whether or not the Scan Tool is being properly powered through the vehicle's Data Link Connector (DLC). A visible icon indicates that the Scan Tool is being powered through the vehicle's DLC connector.

4. **Link icon** - Indicates whether or not the Scan Tool is communicating (linked) with the vehicle's on-board computer. When visible, the Scan Tool is communicating with the computer. If the Link icon is not visible, the Scan Tool is not communicating with the computer.

5. **Computer icon** - When this icon is visible it indicates that the Scan Tool is linked to a personal computer. Optional software is available that makes it possible to upload retrieved data to a personal computer.

6. **Scan Tool Internal Battery icon** - When visible, indicates the Scan Tool batteries are "low" and should be replaced. If the batteries are not replaced when the battery symbol is "on", all 3 LEDs will light up as a last resort indicator to warn you that the batteries need replacement. No data will be displayed on screen when all 3 LEDs are lit.

7. **DTC Display Area** - Displays the Diagnostic Trouble Code (DTC) number. Each fault is assigned a code number that is specific to that fault.

8. **Test Data Display Area** - Displays DTC definitions, Freeze Frame data and other pertinent test information messages.

9. **FREEZE FRAME icon** - Indicates that there is Freeze Frame data from "Priority Code" (Code #1) stored in the vehicle's computer memory.

10. **PERMANENT icon** - Indicates the currently displayed DTC is a "Permanent" code.

11. **PENDING icon** - Indicates the currently displayed DTC is a "Pending" code.

12. **MIL icon** - Indicates the status of the Malfunction Indicator Lamp (MIL). The MIL icon is visible only when a DTC has commanded the MIL on the vehicle's dashboard to light.

13. **Code Number Sequence** - The Scan Tool assigns a sequence number to each DTC that is present in the computer's memory, starting with "01." This number indicates which code is currently displayed. Code number "01" is always the highest priority code, and the one for which "Freeze Frame" data has been stored.

If "01" is a "Pending" code, there may or may not be "Freeze Frame" data stored in memory.

14. **Code Enumerator** - Indicates the total number of codes retrieved from the vehicle's computer.

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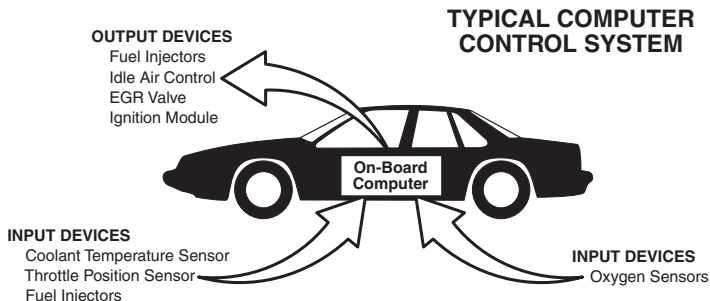
Most on-board computers are located inside the vehicle behind the dashboard, under the passenger's or driver's seat, or behind the right kick panel. However, some manufacturers may still position it in the engine compartment.

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.

TYPICAL COMPUTER CONTROL SYSTEM

OUTPUT DEVICES
Fuel Injectors
Idle Air Control
EGR Valve
Ignition Module

On-Board Computer

INPUT DEVICES
Coolant Temperature Sensor
Throttle Position Sensor
Fuel Injectors

INPUT DEVICES
Oxygen Sensors

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)

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 OBD2 System is an enhancement of the OBD1 System.

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 has 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 has not 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.

Onboard Diagnostics
DIAGNOSTIC TROUBLE CODES (DTCs)

■ **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.

Diagnostic Trouble Codes (DTCs) are codes that identify a specific problem area.

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).
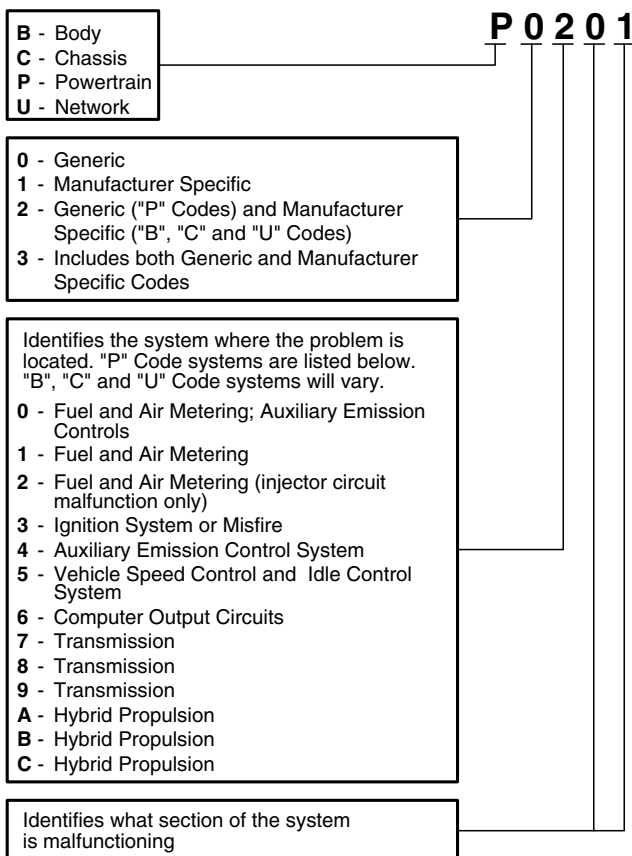
_**16**_ _**3160d**_

👉 *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

P 0 2 0 1

B - Body
C - Chassis
P - Powertrain
U - Network

0 - Generic
1 - Manufacturer Specific
2 - Generic ("P" Codes) and Manufacturer Specific ("B", "C" and "U" Codes)
3 - Includes both Generic and Manufacturer Specific Codes

Identifies the system where the problem is located. "P" Code systems are listed below. "B", "C" and "U" Code systems will vary.

0 - Fuel and Air Metering; Auxiliary Emission Controls
1 - Fuel and Air Metering
2 - Fuel and Air Metering (injector circuit malfunction only)
3 - Ignition System or Misfire
4 - Auxiliary Emission Control System
5 - Vehicle Speed Control and Idle Control System
6 - Computer Output Circuits
7 - Transmission
8 - Transmission
9 - Transmission
A - Hybrid Propulsion
B - Hybrid Propulsion
C - Hybrid Propulsion

Identifies what section of the system is malfunctioning

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 49, before erasing codes from the computer's memory. If a Diagnostic Tool or 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.

FUE **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.

MIS **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.

CAT **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.

HTR **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.

O2S **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.

AIR **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.

HCC **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.

DPF **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 CO_2 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

PRELIMINARY VEHICLE DIAGNOSTIC WORKSHEET

The purpose of this form is to help you gather preliminary information on your vehicle before you retrieve codes. By having a complete account of your vehicle's current problem(s), you will be able to systematically pinpoint the problem(s) by comparing your answers to the fault codes you retrieve. You can also provide this information to your mechanic to assist in diagnosis and help avoid costly and unnecessary repairs. It is important for you to complete this form to help you and/or your mechanic have a clear understanding of your vehicle's problems.

NAME:

DATE:

VIN*:

YEAR:

MAKE:

MODEL:

ENGINE SIZE:

VEHICLE MILEAGE:

*VIN: Vehicle Identification Number, found at the base of the windshield on a metallic plate, or at the driver door latch area (consult your vehicle owner's manual for location).

TRANSMISSION:

☐   Automatic

☐   Manual

Please check all applicable items in each category.

DESCRIBE THE PROBLEM:

WHEN DID YOU FIRST NOTICE THE PROBLEM:

☐ Just Started

☐ Started Last Week

☐ Started Last Month

☐ Other:

LIST ANY REPAIRS DONE IN THE PAST SIX MONTHS:

PROBLEMS STARTING

☐ No symptoms

☐ Will not crank

☐ Cranks, but will not start

☐ Starts, but takes a long time

ENGINE QUITS OR STALLS

☐ No symptoms

☐ Right after starting

☐ When shifting into gear

☐ During steady-speed driving

☐ Right after vehicle comes to a stop

☐ While idling

☐ During acceleration

☐ When parking

IDLING CONDITIONS

☐ No symptoms

☐ Is too slow at all times

☐ Is too fast

☐ Is sometimes too fast or too slow

☐ Is rough or uneven

☐ Fluctuates up and down

RUNNING CONDITIONS

☐ No symptoms

☐ Runs rough

☐ Lacks power

☐ Bucks and jerks

☐ Poor fuel economy

☐ Hesitates or stumbles on accelerations

☐ Backfires

☐ Misfires or cuts out

☐ Engine knocks, pings or rattles

☐ Surges

☐ Dieseling or run-on

AUTOMATIC TRANSMISSION PROBLEMS (if applicable)

- ☐ No symptoms
- ☐ Shifts too early or too late
- ☐ Changes gear incorrectly
- ☐ Vehicle does not move when in gear
- ☐ Jerks or bucks

PROBLEM OCCURS

- ☐ Morning
- ☐ Afternoon
- ☐ Anytime

ENGINE TEMPERATURE WHEN PROBLEM OCCURS

- ☐ Cold
- ☐ Warm
- ☐ Hot

DRIVING CONDITIONS WHEN PROBLEM OCCURS

- ☐ Short - less than 2 miles
- ☐ 2 - 10 miles
- ☐ Long - more than 10 miles
- ☐ Stop and go
- ☐ While turning
- ☐ While braking
- ☐ At gear engagement
- ☐ With A/C operating
- ☐ With headlights on
- ☐ During acceleration
- ☐ Mostly driving downhill
- ☐ Mostly driving uphill
- ☐ Mostly driving level
- ☐ Mostly driving curvy roads
- ☐ Mostly driving rough roads

DRIVING HABITS

- ☐ Mostly city driving
- ☐ Highway
- ☐ Park vehicle inside
- ☐ Park vehicle outside
- ☐ Drive less than 10 miles per day
- ☐ Drive 10 to 50 miles per day
- ☐ Drive more than 50 miles per day

GASOLINE USED

- ☐ 87 Octane
- ☐ 89 Octane
- ☐ 91 Octane
- ☐ More than 91 Octane

WEATHER CONDITIONS WHEN PROBLEM OCCURS

- ☐ 32 - 55° F (0 - 13° C)
- ☐ Below freezing (32° F / 0° C)
- ☐ Above 55° F (13° C)

CHECK ENGINE LIGHT / DASH WARNING LIGHT

- ☐ Sometimes ON
- ☐ Always ON
- ☐ Never ON

PECULIAR SMELLS

- ☐ "Hot"
- ☐ Sulfur ("rotten egg")
- ☐ Burning rubber
- ☐ Gasoline
- ☐ Burning oil
- ☐ Electrical

STRANGE NOISES

- ☐ Rattle
- ☐ Knock
- ☐ Squeak
- ☐ Other

BEFORE YOU BEGIN

The Scan Tool aids in monitoring electronic- and emissions-related faults in your vehicle and retrieving fault codes related to malfunctions in these systems. Mechanical problems such as low oil level or damaged hoses, wiring or electrical connectors can cause poor engine performance and may also cause a fault code to set. Fix any known mechanical problems before performing any test. See your vehicle's service manual or a mechanic for more information.

Check the following areas **before** starting any test:

■ Check the engine oil, power steering fluid, transmission fluid (if applicable), engine coolant and other fluids for proper levels. Top off low fluid levels if needed.

■ Make sure the air filter is clean and in good condition. Make sure all air filter ducts are properly connected. Check the air filter ducts for holes, rips or cracks.

■ Make sure all engine belts are in good condition. Check for cracked, torn, brittle, loose or missing belts.

■ Make sure mechanical linkages to engine sensors (throttle, gearshift position, transmission, etc.) are secure and properly connected. See your vehicle's service manual for locations.

■ Check all rubber hoses (radiator) and steel hoses (vacuum/fuel) for leaks, cracks, blockage or other damage. Make sure all hoses are routed and connected properly.

■ Make sure all spark plugs are clean and in good condition. Check for damaged, loose, disconnected or missing spark plug wires.

■ Make sure the battery terminals are clean and tight. Check for corrosion or broken connections. Check for proper battery and charging system voltages.

■ Check all electrical wiring and harnesses for proper connection. Make sure wire insulation is in good condition, and there are no bare wires.

■ Make sure the engine is mechanically sound. If needed, perform a compression check, engine vacuum check, timing check (if applicable), etc.

VEHICLE SERVICE MANUALS

Always refer to the manufacturer's service manual for your vehicle before performing any test or repair procedures. Contact your local car dealership, auto parts store or bookstore for availability of these manuals. The following companies publish valuable repair manuals:

■ **Haynes Publications**
861 Lawrence Drive
Newbury Park, California 91320
Phone: 800-442-9637
Web: www.haynes.com

■ **Mitchell 1**
14145 Danielson Street
Poway, California 92064
Phone: 888-724-6742
Web: www.m1products.com

■ **Motor Publications**
5600 Crooks Road, Suite 200
Troy, Michigan 48098
Phone: 800-426-6867
Web: www.motor.com
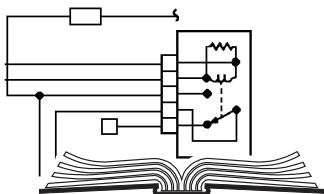
FACTORY SOURCES

Ford, GM, Chrysler, Honda, Isuzu, Hyundai and Subaru Service Manuals

■ **Helm Inc.**
14310 Hamilton Avenue
Highland Park, Michigan 48203
Phone: 800-782-4356
Web: www.helminc.com

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. This information is found in the vehicle's service manual. Always refer to the vehicle's service manual for detailed testing instructions.

Check your vehicle thoroughly before performing any test. See BEFORE YOU BEGIN on page 31 for details.

ALWAYS observe safety precautions whenever working on a vehicle. See SAFETY PRECAUTIONS on page 3 for more information.

1. Turn the ignition off.

2. Locate the vehicle's 16-pin Data Link Connector (DLC). See page 5 for connector location.

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

*If the Scan Tool is ON, turn it OFF by pressing the **POWER/LINK** ⊂▷⏻ button BEFORE connecting the Tool to the DLC.*
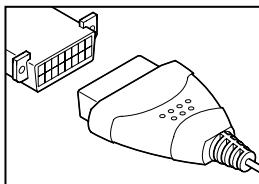
3. Connect the Scan Tool cable connector to the vehicle's DLC. The cable connector is keyed and will only fit one way.

■ If you have problems connecting the cable connector to the DLC, rotate the connector 180° and try again.

■ If you still have problems, check the DLC on the vehicle and on the Scan Tool. Refer to your vehicle's service manual to properly check the vehicle's DLC.

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

5. When the Scan Tool's cable connector is properly connected to the vehicle's DLC, the unit automatically turns ON.

■ If the unit does not power on automatically when connected to the vehicle's DLC connector, it usually indicates there is no power present at the vehicle's DLC connector. Check your 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 will automatically start 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. The protocol type used by the vehicle's computer is shown on the display.

```
One moment
Auto-Link is in progress

Battery voltage, 11.8

Detecting the protocol
```
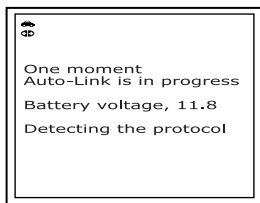
A PROTOCOL is a set of rules and procedures for regulating data transmission between computers, and between testing equipment and computers. As of this writing, five different types of protocols (ISO 9141, Keyword 2000, J1850 PWM, J1850 VPW and CAN) are in use by vehicle manufacturers. The Scan Tool automatically identifies the protocol type and establishes a communication link with the vehicle's computer.

```
One moment
Auto-Link is in progress

Linked to ISO 9141
```
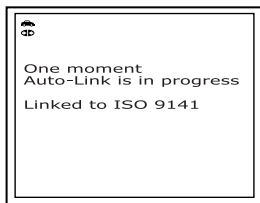
7. After approximately 10~60 seconds, the Scan Tool will **retrieve** and **display** any Diagnostic Trouble Codes, I/M Monitor Status and Freeze Frame Data retrieved from the vehicle's computer memory.

■ If the Scan Tool fails to link to the vehicle's computer a "Linking Failed" message shows on the Scan Tool's display.

```
Unable to establish a
link with the vehicle
Verify the connection at
the DLC. Verify the
ignition is ON and press
▣▣ button
```

- Verify the connection at the DLC, and verify the ignition is ON.

- Turn the ignition OFF, wait 5 seconds, then turn back ON to reset the computer.
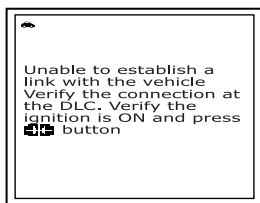
- Ensure your vehicle is OBD2 compliant. See VEHICLES COVERED on page 5 for vehicle compliance verification information.

■ The Scan Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, the message "No Powertrain DTCs or Freeze Frame Data presently stored in the vehicle's computer. Press **DTC** button to continue" displays. Press the **SYSTEM MENU** (S) button to enter the "OEM Enhanced" mode (see THE SYSTEM MENU on page 38).

```
I/M MONITOR STATUS
MIS FUB CCM CAT HCA EVA HCG NOx
AIR O2S HTR EGR BPS EGS DPF

No Powertrain DTCs or
Freeze Frame data
presently stored in the
vehicle's computer.
Press DTC button to
continue
```
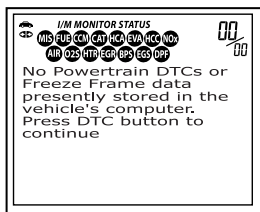
■ The Scan Tool is capable of retrieving and storing up to 32 codes in memory, for immediate or later viewing.

8. To read the display:

☞ *Refer to DISPLAY FUNCTIONS on page 9 for a description of display elements.*

■ A visible 🚗 icon indicates that the Scan Tool is being powered through the vehicle's DLC connector.

■ A visible ⬌ icon indicates that the Scan Tool is linked to (communicating with) the vehicle's computer.

■ The I/M Monitor Status icons indicate the type and number of Monitors the vehicle supports, and provides indications of the current status of the vehicle's Monitors. A **solid** Monitor icon indicates the associated Monitor **has run** and completed its testing. A **blinking** Monitor icon indicates the associated Monitor **has not** run and completed its testing.

■ The upper right hand corner of the display shows the number of the code currently being displayed, the total number of codes retrieved, and whether or not the displayed code commanded the MIL on. If the code being displayed is a PENDING code, the PENDING icon is shown. If the code being displayed is a PERMANENT code, the PERMA-NENT icon is shown.

> I/M MONITOR STATUS
> MIS FUE CCM CAT HCA EVA HCC NOx
> AIR O2S HTR EGR BPS EGS OPF
> MIL 01/02 FREEZE FRAME
> **P0743** Generic
> Torque Converter Clutch
> Solenoid Circuit
> Electrical

■ The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the display.
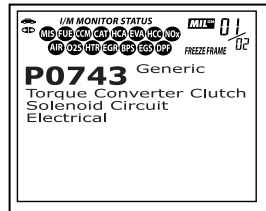
☞ *In the case of long code definitions, a small arrow is shown in the upper/lower right-hand corner of the Scan Tool display area to indicate the presence of additional information. Use the △ and ▽ buttons, as necessary, to view the additional information.*

☞ *If a definition for the currently displayed code is not available, an advisory message shows on the Tool's display.*

> I/M MONITOR STATUS
> MIS FUE CCM CAT HCA EVA HCC NOx
> AIR O2S HTR EGR BPS EGS OPF
> MIL 01/02 FREEZE FRAME
> **P0744** Generic
> The DTC Definition is
> not available please visit
> www.innova.com

9. Read and interpret Diagnostic Trouble Codes/system condition using the display and the green, yellow and red LEDs.
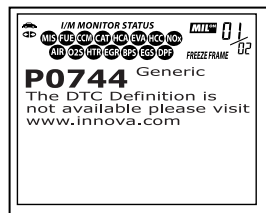
☞ *The green, yellow and red LEDs are used (with the display) as visual aids to make it easier to determine engine system conditions.*

■ **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.
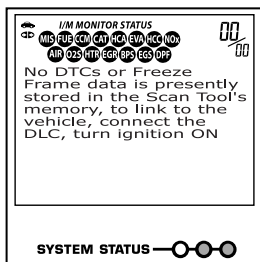
■ **Yellow LED** – Indicates one of the following conditions:

A. A PENDING CODE IS PRESENT – If the yellow LED is illuminated, it may indicate a Pending code is present. Check the Scan Tool's display for confirmation. A Pending code is confirmed by the presence of a numeric code and the word PENDING on the Scan Tool's display.
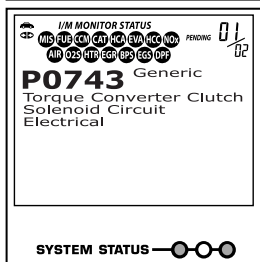
B. MONITOR NOT RUN STATUS – If the Scan Tool's display shows a zero (indicating there are no DTC's present in the vehicle's computer memory), but the yellow LED is illuminated, it may be an indication that some of the Monitors supported by the vehicle have not yet run and completed their diagnostic testing. Check the Scan Tool's 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.
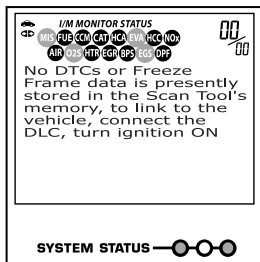
■ **Red LED** – Indicates there is a problem with one or more of the vehicle's systems. The red LED is also used to indicate that DTC(s) are present (displayed on the Scan Tool's screen). In this case, the Malfunction Indicator (Check Engine) lamp on the vehicle's instrument panel will be illuminated.
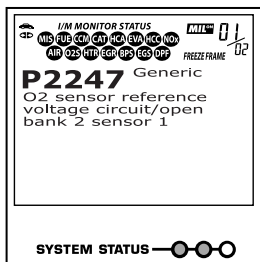
■ DTC's that start with "P0", "P2" and some "P3" are considered Generic (Universal). All Generic DTC definitions are the same on all OBD2 equipped vehicles. The Scan Tool automatically displays the code definitions (if available) for Generic DTC's.

- DTC's that start with "P1" and some "P3" are Manufacturer specific codes and their code definitions vary with each vehicle manufacturer. When a Manufacturer specific DTC is retrieved, the LCD display shows a list of vehicle manufacturers. Use the **UP** ⊘ and **DOWN** ⊝ buttons, as necessary, to highlight the appropriate manufacturer, then press the **ENTER** ⏎ button to display the correct code definition for your vehicle. A confirmation message shows on the LCD display.
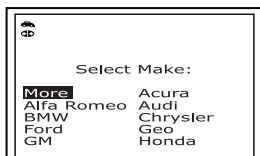
  - If the correct manufacturer is shown, use the **UP** ⊘ and **DOWN** ⊝ buttons, as necessary, to highlight **YES**, then press the **ENTER** ⏎ button to continue.
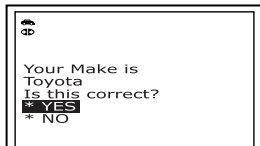
  - If the correct manufacturer is not shown, Use **UP** ⊘ and **DOWN** ⊝ buttons, as necessary, to highlight **NO**, then press the **ENTER** ⏎ button to return to the list of vehicle manufacturers.

☞ *If the manufacturer for your vehicle is not listed, use the **UP** ⊘ and **DOWN** ⊝ buttons, as necessary, to select **Other manufacturer** and press the **ENTER** ⏎ button for additional DTC information.*

☞ *If the definition for the currently displayed code is not available, an advisory message shows on the Scan Tool's LCD display.*

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

- Each time the **DTC/FF** button is pressed and released, the Scan Tool will scroll and display the next DTC in sequence until all DTCs in its memory have displayed.

- Freeze Frame Data (if available) will display after DTC #1.

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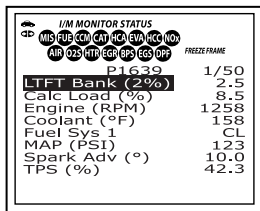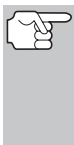
☞ *If more than one malfunction is present that causes more than one DTC to be set, only the code with the highest priority will contain Freeze Frame data. The code designated "**01**" on the Scan Tool display is referred to as the PRIORITY code, and Freeze Frame data always refers to this code. The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

☞ *Retrieved information can be uploaded to a Personal Computer (PC) with the use of optional software (see instructions included with the software for more information).*

11. When the last retrieved DTC has been displayed and the **DTC/FF** button is pressed, the Scan Tool returns to the "Priority" code.

- See VIEWING OEM ENHANCED DTCs on page 40 to view OEM enhanced DTCs, ABS DTCs, or SRS DTCs for your vehicle.

- If you do not wish to view OEM enhanced, ABS or SRS DTCs, press the **M** button to return to the Main Menu.

12. Determine engine system(s) condition by viewing the Scan Tool's display for any retrieved Diagnostic Trouble Codes, code definitions and Freeze Frame data, 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).

- If you plan to take the vehicle to a professional to have it serviced, complete the PRELIMINARY VEHICLE DIAGNOSTIC WORKSHEET on page 28 and take it together with the retrieved codes, freeze frame data and LED information to aid in the troubleshooting procedure.

- To prolong battery life, the Scan Tool automatically shuts "Off" approximately three minutes after it is disconnected from the vehicle. The DTCs retrieved, Monitor Status and Freeze Frame data (if any) will remain in the Scan Tool's memory, and may be viewed at any time by turning the unit "On". If the Scan Tool's batteries are re-moved, or if the Tool is re-linked to a vehicle to retrieve codes/data, any prior codes/data in its memory are automatically cleared.

THE SYSTEM MENU

The System Menu provides the ability to retrieve *enhanced* DTCs from most Audi, BMW, Chrysler/Jeep, Ford/Mazda, GM/Isuzu, Honda/Acura, Hyundai, Kia, Mercedes Benz, Toyota/Lexus and Volkswagen vehicles. The types of enhanced data available depends on the vehicle make.

- To view OEM enhanced DTCs (if available), press the **SYSTEM MENU** Ⓢ button; the System Menu displays. Use the **UP** △ and **DOWN** ▽ buttons, as necessary, to highlight the desired option, then press the **ENTER** ↵ button to view the selected information, or, press the **M** button to exit.
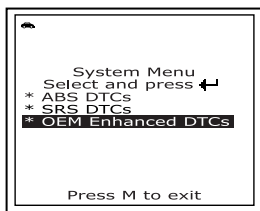
```
        System Menu
    Select and press ↵
  * ABS DTCs
  * SRS DTCs
  * OEM Enhanced DTCs

      Press M to exit
```

- If *no* DTCs were retrieved, or *only* generic DTCs were retrieved, and **OEM Enhanced DTCs**, **ABS DTCs** or **SRS DTCs** is selected, the Select Manufacturer screen displays. Use the **UP** ⊝ and **DOWN** ⊝ buttons, as necessary, to highlight the appropriate manufacturer, then press the **ENTER** ⊕ button to view the selected information.

```
Enhanced DTCs are
available for the
following vehicles:

Ford          GM
Chrysler      Honda
Toyota        Mercedes
Isuzu         Audi
Volkswagen    Hyundai
Kia           Nissan
Exit
```
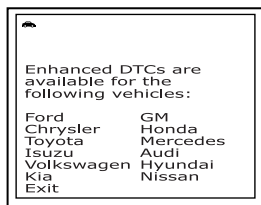
If the manufacturer of the vehicle from which codes were retrieved is not listed, use the UP ⊝ and DOWN ⊝ buttons, as necessary, to highlight Exit on the Select Manufacturer screen, then press the M button to return to the Main Menu. OEM enhanced data is not available for your vehicle.

■ If a Manufacturer specific DTC was retrieved, and the manufacturer selected for the code was Chrysler, Jeep, Ford, Mazda, General Motors, Isuzu, Honda, Acura, Toyota or Lexus, the Select Data menu displays, as appropriate. Use the **UP** ⊝ and **DOWN** ⊝ buttons, as necessary, to highlight the desired option, the press the **ENTER** ⊕ button to view the selected information, or, press the **M** button to return to the Main Menu.

■ If the manufacturer selected was Audi, BMW, Hyundai, Kia, Mercedes Benz or Volkswagen, the Scan Tool retrieves enhanced DTCs from the vehicle's computer.

■ If enhanced communication is not supported by the vehicle under test, an advisory message displays. Press the **M** button to exit. OEM enhanced DTCs are not available for your vehicle.

```
This vehicle does not
support Enhanced
communication




        Press M to exit
```

To view OEM Enhanced DTCs: Select **OEM Enhanced DTCs** from the System Menu (then choose the appropriate manufacturer if prompted). Refer to VIEWING OEM ENHANCED DTCs on page 40 to view enhanced DTCs for your vehicle.

```
        System Menu
     Select and press ⏎
  *  ABS DTCs
  *  SRS DTCs
  * OEM Enhanced DTCs


        Press M to exit
```
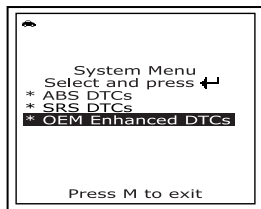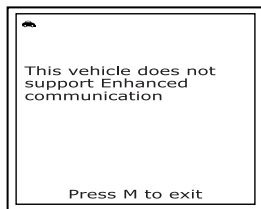
To view ABS DTCs: Select **ABS DTCs** from the System Menu (then choose the appropriate manufacturer if prompted). Refer to VIEWING ABS DTCs on page 50 to view ABS DTCs for your vehicle.

```
        System Menu
     Select and press ⏎
  * ABS DTCs
  *  SRS DTCs
  *  OEM Enhanced DTCs


        Press M to exit
```
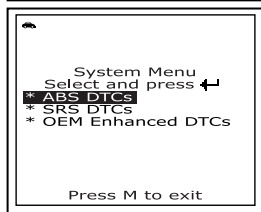
To view SRS DTCs: Select **SRS DTCs** from the System Menu (then choose the appropriate manufacturer if prompted). Refer to VIEWING SRS DTCs on page 51 to view SRS DTCs for your vehicle.

```
System Menu
Select and press ↵
* ABS DTCs
* SRS DTCs
* OEM Enhanced DTCs


   Press M to exit
```
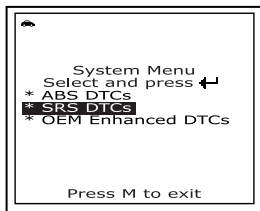
VIEWING OEM ENHANCED DTCs

Refer to the appropriate paragraph to view enhanced data for your vehicle:

- Chrysler/Jeep... page 40
- Ford/Mazda... page 41
- GM/Isuzu.. page 44
- Honda/Acura .... page 45
- Toyota/Lexus .... page 47
- Other Vehicle .... page 49

Chrysler/Jeep Enhanced DTCs

When **OEM Enhanced DTCs** is chosen from the System Menu (and **Chrysler** is selected when prompted), the Chrysler Enhanced menu displays. You may view either "Engine DTCs" or "Transmission DTCs."

1. Use the **UP** ⌃ and **DOWN** ⌄ buttons, as necessary, to highlight the desired option, then press the **ENTER** ↵ button.

☞ *Transmission DTCs **are not** supported on most Chrysler/Jeep vehicles manufactured prior to 2002.*

- A "One moment please" message displays while the Scan Tool retrieves the selected DTCs.

- If the Scan Tool fails to link to the vehicle's computer, a "Linking Failed" message shows on the Scan Tool's display.

    - Verify the ignition is ON, then press the **POWER/LINK** ⊲▷⏻ button to continue.

```
Chrysler Enhanced
Select and press ↵
* Engine DTCs
* Transmission DTCs


   Press M to exit
```

```
Chrysler Enhanced

Unable to establish a
link with the vehicle.
Verify the connection at
the DLC. Verify the
ignition is ON and press
⊲▮▷ button
   Press M to exit
```

2. To read the display:

☞ *Refer to DISPLAY FUNCTIONS on page 9 for a description of LCD display elements.*

- A visible 🚗 icon indicates that the Scan Tool is being powered through the vehicle's DLC connector.

■ The upper right hand corner of the display shows the number of the code currently being displayed, the total number of codes retrieved.

```
                                    01/
                                      02
P1250  Chrysler
       Engine
Vacuum reservoir
control circuit open
```

■ The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display.

> *If the definition for the currently displayed code is not available, an advisory message shows on the Tool's LCD display.*

```
                                    01/
                                      02
P1251  Chrysler
       Engine
The DTC Definition is
not available, please
visit: www.innova.com
```

> *I/M MONITOR STATUS icons are not displayed when viewing enhanced DTCs.*

> *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 code display area to indicate the presence of additional information. Use the **UP** ⊘ and **DOWN** ⊘ buttons, as necessary, to view the additional information.*

■ The Scan Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No Enhanced DTC's are presently stored in the vehicle's computer" is displayed. Press the **M** button to return to the Main Menu.

```
No Enhanced DTCs are
presently stored in the
vehicle's computer.



      Press M to exit
```

3. If more than one code was retrieved press the **DTC/FF** button, as necessary, to display additional codes one at a time.

■ Whenever the Scroll function is used to view additional codes, the Scan Tool's communication link with the vehicle's computer disconnects. To re-establish communication, press the **POWER/LINK** ⊂⊃⏻ button again.

4. When the last retrieved DTC has been displayed and the **DTC/FF** button is pressed, the Scan Tool returns to the "Priority" code.

■ To view *additional* enhanced DTCs, repeat steps **1** through **4**, above.

■ To exit the enhanced mode, press the **M** button. The Scan Tool returns to the Main Menu.

Ford/Mazda Enhanced DTCs

> *Mazda Enhanced DTCs are available for **Mazda-branded Ford vehicles only**.*
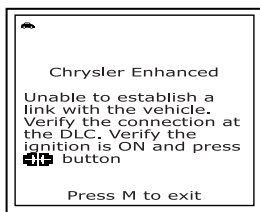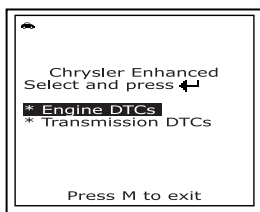
When **OEM Enhanced DTCs** is chosen from the System Menu (and **Ford** is selected when prompted), the Ford Enhanced menu displays. You may view DTCs for either the "Continuous Memory Test", "KOEO (Key On Engine Off) Test" or "KOER (Key On Engine Running) Test."

1. Use the **UP** ⊖ and **DOWN** ⊝ buttons, as necessary, to highlight the desired option, then press the **ENTER** ⏎ button.

    ☞ *When choosing to view **KOER Test** DTCs, start the vehicle's engine before making your selection.*

    ■ If the KOER Test was selected, and the vehicle's engine *is not* running, an advisory message shows on the Scan Tool's display.

        - Press the **M** button to return to the Main Menu.

    ■ If the KOEO Test was selected, and the vehicle's engine *is running*, an advisory message shows on the Scan Tool's display.

        - Press the **M** button to return to the Main Menu.

2. An "instructional" message shows on the Scan Tool's display. Perform test procedures as appropriate.

    ■ If the Continuous Memory or KOEO test was selected, turn the ignition OFF, then back ON. Press the **ENTER** ⏎ button to start the test.

        - A "One moment please" message displays while the test is in progress.

    ■ If the KOER test was selected, press the **ENTER** ⏎ button to continue.

        - Turn the steering wheel to the right, then release.

        - Press and release the brake pedal.

        - Cycle the overdrive switch (if equipped).

        - A "One moment please" message displays while the test is in progress.

```
         Ford Enhanced
Select and press ⏎
* Continuous Memory
Test
* KOEO Test
* KOER Test

    Press M to exit
```

```
         Ford KOER
The vehicle must be
running to perform the
KOER test.



    Press M to exit
```

```
Enhanced DTCs are
available for the
following vehicles:

Ford        GM
Chrysler    Honda
Toyota

    Press M to exit
```

```
         Ford KOEO
Turn ignition OFF, then
back ON. When
complete, press ⏎ to
start KOEO test.
```

```
         Ford KOER
When test starts, do the
following:
* Turn steering wheel
1/2 turn to right
* Press and release the
brake pedal
* Cycle the overdrive
switch (if equipped)
Press ⏎ to continue
```

- A "One moment please" message displays, while the Scan Tool retrieves the selected DTCs.

- If the Scan Tool fails to link to the vehicle's computer, a "Linking Failed" message shows on the Scan Tool's Display.

```
Ford Enhanced

Unable to establish a
link with the vehicle.
Verify the connection at
the DLC. Verify the
ignition is ON and press
       button

Press M to exit
```

  - Verify the ignition is ON, then press the **POWER/LINK** button to continue.

3. To read the display:

Refer to DISPLAY FUNCTIONS on page 9 for a description of LCD display elements.

- A visible icon indicates that the Scan Tool is being powered through the vehicle's DLC connector.

- The upper right hand corner of the display shows the number of the code currently being displayed, the total number of codes retrieved.

```
                    01/02

P1250  Ford
       KOEO
Vacuum reservoir
control circuit open
```

- The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display.

  If the definition for the currently displayed code is not available, an advisory message shows on the Scan Tool's LCD display.

  I/M MONITOR STATUS icons are not displayed when viewing enhanced DTCs.

```
                    01/02

P1251  Ford
       KOEO
The DTC Definition is
not available, please
visit: www.innova.com
```

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 code display area to indicate the presence of additional information. Use the ⊘ and ⊘ buttons, as necessary, to view the additional information.

- The Scan Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No Enhanced DTC's are presently stored in the vehicle's computer" is displayed. Press the **M** button to return to the Main Menu.

```
No Enhanced DTCs are
presently stored in the
vehicle's computer.

Press M to exit
```

4. If more than one code was retrieved press the **DTC/FF** button, as necessary, to display additional codes one at a time.

■ Whenever the Scroll function is used to view additional codes, the Scan Tool's communication link with the vehicle's computer disconnects. To re-establish communication, press the **POWER/LINK** ◁▷⏻ button again.

5. When the last retrieved DTC has been displayed and the **DTC/FF** button is pressed, the Scan Tool returns to the "Priority" code.

■ To view *additional* enhanced DTCs, repeat steps **1** through **5**, above.

■ To exit the enhanced mode, press the **M** button. The Scan Tool returns to the Main Menu.

General Motors/Isuzu Enhanced DTCs

When **OEM Enhanced DTCs** is chosen from the System Menu (and **General Motors** is selected when prompted), the GM Enhanced menu displays. You may view the "MIL DTC", "Current DTC", "Fail Since Clear DTC" or "History DTC."

1. Use the **UP** ⊝ and **DOWN** ⊝ buttons, as necessary, to highlight the desired option, then press the **ENTER** ⊕ button.

■ A "One moment please" message displays while the Tool retrieves the selected DTCs.

■ If the Scan Tool fails to link to the vehicle's computer, a "Linking Failed" message shows on the Scan Tool's display.

   - Verify the ignition is ON, then press the **POWER/LINK** ◁▷⏻ button to continue.

```
       GM Enhanced
Select and press  ↵

* MIL DTCs
* Current DTCs
* Fail Since Clear DTCs
* History DTCs


     Press M to exit
```

```
       GM Enhanced

Unable to establish a
link with the vehicle.
Verify the connection at
the DLC. Verify the
ignition is ON and press
◁▷  button

     Press M to exit
```
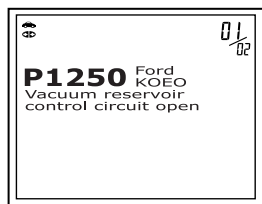
2. To read the display:

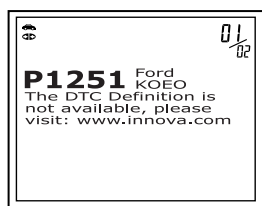☞ *Refer to DISPLAY FUNCTIONS on page 9 for a description of LCD display elements.*

■ A visible ⛟ icon indicates that the Scan Tool is being powered through the vehicle's DLC connector.

■ The upper right hand corner of the display shows the number of the code currently being displayed, the total number of codes retrieved.

■ The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display.

```
                          01
                          02
P1250  GM
       Current
Vacuum reservoir
control circuit open
```

If the definition for the currently displayed code is not available, an advisory message shows on the Scan Tool's LCD display.

P1251 GM
Current
The DTC Definition is not available, please visit:www.innova.com
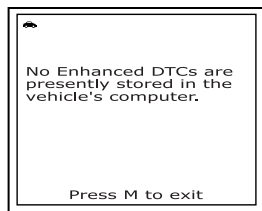
01/02

I/M MONITOR STATUS icons are not displayed when viewing enhanced DTCs.

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 code display area to indicate the presence of additional information. Use the △ and ▽ buttons, as necessary, to view the additional information.

- The Scan Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No Enhanced DTC's are presently stored in the vehicle's computer" is displayed. Press the **M** button to return to the Main Menu.

No Enhanced DTCs are presently stored in the vehicle's computer.

Press M to exit

3. If more than one code was retrieved press the **DTC/FF** button, as necessary, to display additional codes one at a time.

- Whenever the Scroll function is used to view additional codes, the Tool's communication link with the vehicle's computer disconnects. To re-establish communication, press the **POWER/LINK** ⊂▷⏻ button again.

4. When the last retrieved DTC has been displayed and the **DTC/FF** button is pressed, the Scan Tool returns to the "Priority" code.

- To view *additional* enhanced DTCs, repeat steps **1** through **4**, above.

- To exit the enhanced mode, press the **M** button. The Scan Tool returns to the Main Menu.

Honda/Acura Enhanced DTCs

When **OEM Enhanced DTCs** is chosen from the System Menu (and **Honda** is selected when prompted), the Honda Enhanced menu displays. Depending on the protocol used to communicate with your vehicle, the Honda Enhanced menu provides options to view:

- Confirmed DTCs or Pending DTCs

Honda Enhanced
Select and press ↵
* Confirmed DTCs
* Pending DTCs

Press M to exit
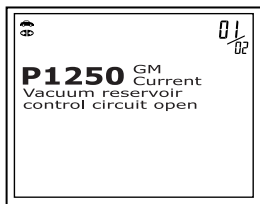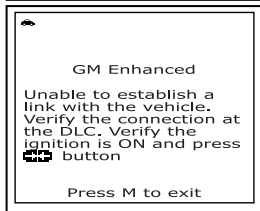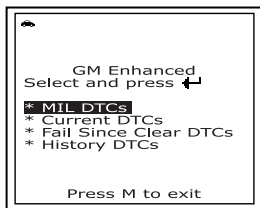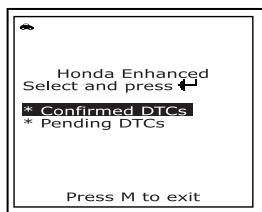
- Permanent DTCs or Temporary DTCs

1. Use the **UP** ⊖ and **DOWN** ⊖ buttons, as necessary, to highlight the desired option, then press the **ENTER** ⊕ button.

   - A "One moment please" message displays while the Tool retrieves the

     selected DTCs.

   - If the Scan Tool fails to link to the vehicle's computer, a "Linking Failed" message shows on the Scan Tool's display.

     - Verify the ignition is ON, then press the **POWER/LINK** ◁▷⏻ button to continue.

> Honda Enhanced
> Select and press ↵
> * Permanent DTCs
> * Temporary DTCs
>
> Press M to exit

> Honda Enhanced
>
> Unable to establish a link with the vehicle. Verify the connection at the DLC. Verify the ignition is ON and press button
>
> Press M to exit

2. To read the display:

> *Refer to DISPLAY FUNCTIONS on page 9 for a description of LCD display elements.*

   - A visible ⛟ icon indicates that the Scan Tool is being powered through the vehicle's DLC connector.

   - The upper right hand corner of the display shows the number of the code currently being displayed, the total number of codes retrieved.

   - The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display.

> 01/02
> **P1456** Honda 90-01
> Permanent
> EVAP Emission Control System Leak Detected (Fuel Tank System)

> *If the definition for the currently displayed code is not available, an advisory message shows on the Scan Tool's LCD display.*

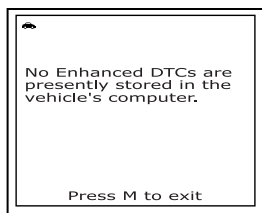> *I/M MONITOR STATUS icons are not displayed when viewing enhanced DTCs.*

> 01/02
> **P1457** Honda 90-01
> Permanent
> The DTC Definition is not available, please visit: www.innova.com

> *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 code display area to indicate the presence of additional information. Use the ⊖ and ⊖ buttons, as necessary, to view the additional information.*

- The Scan Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No Enhanced DTC's are presently stored in the vehicle's computer" is displayed. Press the **M** button to return to the Main Menu.

```
No Enhanced DTCs are
presently stored in the
vehicle's computer.



      Press M to exit
```

3. If more than one code was retrieved press the **DTC/FF** button, as necessary, to display additional codes one at a time.

- Whenever the Scroll function is used to view additional codes, the Scan Tool's communication link with the vehicle's computer disconnects. To re-establish communication, press the **POWER/LINK** ◀▷⏻ button again.

4. When the last retrieved DTC has been displayed and the **DTC/FF** button is pressed, the Scan Tool returns to the "Priority" code.

- To view *additional* enhanced DTCs, repeat steps **1** through **4**, above.

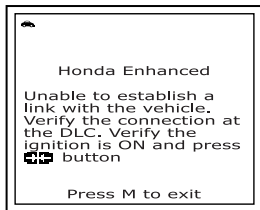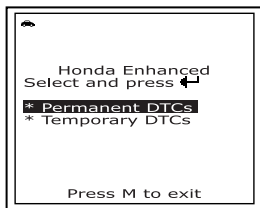- To exit the enhanced mode, press the **M** button. The Scan Tool returns to the Main Menu.

Toyota/Lexus Enhanced DTCs

When **OEM Enhanced DTCs** is chosen from the System Menu (and **Toyota** is selected when prompted), the Toyota Enhanced menu displays. Depending on the protocol used to communicate with your vehicle, the Toyota Enhanced menu provides options to view:

```
      Toyota Enhanced
Select and press ↵
* Current DTCs
* History DTCs
* Pending DTCs


      Press M to exit
```

- Current DTCs, History DTCs or Pending DTCs

- Current DTCs, Historical DTCs or Readiness DTCs

1. Use the **UP** ⌃ and **DOWN** ⌄ buttons, as necessary, to highlight the desired option, then press the **ENTER** ↵ button.

```
      Toyota Enhanced
Select and press ↵
* Current DTCs
* Historical DTCs
* Readiness DTCs


      Press M to exit
```

- A "One moment please" message displays while the Scan Tool retrieves the selected DTCs.

- If the Scan Tool fails to link to the vehicle's computer, a "Linking Failed" message shows on the Scan Tool's display.

```
      Toyota Enhanced

Unable to establish a
link with the vehicle.
Verify the connection at
the DLC. Verify the
ignition is ON and press
▣▣ button

      Press M to exit
```

- Verify the ignition is ON, then press the **POWER/LINK** ◀▷⏻ button to continue.
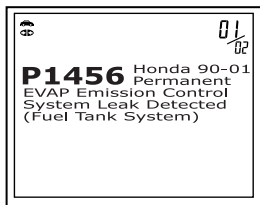
2. To read the display:

☞ *Refer to DISPLAY FUNCTIONS on page 9 for a description of LCD display elements.*
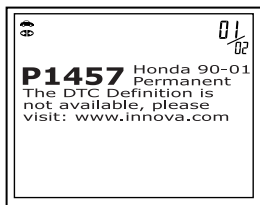
- A visible 🚗 icon indicates that the Scan Tool is being powered through the vehicle's DLC connector.

- The upper right hand corner of the display shows the number of the code currently being displayed, the total number of codes retrieved.

- The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display.

> ☞ *If the definition for the currently displayed code is not available, an advisory message shows on the Scan Tool's LCD display.*
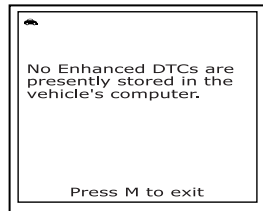
> ☞ *I/M MONITOR STATUS icons are not displayed when viewing enhanced DTCs.*

> ☞ *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 code display area to indicate the presence of additional information. Use the ⊘ and ⊘ buttons, as necessary, to view the additional information.*

- The Scan Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No Enhanced DTC's are presently stored in the vehicle's computer" is displayed. Press the **M** button to return to the Main Menu.

3. If more than one code was retrieved press the **DTC/FF** button, as necessary, to display additional codes one at a time.

- Whenever the Scroll function is used to view additional codes, the Scan Tool's communication link with the vehicle's computer disconnects. To re-establish communication, press the **POWER/LINK** ⊂▷⏻ button again.

4. When the last retrieved DTC has been displayed and the **DTC/FF** button is pressed, the Tool returns to the "Priority" code.

- To view *additional* enhanced DTCs, repeat steps **1** through **4**, above.

- To exit the enhanced mode, press the **M** button. The Scan Tool returns to the Main Menu.

Enhanced DTCs for Other Vehicles

When **OEM Enhanced DTCs** is chosen from the System Menu (and **Audi**, **BMW**, **Hyundai**, **Kia**, **Mercedes**, or **Volkswagen** is selected when prompted, the Scan Tool retrieves enhanced DTCs from the vehicle's computer.

1. A "One moment please message displays while the Scan Tool retrieves enhanced DTCs.

```
Audi Enhanced
One moment please.
Retrieving Audi
Enhanced DTCs...
```

■ If the Scan Tool fails to link to the vehicle's computer, a "Linking Failed" message shows on the Scan Tool's display.

- Verify the ignition is ON, then press the **POWER/LINK** ⊏⊃⏻ button to continue.

```
Audi Enhanced
Unable to establish a
link with the vehicle.
Verify the connection at
the DLC. Verify the
ignition is ON and press
⊏⊐ button

Press M to exit
```

2. To read the display:

☞ *Refer to DISPLAY FUNCTIONS on page 9 for a description of LCD display elements.*

■ A visible 🚗 icon indicates that the Scan Tool is being powered through the vehicle's DLC connector.

■ The upper right hand corner of the display shows the number of the code currently being displayed, the total number of codes retrieved.

```
             01/
             02
P0100 Audi
       Current
Mass or Volume Air Flow
Circuit
```

■ The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display.
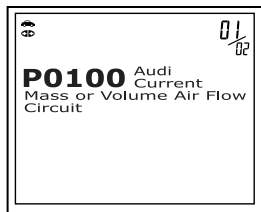
☞ *I/M MONITOR STATUS icons are not displayed when viewing enhanced DTCs.*

☞ *Freeze Frame data, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the ⊘ and ⊙ buttons, as necessary, to view the additional information.*

■ The Scan Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No Enhanced DTC's are presently stored in the vehicle's computer" is displayed. Press the **M** button to return to the Main Menu.

3. If more than one code was retrieved press the **DTC/FF** button, as necessary, to display additional codes one at a time.

■ Whenever the Scroll function is used to view additional codes, the Scan Tool's communication link with the vehicle's computer disconnects. To re-establish communication, press the **POWER/LINK** ⊏⊃⏻ button again.

4. When the last retrieved DTC has been displayed and the **DTC/FF** button is pressed, the Scan Tool returns to the "Priority" code.

    ■ To exit the enhanced mode, press the **M** button. The Scan Tool returns to the Main Menu.

VIEWING ABS DTCs

Refer to Vehicle Applications - ABS on page 89 for Vehicle Makes.

Reading ABS DTCs

1. When **ABS DTCs** is chosen from the System Menu, a "One moment please" message displays while the Scan Tool retrieves the selected DTCs.

    ■ If the Scan Tool fails to link to the vehicle's computer, a "Linking Failed" message shows on the Scan Tool's display.

        - Verify the ignition is ON, then press the **ENTER** ⏎ button to continue.

        ```
        Chrysler ABS

        Unable to establish a
        link with the vehicle.
        Verify the connection at
        the DLC. Verify the
        ignition is ON and press
        ▣▣ button

            Press M to exit
        ```
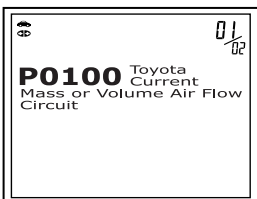
2. To read the display:

    Refer to DISPLAY FUNCTIONS on page 9 for a description of LCD display elements.

    ■ A visible 🚗 icon indicates that the Scan Tool is being powered through the vehicle's DLC connector.

    ■ A visible ⬌ icon indicates that the Scan Tool is linked to (communicating with) the vehicle's computer.

    ■ The upper right hand corner of the display shows the number of the code currently being displayed, the total number of codes retrieved.

    ■ The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display.

        ```
        🚗  I/M MONITOR STATUS            01
        ⬌ MIS FUE CCM CAT HCA EVA HCC NOx   /
            AIR O2S HTR EGR BPS EGS OPF     02
        C1274
        Right front ABS wheel-
        speed sensor/ABS
        sensor rotor signal
        abnormal
        ```

    If the definition for the currently displayed code is not available, an advisory message shows on the Scan Tool's LCD display.

        ```
        P1274  Ford
        The DTC definition is not
        available, please visit
        www.innova.com
        ```
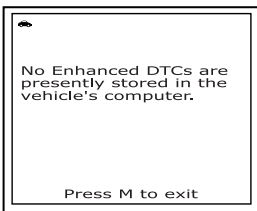
    I/M MONITOR STATUS icons are not displayed when viewing ABS DTCs.
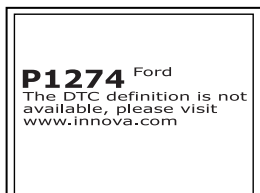
☞ *In the case of long code definitions, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the **UP** ⌃ and **DOWN** ⌄ buttons, as necessary, to view the additional information.*

■ The Scan Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No ABS DTC's are presently stored in the vehicle's computer" is displayed. Press the **M** button to return to the Main Menu.

```
┌────────────────────────┐
│ 🚗                      │
│                        │
│ No ABS DTCs are        │
│ presently stored in    │
│ vehicle's computer.    │
│                        │
│                        │
│                        │
│    Press M to exit     │
└────────────────────────┘
```

3. If more than one code was retrieved press the **DTC/FF** button, as necessary, to display additional codes one at a time.

■ Whenever the Scroll function is used to view additional codes, the Scan Tool's communication link with the vehicle's computer disconnects. To re-establish communication, press the **POWER/LINK** ⟨▷⭘ button again.

4. When the last retrieved DTC has been displayed and the **DTC/FF** button is pressed, the Scan Tool returns to the "Priority" code.

■ To exit the enhanced mode, press the **M** button. The Scan Tool returns to the Main Menu.

VIEWING SRS DTCs

☞ *Refer to Vehicle Applications - SRS on page 90 for Vehicle Makes.*

Reading SRS DTCs

1. When **SRS DTCs** is chosen from the System Menu, a "One moment please" message displays while the Scan Tool retrieves the selected DTCs.

```
┌────────────────────────┐
│ 🚗                      │
│                        │
│      Ford SRS          │
│                        │
│ Unable to establish a  │
│ link with the vehicle. │
│ Verify the connection at│
│ the DLC. Verify the    │
│ ignition is ON and press│
│ ▣▣ button to continue  │
│    Press M to exit     │
└────────────────────────┘
```

■ If the Scan Tool fails to link to the vehicle's computer, a "Linking Failed" message shows on the Scan Tool's display.

- Verify the ignition is ON, then press the **ENTER** ⏎ button to continue.

2. To read the display:

☞ *Refer to DISPLAY FUNCTIONS on page 9 for a description of LCD display elements.*

■ A visible 🚗 icon indicates that the Scan Tool is being powered through the vehicle's DLC connector.

■ A visible ⬤⬤ icon indicates that the Scan Tool is linked to (communicating with) the vehicle's computer.

■ The upper right hand corner of the display shows the number of the code currently being displayed, the total number of codes retrieved.

■ The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display.

☞ *If the definition for the currently displayed code is not available, an advisory message shows on the Scan Tool's LCD display.*

☞ *I/M MONITOR STATUS icons are not displayed when viewing SRS DTCs.*

☞ *In the case of long code definitions, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the **UP** ⊖ and **DOWN** ⊖ buttons, as necessary, to view the additional information.*
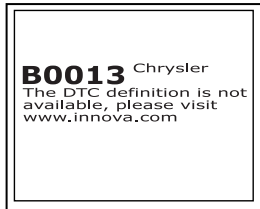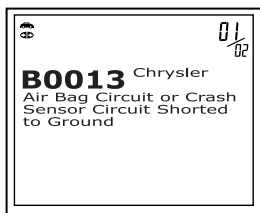
■ The Scan Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No SRS DTC's are presently stored in the vehicle's computer" is displayed. Press the **M** button to return to the Main Menu.

3. If more than one code was retrieved press the **DTC/FF** button, as necessary, to display additional codes one at a time.

■ Whenever the Scroll function is used to view additional codes, the Scan Tool's communication link with the vehicle's computer disconnects. To re-establish communication, press the **POWER/LINK** ⬤▷⏻ button again.

4. When the last retrieved DTC has been displayed and the **DTC/FF** button is pressed, the Scan Tool returns to the "Priority" code.

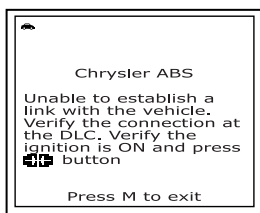■ To exit the enhanced mode, press the **M** button. The Tool returns to the Main Menu.

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 from the vehicle's computer memory, the I/M Readiness Monitor Status program resets the status of all Monitors to a not run "flashing" condition. To set all of the Monitors to a DONE status, an OBD2 Drive Cycle must be performed. Refer to your vehicle's service manual for information on how to perform an OBD2 Drive Cycle for the vehicle under test.

1. If not connected already, connect the Tool to the vehicle's DLC, and turn the ignition "On." (If the Tool is already connected and linked to the vehicle's computer, proceed directly to step 3. If not, continue to step 2.)
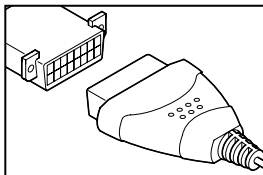
2. Perform the Code Retrieval procedure as described on page 33.

   ■ **To erase OBD2 DTCs:** Wait until the codes are displayed on the Tool's LCD and then proceed to step 3.

   ■ **To erase OEM enhanced, ABS or SRS DTCs:** Press the **SYSTEM MENU** 🔘 button to display the System Menu. Perform the appropriate Code Retrieval (see page 40 for more information) and then proceed to step 3.
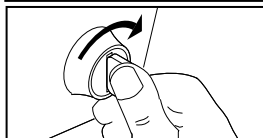
3. Press and release the **ERASE** ✐ button. A confirmation message shows on the LCD display.

   ■ If you are sure you want to proceed, use the **UP** ⊘ and **DOWN** ⊙ buttons, as necessary, to highlight **YES**, then press the **ENTER** ⊕ button.
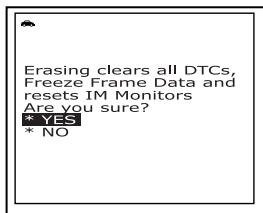
   - If you do not want to proceed, use the **UP** ⊘ and **DOWN** ⊙ buttons, as necessary, to highlight **NO**, then press the **ENTER** ⊕ button.

```
Erasing clears all DTCs,
Freeze Frame Data and
resets IM Monitors
Are you sure?
* YES
* NO
```

4. If you chose to erase DTCs, a progress screen displays while the erase function is in progress.

■ If the erase was successful, a confirmation message shows on the display. Press the **POWER/LINK** ◖▷◔ button to re-link the Scan Tool to the vehicle.

■ If the erase was not successful, an advisory message shows on the display. Verify that the Tool is properly connected to the vehicle's DLC and that the ignition is on, then repeat steps **2** and **3**, above.

```
Erase was successful!

Press ▦▦ button to view
the current DTCs and
I/M Readiness Status
```

```
Erase has failed!

Verify the Connection at
the DLC. Verify that the
ignition switch is ON.
Press the ⬠ button to
continue
```

I/M READINESS TESTING

I/M is an Inspection and Maintenance program legislated by the Government to meet federal clean-air standards.

The program requires that a vehicle be taken periodically to an Emissions Station for an "Emissions Test" or "Smog Check," where the emissions-related components and systems are inspected and tested for proper operation. Emissions Tests are generally performed once a year, or once every two years.

On OBD2 systems, the I/M program is enhanced by requiring vehicles to meet stricter test standards. One of the tests instituted by the Federal Government is called I/M 240. On I/M 240, the vehicle under test is driven under different speeds and load conditions on a dynamometer for 240 seconds, while the vehicle's emissions are measured.
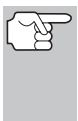
☞ *Emissions tests vary depending on the geographic or regional area in which the vehicle is registered. If the vehicle is registered in a highly urbanized area, the I/M 240 is probably the type of test required. If the vehicle is registered in a rural area, the stricter "dynamometer type" test may not be required.*

I/M Readiness Monitors

I/M Readiness shows whether the various emissions-related systems on the vehicle are operating properly and are ready for Inspection and Maintenance testing.

State and Federal Governments enacted Regulations, Procedures and Emission Standards to ensure that all emissions-related components and systems are **continuously** or **periodically** monitored, tested and diagnosed whenever the vehicle is in operation. It also requires vehicle manufacturers to automatically detect and report any problems or faults that may increase the vehicle's emissions to an unacceptable level.

The vehicle's emissions control system consists of several components or sub-systems (Oxygen Sensor, Catalytic Converter, EGR, Fuel System, etc.) that aid in reducing vehicle emissions.

To have an efficient Vehicle Emission Control System, all the emissions-related components and systems must work correctly whenever the vehicle is in operation.

To comply with State and Federal Government regulations, vehicle manufacturers designed a series of special computer programs called "Monitors" that are programmed into the vehicle's computer. Each of these Monitors is specifically designed to run tests and diagnostics on a specific emissions-related component or system (Oxygen Sensor, Catalytic Converter, EGR Valve, Fuel System, etc.) to ensure their proper operation. Currently, there are a maximum of fifteen Monitors available for use.

Each Monitor has a specific function to test and diagnose only its designated emissions-related component or system. The names of the Monitors (Oxygen Sensor Monitor, Catalyst Monitor, EGR Monitor, Misfire Monitor, etc.) describe which component or system each Monitor is designed to test and diagnose.

Emissions Inspection and Maintenance (I/M) Readiness

Monitor Status Information

I/M Readiness Monitor Status shows which of the vehicle's Monitors have run and completed their diagnosis and testing, and which ones have not yet run and completed testing and diagnosis of their designated sections of the vehicle's emissions system.

■ If a Monitor was able to meet all the conditions required to enable it to perform the self-diagnosis and testing of its assigned engine system, it means the monitor "<u>HAS</u> RUN."

■ If a Monitor has not yet met all the conditions required for it to perform the self-diagnosis and testing of its assigned engine system; it means the Monitor "<u>HAS NOT</u> RUN."

The Monitor Run/Not Run status does not show whether or not a problem exists in a system. Monitor status only indicates whether a particular Monitor has or has not run and performed the self-diagnosis and testing of its associated system.

Performing I/M Readiness Quick Check

When a vehicle first comes from the factory, all Monitors indicate a "HAVE RUN" status. This indicates that all Monitors have run and completed their diagnostic testing. The "HAVE RUN" status remains in the computer's memory, unless the Diagnostic Trouble Codes are erased or the vehicle's computer memory is cleared.

The Scan Tool allows you to retrieve Monitor/System Status Information to help you determine if the vehicle is ready for an Emissions Test (Smog Check). In addition to retrieving Diagnostic Trouble Codes, the Tool also retrieves Monitor Run/Not Run status. This information is very important since different areas of the state/country have different emissions laws and regulations concerning Monitor Run/Not Run status.

Before an Emissions Test (Smog Check) can be performed, your vehicle must meet certain rules, requirements and procedures legislated by the Federal and state (country) governments where you live.

1. In most areas, one of the requirements that must be met before a vehicle is allowed to be Emissions Tested (Smog Checked) is that the vehicle does not have any Diagnostic Trouble Codes present (with the exception of PENDING Diagnostic Trouble Codes).

2. In addition to the requirement that no Diagnostic Trouble Codes be present, some areas also require that all the Monitors that a particular vehicle supports indicate a "Has Run" status condition before an Emissions Check may be performed.

3. Other areas may only require that some (but not all) Monitors indicate a "Has Run" status before an Emissions Test (Smog Check) may be performed.

> *Monitors with a "Has Run" status indicate that all the required conditions they needed to perform diagnosis and testing of their assigned engine area (system) have been met, and all diagnostic testing has completed successfully.*
>
> *Monitors with a "Has Not Run" status have not yet met the conditions they need to perform diagnosis and testing of their assigned engine area (system), and have not been able to perform diagnostic testing on that system.*

The green, yellow and red LEDs provide a quick way to help you determine if a vehicle is ready for an Emissions Test (Smog Check). Follow the instructions below to perform the Quick Check.

Perform the CODE RETRIEVAL PROCEDURE as described on page 33, then interpret the LED indications as follows:

Interpreting I/M Readiness Test Results

1. **GREEN LED** - Indicates that all engine systems are "OK" and operating normally (all Monitors supported by the vehicle have run and performed their self-diagnostic testing). The vehicle is ready for an Emissions Test (Smog Check), and there is a good possibility that it can be certified.

2. **YELLOW LED** - Determine from the CODE RETRIEVAL PROCEDURE (page 33) which of the two possible conditions is causing the yellow LED to light.
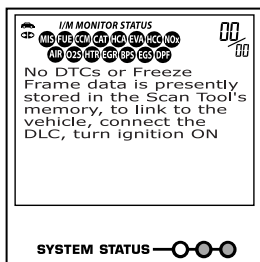
■ If a "PENDING" Diagnostic Trouble Code is causing the yellow LED to light, it is possible that the vehicle will be allowed to be tested for emissions and certified. Currently, most areas (states / countries) will allow an Emissions Test (Smog Check) to be performed if the only code in the vehicle's computer is a "PENDING" Diagnostic Trouble Code.
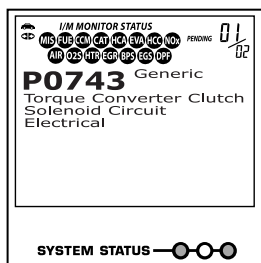
■ If the illumination of the Yellow LED is being caused by monitors that "have not run" their diagnostic testing, then the issue of the vehicle being ready for an Emissions Test (Smog Check) depends on the emissions regulations and laws of your local area.
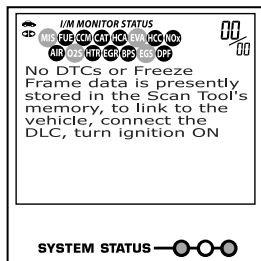
- Some areas require that all Monitors indicate a "Has Run" status before they allow an Emissions Test (Smog Check) to be performed. Other areas only require that some, but not all, Monitors have run their self-diagnostic testing before an Emissions Test (Smog Check) may be performed.

- From the code retrieval procedure, determine the status of each Monitor (a solid Monitor icon shows Monitor "Has Run" status, a flashing Monitor icon indicates "Has Not Run" status). Take this information to an emissions professional to determine (based on your test results) if your vehicle is ready for an Emissions Test (Smog Check).

3. **RED LED** - Indicates there is a problem with one or more of the vehicle's systems. A vehicle displaying a red LED is definitely not ready for an Emissions Test (Smog Check). The red LED is also an indication that there are Diagnostic Trouble Code(s) present (displayed on the Tool's screen). The Malfunction Indicator (Check Engine) Lamp on the vehicle's instrument panel will light steady. The problem that is causing the red LED to light must be repaired before an Emissions Test (Smog Check) can be performed. It is also suggested that the vehicle be inspected/repaired before driving the vehicle further.
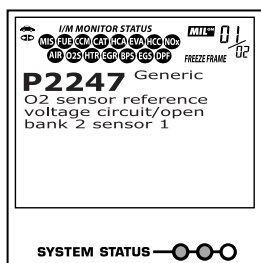
If the Red LED was obtained, there is a definite problem present in the system(s). In these cases, you have the following options.

■ Repair the vehicle yourself. If you are going to perform the repairs yourself, proceed by reading the vehicle service manual and following all its procedures and recommendations.

- Take the vehicle to a professional to have it serviced. The problem(s) causing the red LED to light must be repaired before the vehicle is ready for an Emissions Test (Smog Check).

Using the I/M Readiness Monitor Status to Confirm a Repair

The I/M Readiness Monitor Status function can be used (after repair of a fault has been performed) to confirm that the repair has been performed correctly, and/or to check for Monitor Run Status. Use the following procedure to determine I/M Readiness Monitor Status:

1. Using retrieved Diagnostic Trouble Codes (DTCs) and code definitions as a guide, and following manufacturer's repair procedures, repair the fault or faults as instructed.

2. After the fault or faults have been repaired, connect the Tool to the vehicle's DLC and erase the code or codes from the vehicle's computer memory.

- See page 49 for procedures for ERASING DIAGNOSTIC TROUBLE CODES (DTCs) from the vehicle's on-board computer.

- Write the codes down on a piece of paper for reference before erasing.

3. After the erase procedure is performed, most of the Monitor icons on the Tool's display will be flashing. Leave the Tool connected to the vehicle, and perform a Trip Drive Cycle for each "flashing" Monitor:

Misfire, Fuel and Comprehensive Component Monitors run continuously and their icons will always be on solid, even after the erase function is performed.

- Each DTC is associated with a specific Monitor. Consult the vehicle's service manual to identify the Monitor (or Monitors) associated with the faults that were repaired. Follow the manufacturer's procedures to perform a Trip Drive Cycle for the appropriate Monitors.

- While observing the Monitor icons on the Tool's display, perform a Trip Drive Cycle for the appropriate Monitor or Monitors.

If the vehicle needs to be driven in order to perform a Trip Drive Cycle, ALWAYS have a second person help you. One person should drive the vehicle while the other person observes the Monitor icons on the Tool for Monitor RUN status. Trying to drive and observe the Tool at the same time is dangerous, and could cause a serious traffic accident.

4. When a Monitor's Trip Drive Cycle is performed properly, the Monitor icon on the Tool's display changes from "flashing" to "solid," indicating that the Monitor has run and finished its diagnostic testing.

- If, after the Monitor has run, the MIL on the vehicle's dash is not lit, and no stored or pending codes associated with that particular Monitor are present in the vehicle's computer, the repair was successful.

■ If, after the Monitor has run, the MIL on the vehicle's dash lights and/or a DTC associated with that Monitor is present in the vehicle's computer, the repair was unsuccessful. Refer to the vehicle's service manual and recheck repair procedures.

ABOUT REPAIRSOLUTIONS®

RepairSolutions® is a web-based service created to assist professional technicians in quickly and accurately diagnosing and repairing today's vehicles. RepairSolutions® allows you to view, save, and email the diagnostic data retrieved from a vehicle's on-board computer(s) using an Innova Tool. RepairSolutions® 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.

■ **Step-By-Step Repair Instructions** – View available repair instructions to properly perform the fix.

■ **How-To-Repair Videos** – 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 www.innova.com for additional information.

Hardware Requirements:

■ Innova Tool
■ Mini USB Cable (included with tool)

Minimum System Operating Requirements:

■ Windows® PC System
■ Windows® XP, Windows® Vista, or Windows® 7
■ 128 MD Ram
■ Pentium III Processor
■ One available USB port
■ Internet Connection
■ Internet Explorer 5.5, Netscape 7.0 or Firefox 1.0 browser

Accessing RepairSolutions®

1. Link your Scan Tool to a vehicle and retrieve diagnostic data.

2. Visit www.innova.com, download and install the latest RepairSolutions® software for your Scan Tool. Select the **Support** tab, then choose **Troubleshoot/Download**.

3. Connect the Scan Tool to your PC using a Mini USB cable (cable included).

- Your default web browser launches automatically and connects to the www.innova.com website.

4. Login to your RepairSolutions® account using your registered **Email Address** and **Password**.

> *If you not yet established an account, you must register for a FREE RepairSolutions® account before proceeding.*

The Scan Tool is a special diagnostic 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. 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 **M** button to exit. 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.*

3. 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 **UP** ⊘ and **DOWN** ⊘ buttons, as necessary, 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.

4. Press and release the **ENTER** ⏎ button to view the currently selected PID in "graph" mode. Press and release the **ENTER** ⏎ button again to return to the PID list.

5. Press and hold the **ENTER** ⏎ button to view the "expanded" definition for the currently selected PID. Press and release the **ENTER** ⏎ button again to return to the PID list.

6. 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.

☞ *If desired, you can "customize" the Live Data display to show only those PIDs you are interested in viewing. See **Customizing Live Data (PIDs)** below for details. You may also choose to "capture" (record) Live Data for later viewing. See RECORDING (CAPTURING) LIVE DATA on page 63 for details.*
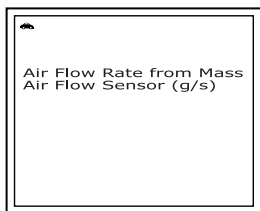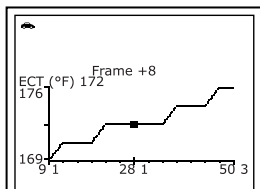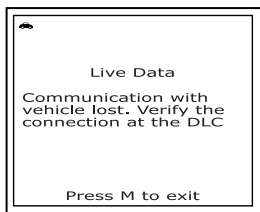
CUSTOMIZING LIVE DATA (PIDs)

This feature lets you customize the Scan Tool display to show only those PIDs that are of interest at the current time. You can customize the Live Data display by placing the Scan Tool in "Custom Live Data" mode and selecting only the PIDs that you wish to display. To customize the Live Data display, proceed as follows:

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

■ The Main Menu displays.

2. Use the **UP** ⊘ and **DOWN** ⊘ buttons, as necessary, to highlight **Live Data Menu**, then press the **ENTER** ⏎ button.

■ The "Live Data" menu displays.

3. Use the **UP** ⊘ and **DOWN** ⊘ buttons, as necessary, to highlight **Custom Live Data**, then press the **ENTER** ⏎ button.
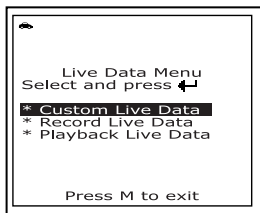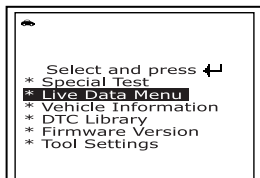
■ The "Custom Live Data" menu displays, with the first PID in the menu highlighted.

■ If Live Data is not supported by the vehicle under test, an advisory message displays. Press the **M** button to exit. Live Data is not available for your vehicle.

```
Live Data

This vehicle doe not
support Live Data



       Press M to exit
```
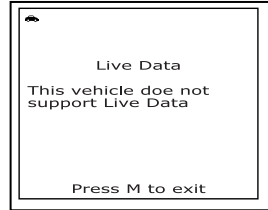
4. Use the **UP** ⊖ and **DOWN** ⊝ buttons to scroll through the available PIDs. When the PID you wish to display is highlighted, press the **ENTER** ⊕ button to select it (a "checkmark" will show in the checkbox to the right of the PID to confirm your selection). Repeat the procedure until only the PIDs you want to display have all been selected.

```
Custom Live Data
                  1/75
Fuel Sys 1          ☑
Fuel Sys 2          ☐
Calc Load(%)        ☐
ECT(°F)             ☐
Engine (RPM)        ☐
Coolant (°F)        ☐
MAP (PSI)           ☐
Spark Adv (°)       ☐
TPS (%)             ☐
```
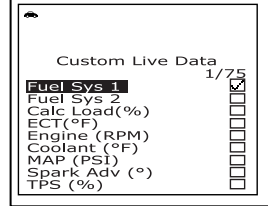
■ To deselect a currently selected PID, highlight the PID, then press the **ENTER** ⊕ button. The checkmark will be removed from the checkbox.

5. When you are finished making your selection(s), press the **LD** button to save your Custom Live Data PIDs.

■ If *no PIDs* have been selected, an advisory message displays. Press the **M** button to return to the Custom Live Data menu.

```
Custom Live Data

No PID has been
selected



       Press M to exit
```
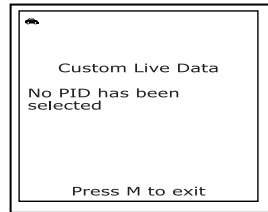
■ The Scan Tool is now in "Custom Live Data" mode. Only the PIDs you selected are shown on the Scan Tools display.

6. To exit the "Custom Live Data" mode, press the **M** button to return to the Live Data Menu.

RECORDING (CAPTURING) LIVE DATA

You can record and save several frames of Live Data information for each PID supported by the vehicle in the Scan Tool's memory. Recorded Live Data can serve as valuable information to help you in the troubleshooting of vehicle problems.

There are two ways that the Scan Tool can "record" Live Data:

■ Record by DTC Trigger

■ Record by Manual Trigger

☞ *If the **POWER/LINK** ⊲▷ button is pressed at any time while in Live Data mode, any stored (recorded) Live Data will be cleared (erased) from the Scan Tool's memory.*

Record by DTC Trigger

This function automatically records (captures) Live Data information when a DTC sets and saves it in the Scan Tool's memory. The recorded (captured) data can be a valuable troubleshooting aid, particularly if you are experiencing a fault that is causing a DTC to set.

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

   ■ The Main Menu displays.

```
Select and press ↵
* Special Test
* Live Data Menu
* Vehicle Information
* DTC Library
* Firmware Version
* Tool Settings
```

2. Use the **UP** ⌃ and **DOWN** ⌄ buttons, as necessary, to highlight **Live Data Menu**, then press the **ENTER** ↵ button.

   ■ The "Live Data" menu displays.

```
      Live Data Menu
Select and press ↵

* Custom Live Data
* Record Live Data
* Playback Live Data


   Press M to exit
```

3. Use the **UP** ⌃ and **DOWN** ⌄ buttons, as necessary, to highlight **Record Live Data**, then press the **ENTER** ↵ button.

   ■ The "Record Live Data Menu" displays.

```
  Record Live Data Menu
Select and press ↵

* Record by DTC trigger
* Record by manual
trigger


   Press M to exit
```

4. Use the **UP** ⌃ and **DOWN** ⌄ buttons, as necessary, to highlight **Record by DTC trigger**, then press the **ENTER** ↵ button.

   ■ If DTCs are presently stored in the vehicle's computer, an advisory message displays. Use the **UP** ⌃ and **DOWN** ⌄ buttons, as necessary, to highlight **Erase DTCs**, then press the **ENTER** ↵ button to erase DTCs from the vehicle's computer. When the Erase process is complete, the "Record by DTC Trigger" screen displays.

```
Please clear DTCs before
recording by DTC trigger
* Erase DTCs



   Press M to exit
```

   ■ If the erase was not successful, an advisory message shows on the display. Press the **M** button to return to the Erase DTCs screen. Verify that the Scan Tool is properly connected to the vehicle's DLC and that the ignition is on, then repeat the erase procedure.

```
Erase has failed!
Verify the connection at
the DLC. Verify that the
ignition switch is ON



   Press M to exit
```

5. When the "Record by DTC Trigger" screen displays, select the desired trigger point as follows:
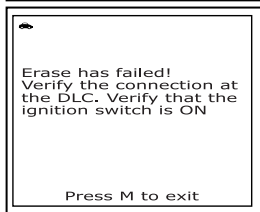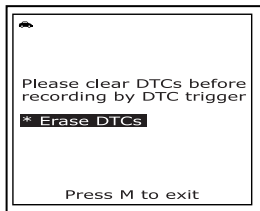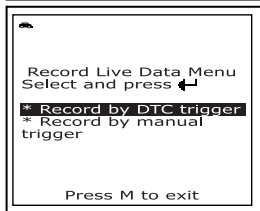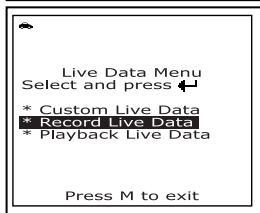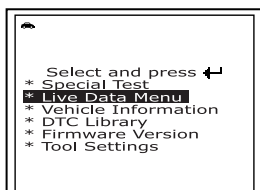
👉 *The Scan Tool is capable of recording approximately 100 frames of Live Data. Record by DTC trigger lets you select the point in time at which you wish the Scan Tool to begin recording Live Data. You can set the trigger point to record the 100 frames of data before an event (when the DTC sets), after the event, or in the middle (50 frames before and 50 frames after the event.*

- **Beginning** - records approximately 100 frames of Live Data after the DTC sets.
- **Middle** - records approximately 50 frames of Live Data before and 50 frames after the DTC sets.
- **End** - records approximately 100 frames of Live Data before the DTC sets.

```
Record Live Data
DTC Trigger Mode
Beginning *----------
Middle        ----*----
End           |--------*|



Press M to exit
```

6. Use the **UP** ⊖ and **DOWN** ⊖ buttons, as necessary, to select the desired trigger point, then press the **ENTER** ⊕ button.

- A "One moment please. . ." message shows on the display. When the Scan Tool is ready to record Live Data, the "Record Live Data" screen displays.

```
Record Live Data
DTC Trigger Mode

Ready to record.
Waiting for DTC.



Press M to exit
```

7. Put the engine in the operating condition that causes the DTC to set.

- If necessary, drive the vehicle until you reach the vehicle speed at which the problem occurs.

8. When the Scan Tool detects a fault that causes a DTC to set, it automatically records and saves approximately 20 frames of Live Data information in its memory (according to your trigger selection) for each PID supported by the vehicle.

```
Record Live Data

One moment please
Recording Frame 3



Press M to exit
```

- All three LEDs will blink for three seconds to indicate that Live Data is being recorded, and a "One moment please..." message shows on the display, along with the number of the frame being recorded.

- When recording is complete, a confirmation screen displays, asking if you would like to view the recorded data. Use the **UP** ⊖ and **DOWN** ⊖ buttons, as necessary, to

```
Live Data record was
successful! Would you
like to view now?
Select and press ⏎
* YES
* NO



Press M to exit
```

select **Yes** or **No**, as desired, then press the **ENTER** ⊕ button.

■ If recording was not successful, an advisory message shows on the display. Press the **M** button to return to the Record Live Data menu.

```
Record Live Data
Live Data record was
not successful!



   Press M to exit
```

☞ *If **Yes** is selected, the Scan Tool enters "Playback" mode from which you can view a frame-by-frame playback of recorded Live Data (see LIVE DATA PLAYBACK on page 68 for details). If **No** is selected, the display returns to the "Mode Selection Menu".*
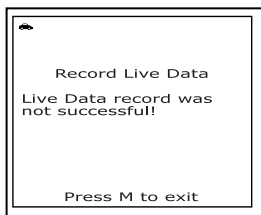
9. You can exit the "Record Live Data Mode" at any time by pressing the **M** button until the Main Menu displays.

☞ *If desired, you can transfer the recorded Live Data information to a personal computer with the use of optional software (see instructions included with the software for more information).*

Record by Manual Trigger

This option lets you select the precise time at which the Live Data recording will occur. Record by Manual Trigger can be a very valuable diagnostic tool when troubleshooting intermittent problems that do not meet the require-ments for a DTC to set. Even though a DTC is not present, the intermittent problems will sometimes manifest themselves briefly, for a few fractions of a second and/or only at certain vehicle speeds or vehicle operating conditions.

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

■ The Main Menu displays.

```
  Select and press ↵
* Special Test
* Live Data Menu
* Vehicle Information
* DTC Library
* Firmware Version
* Tool Settings
```

2. Use the **UP** ⊘ and **DOWN** ⊘ buttons, as necessary, to highlight **Live Data Menu**, then press the **ENTER** ⊕ button.

■ The "Live Data" menu displays.

3. Use the **UP** ⊘ and **DOWN** ⊘ buttons, as necessary, to highlight **Record Live Data**, then press the **ENTER** ⊕ button.

■ The "Record Live Data Menu" dis-plays.

```
         Live Data Menu
Select and press ↵

* Custom Live Data
* Record Live Data
* Playback Live Data


   Press M to exit
```

4. Use the **UP** ⊘ and **DOWN** ⊘ buttons, as necessary, to highlight **Record by manual trigger**, then press the **ENTER** ⊕ button.

5. When the "Record by Manual Trigger" screen displays, select the desired trigger point as follows:
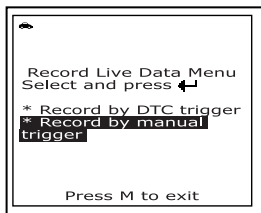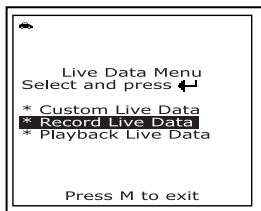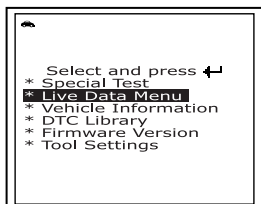
```
 Record Live Data Menu
Select and press ↵

* Record by DTC trigger
* Record by manual
trigger


   Press M to exit
```

The Scan Tool is capable of recording approximately 100 frames of Live Data. Record by DTC trigger lets you select the point in time at which you wish the Scan Tool to begin recording Live Data. You can set the trigger point to record the 100 frames of data before an event (when the DTC was set), after the event, or in the middle (50 frames before and 50 frames after the event.

■ **Beginning** - records approximately 100 frames of Live Data after the **ENTER** ⏎ button was pressed.

■ **Middle** - records approximately 50 frames of Live Data before and 50 frames after the **ENTER** ⏎ button was pressed.

■ **End** - records approximately 100 frames of Live Data before the **ENTER** ⏎ button was pressed.

```
-----------------------------
|  ☞                          |
|                             |
|       Record Live Data      |
|     Manual Trigger Mode     |
| Beginning *---------- ▮     |
| Middle        ----*----     |
| End           --------*|    |
|                             |
|                             |
|      Press M to exit        |
-----------------------------
```

6. Use the **UP** ⬙ and **DOWN** ⬗ buttons, as necessary, to select the desired trigger point, then press the **ENTER** ⏎ button.

■ A "One moment please. . ." message shows on the display. When the Scan Tool is ready to record Live Data, the "Record Live Data" screen displays.

```
-----------------------------
|  ☞                          |
|                             |
|       Record Live Data      |
|     Manual Trigger Mode     |
|                             |
| Ready to record.            |
| Press LD to record Live     |
| Data                        |
|                             |
|      Press M to exit        |
-----------------------------
```

7. Put the engine in the operating condition where the problem manifests itself.

■ If necessary, drive the vehicle until you reach the vehicle speed at which the problem occurs.

8. When the problem occurs, press and release the **LD** button.

■ All three LEDs will blink for three seconds to indicate that Live Data is being recorded, and a "One moment please. . ." message shows on the display, along with the number of the frame being recorded.

```
-----------------------------
|  ☞                          |
|                             |
|       Record Live Data      |
|                             |
| One moment please           |
| Recording Frame 3           |
|                             |
|                             |
|      Press M to exit        |
-----------------------------
```

■ When recording is complete, a confirmation screen displays, asking if you would like to view the recorded data. Use the **UP** ⬙ and **DOWN** ⬗ buttons, as necessary, to select **Yes** or **No**, as desired, then press the **ENTER** ⏎ button.

```
-----------------------------
|  ☞                          |
|                             |
| Live Data record was        |
| successful! Would you       |
| like to view now?           |
| Select and press ⏎          |
| * YES                       |
| * NO                        |
|                             |
|      Press M to exit        |
-----------------------------
```

■ If recording was not successful, an advisory message shows on the display. Press the **M** button to return to the Record Live Data menu.

```
Record Live Data
Live Data record was
not successful!



      Press M to exit
```

👉 *If **Yes** is selected, the Scan Tool enters "Playback" mode from which you can view a frame-by-frame playback of recorded Live Data (see LIVE DATA PLAYBACK on page 68 for details). If **No** is selected, the display returns to the "Mode Selection Menu".*

9. You can exit the "Record Live Data Mode" at any time by pressing and holding the **M** button until the "Test Modes" menu displays.

👉 *If desired, you can transfer the recorded Live Data information to a personal computer with the use of optional software (see instructions included with the software for more information).*

Important Information

1. When Live Data capture is initiated, the green, yellow and red LEDs on the Scan Tool will flash three times to indicate that Live Data is being saved to the Scan Tool's memory.

2. When you are LINKED to a vehicle and you are in the "Live Data View mode", you can toggle between "Live Data View" mode and "DTC view" mode by alternately pressing and releasing the **DTC/FF** or the **M** buttons. The Scan Tool will stay linked to the vehicle's computer during this process. However, if the **DTC/FF** button is pressed twice the DTC screen will be advanced to the next DTC screen and the Scan Tool will be taken out of link.

LIVE DATA PLAYBACK

Once Live Data has been recorded, it is saved in the Scan Tool's memory. You can view recorded Live Data immediately after recording by selecting **Yes** from the Record Live Data confirmation screen (see RECORDING (CAPTURING) LIVE DATA on page 63 for more information), or you can view it later using the "Playback" function.

1. With the Scan Tool not connected to a vehicle, press the **POWER/LINK** ⊂▻⏻ button.

■ The "To Link" screen shows on the Scan Tool's display.
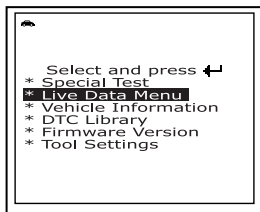
```
    Select and press ↵
  * Special Test
  * Live Data Menu
  * Vehicle Information
  * DTC Library
  * Firmware Version
  * Tool Settings
```

2. Press and release the **M** button.

■ The Main Menu displays.

3. Use the **UP** ⊖ and **DOWN** ⊝ buttons, as necessary, to highlight **Live Data Menu**, then press the **ENTER** ⊖ button.

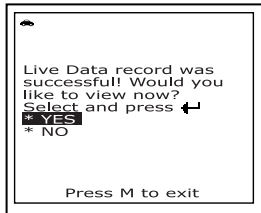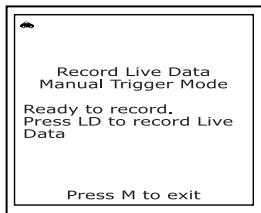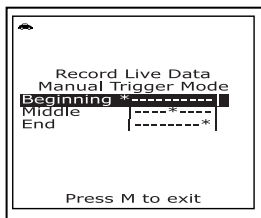- The "Live Data" menu displays.

4. Use the **UP** ⊙ and **DOWN** ⊙ buttons, as necessary, to highlight **Playback Live Data**, then press the **ENTER** ⊕ button to place the Scan Tool in "Live Data Playback" mode.

```
Live Data Menu
Select and press ↵

* Custom Live Data
* Record Live Data
* Playback Live Data

    Press M to exit
```
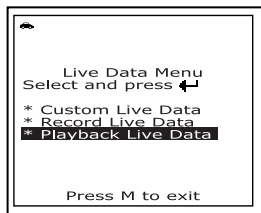
- The display shows the recorded Live Data, beginning with the "trigger" frame.

☞ *When you select Yes from the Record Live Data confirmation screen, the Scan Tool enters the "Live Data Playback" mode, and the display shows the recorded Live Data, beginning with the "trigger" frame.*

```
I/M MONITOR STATUS              01
MIS FUB CCM CAT HCA EVA HCC NOX     02
AIR O2S HTR EGR GPS CGS OPF
         Live Data
                          1/75
LTFT Bank 2(%)             2.5
Calc Load(%)               8.5
Engine (RPM)             1258
Coolant (°F)              158
Fuel Sys 1                 CL
MAP (PSI)                 123
Spark Adv (°)             10.0
TPS (%)                   42.3
Veh Speed (MPH)            23
```

- 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 **UP** ⊙ and **DOWN** ⊙ buttons, as necessary, to scroll up or down to view all available PID data.

- When viewing recorded Live Data, look for any irregularities in any of the PID values/signal information (LTFT %, RPM, MAP, TEMP, etc.). If any PIDs are not within specification, or irregularities are detected, follow the procedures in the vehicle's service repair manual to perform additional troubleshooting and repair.

☞ *When recorded Live Data is played back, all available PIDs are shown, even if you have customized the Live Data selections.*

☞ *If there is no Live Data currently stored in the Scan Tool's memory, an advisory message shows on the display. Press the M button to exit the "Live Data Playback" mode.*

```
     Playback Live Data

No Live Data is
presently stored in the
tool's memory

    Press M to exit
```
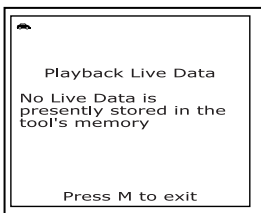
5. When you have viewed all PID information for the current frame of Live Data, use the **DOWN** ⊙ button to scroll to the end of the PID list. Highlight **Next Frame** or **Previous Frame**, as desired, then press the **ENTER** ⊕ button.

6. When you have finished viewing the recorded Live Data, exit the "Live Data Playback" mode using the appropriate procedure shown below:

- If the Scan Tool is connected to a vehicle, use the **DOWN** ⊙ button to scroll to the end of the PID list, highlight **Exit Playback**, then press the **ENTER** ⊕ button.

- If the Scan Tool is not connected to a vehicle, press the **DTC/FF** button.

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 Tool for your particular needs.

SPECIAL TEST MENU

Additional tests are accessed through the "Special Test Menu." The following functions are available from the "Special Test Menu:"

- **O2 Sensor Test** - Retrieves and displays O2 sensor monitor test results from your vehicle's on-board computer.

- **Non-Continuous Test** - Retrieves and displays test results for emission-related powertrain components and systems that are not continuously monitored.

- **EVAP Leak Test** - Performs a leak test for the vehicle's EVAP system.

1. While linked to the vehicle, press and release the **M** button.

   - The Main Menu displays.

2. Use the **UP** ⊘ and **DOWN** ⊘ buttons, as necessary, to highlight **Special Test**, then press the **ENTER** ⊕ button.
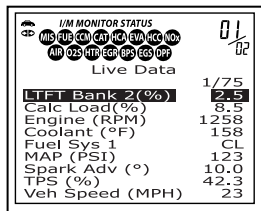
   - The Special Test menu displays.

```
              Select and press ↵
* Special Test
* Live Data Menu
* Vehicle Information
* DTC Library
* Firmware Version
* Tool Settings
```

```
              Special Test
Select and press ↵
* O2 Sensor Test
* Non-Continuous Test
* EVAP Leak Test


              Press M to exit
```
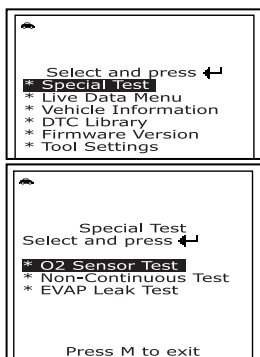
O2 Sensor Test

OBD2 regulations require that applicable vehicles monitor and test operation of the oxygen (O2) sensors to identify problems that can affect fuel efficiency and vehicle emissions. These tests are performed automatically when engine operating conditions are within predefined limits. Results of these tests are stored in the on-board computer's memory.

The **O2 Sensor Test** function lets you retrieve and view O2 sensor monitor test results for the most recently completed tests from your vehicle's on-board computer.

Vehicles are equipped with multiple O2 sensors. O2 sensors are installed both upstream of (before) and downstream of (after) the exhaust system Catalytic Converters. The name of an O2 sensor identifies its location in the exhaust system. The name of each O2 sensor is made up of three parts:

<p style="text-align:center">O2S XX YY -or- O2S X Y</p>

- **O2S** - this is the basic designation for all O2 sensors.

- **X** or **XX** - These characters identify the location of the O2 sensor in relation to a cylinder bank. An O2 sensor for cylinder bank 1 is identified by the designation "1" or "B1"; a sensor for cylinder bank 2 is identified as "2" or "B2."

"Bank One" indicates the side of the engine where cylinder number one is located (V-type engines). Bank Two is opposite of Bank One.

■ **Y** or **YY** - These characters identity the location of the O2 sensor in relation to the exhaust system catalyst. An O2 sensor located upstream of the catalyst is identified by the designation"1" or "S1", a sensor located downstream of the Catalytic Converter is identified as "2" or "S2."

For example, **O2S12** or **O2SB1S2** is the designation for the downstream O2 sensor for cylinder bank 1.

The Scan Tool does not perform O2 sensor tests, but retrieves results from the most recently performed O2 sensor tests from the on-board computer's memory. You may retrieve O2 sensor test results for only one test of one sensor at any given time.

1. From the "Special Test Menu", use the **UP** ⊘ and **DOWN** ⊗ buttons, as necessary, to highlight **O2 Sensor Test,** then press the **ENTER** ⏎ button.

2. A "One moment please..." message displays while the request is sent to the vehicle's on-board computer.

   ■ The "Select Sensor" screen displays. The screen shows all O2 sensors applicable to the vehicle under test.

   *If O2 sensor tests are not supported by the vehicle under test, an advisory message shows on the Scan Tool's display. Press the **M** button to return to the "Special Test Menu."*

3. Use the **UP** ⊘ and **DOWN** ⊗ buttons, as necessary, to highlight the O2 sensor for which you wish to view test results, then press the **ENTER** ⏎ button.

4. When test results have been retrieved, data for the selected sensor test will show on the Scan Tool's display.

5. When you have finished viewing the retrieved test data, press the **M** button to return to the "Select sensor" screen.

6. Repeat steps **3** through **5** to view test results for additional sensors. When you have finished viewing the retrieved test data, press the **M** button to return to the "Special Test Menu" screen.

```
        Special Test
Select and press ↵

* O2 Sensor Test
* Non-Continuous Test
* EVAP Leak Test


     Press M to exit
```

```
      O2 Sensor Test
Select and press ↵

* O2SB1S1
* O2SB1S2


     Press M to exit
```

```
     O2 Sensor Test

O2 Sensor Test is not
supported



     Press M to exit
```

```
        O2SB1S2

Rich to Ln Threshold
Value(v)     0.000
Min(v)       00
Max(v)       00


     Press M to exit
```

Non-Continuous Test

The **Non-Continuous Test** function retrieves and displays test results for emission-related powertrain components and systems that are not continuously monitored. The tests available are determined by the vehicle manufacturer.

> *The Scan Tool does not perform non-continuous test, but retrieves results from the most recently performed tests from the on-board computer's memory. You may retrieve non-continuous test results for only one test at any given time.*
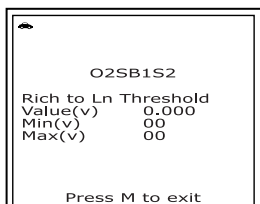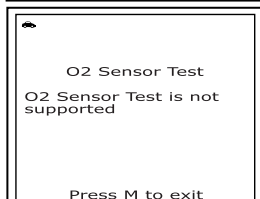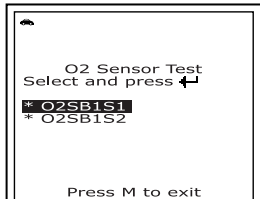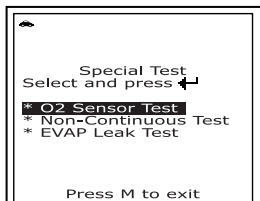
1. From the "Special Test Menu", use the **UP** ⊝ and **DOWN** ⊝ buttons, as necessary, to highlight **Non-Continuous Test**, then press the **ENTER** ⊕ button.

```
Special Test
Select and press ←

* O2 Sensor Test
* Non-Continuous Test
* EVAP Leak Test


      Press M to exit
```

2. A "One moment please. . ." message displays while the request is sent to the vehicle's on-board computer.

   ■ The "Select Test" screen displays. The screen shows all tests applicable to the vehicle under test. Refer to the vehicle's service repair manual for information related to non-continuous tests.

```
Non-Continuous Test
Select and press ←  1/7
* Test ID $01
* Test ID $02
* Test ID $04


      Press M to exit
```
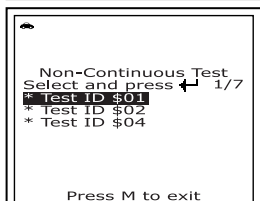
> *If non-continuous tests are not supported by the vehicle under test, an advisory message shows on the Scan Tool's display. Press the **M** button to return to the Mode Selection menu.*

```
Non-Continuous Test

Non-Continuous Test is
not supported



      Press M to exit
```

3. Use the **UP** ⊝ and **DOWN** ⊝ buttons, as necessary, to highlight the desired test, then press the **ENTER** ⊕ button.
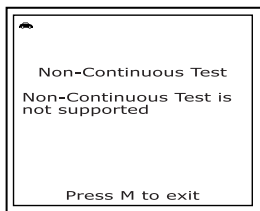
4. When test results have been retrieved, data for the selected test will show on the Scan Tool's display. The display shows the following information:

   ■ **Test ID** number

   ■ **Module ID** number

   ■ **Component ID** number

   ■ **Min** or **Max** test limit

```
      Test ID $02
Module#           $10
Component ID#     $81
Min            $001C
Max              N/A
Test Value     $00FF
Status            OK


      Press M to exit
```
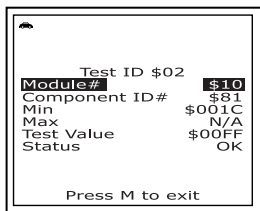
> *Only one test limit, either **Min** or **Max**, is shown for any given test.*

   ■ **Test Value** and status

*Status is calculated by the Scan Tool by comparing the **Test Value** against the displayed test limit (either **Min** or **Max**). Status is shown as either **Low, High** or **OK**.*

5. Press the **M** button to return to the "Select Test" screen. When you have finished viewing the retrieved test data, press the **M** button to return to the "Special Test Menu" screen.
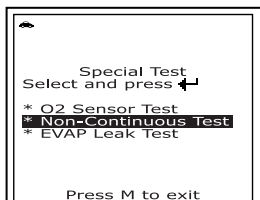
6. Repeat steps **3** through **5** to view test results for additional tests.

EVAP Leak Test

The **EVAP Leak Test** function lets you initiate a leak test for the vehicle's EVAP system.

*The Scan Tool does not perform the leak test, but signals to vehicle's on-board computer to initiate the test. The vehicle manufacturer determines the criteria and method for stopping the test once it has been started. BEFORE using the **EVAP Leak Test** function, refer to the vehicle's service repair manual to determine the procedures necessary to stop the test.*

1. From the "Special Test Menu", use the **UP** ⊝ and **DOWN** ⊝ buttons as necessary, to highlight **System Test**, then press the **ENTER** ⊕ button.

2. A "One moment please..." message displays while the request is sent to the vehicle's on-board computer.

```
          Special Test
Select and press ⏎

* O2 Sensor Test
* Non-Continuous Test
* EVAP Leak Test

     Press M to exit
```
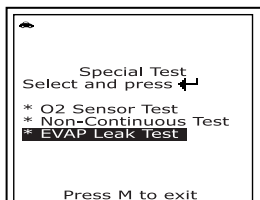
*Some vehicle manufacturers do not allow Tools or other external devices to control vehicle systems. If the **EVAP Leak Test** is not supported by the vehicle under test, an advisory message shows on the Scan Tool's display. Press the **M** button to return to the System Test menu.*

```
     EVAP Leak Test
EVAP Leak Test is not
supported

     Press M to exit
```
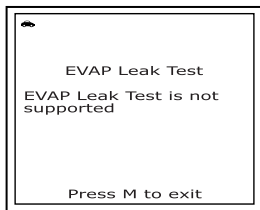
3. When the EVAP leak test has been initiated by the vehicle's on-board computer, a confirmation message shows on the Scan Tool's display. Press the **M** button to return to the "Special Test Menu."

```
     EVAP Leak Test
Test request sent

     Press M to exit
```
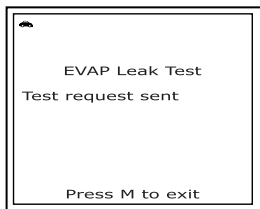
VIEWING VEHICLE INFORMATION

The **Vehicle Info** function 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. With the Scan Tool in OBD2 mode, press and release the **M** button.

  ■ The Main Menu displays.

2. Use the **UP** ⊖ and **DOWN** ⊖ buttons, as necessary, to highlight **Vehicle Info**, then press the **ENTER** ⊕ button.

 ■ The Vehicle Info Menu displays.

3. Use the **UP** ⊖ and **DOWN** ⊖ buttons, as necessary, to highlight **Vehicle ID**, then press the **ENTER** ⊕ button.

4. A "One moment please..." message displays while the requested information is retrieved from the vehicle's computer.

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

5. When the retrieval process is completed, the vehicle ID information is shown on the Scan Tool's display. Use the **UP** ⊖ and **DOWN** ⊖ buttons, as necessary, to view the entire list.

```
   Select and press ↵
* Special Test
* Live Data Menu
* Vehicle Information
* DTC Library
* Firmware Version
* Tool Settings
```

```
   Vehicle Info Menu
   Select and press ↵
* Vehicle ID
* Available Modules
* IPT


   Press M to exit
```

```
   Vehicle Information

VIN# 2G2GT22QPT3200012
Module# $20
Cal ID HYBGH31x.HEX
CVN E5 6C 02 6E


   Press M to exit
```

6. When you have finished viewing the retrieved vehicle ID information, press the **M** button to exit.
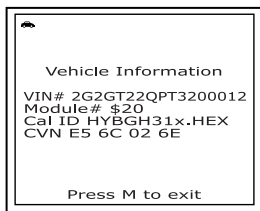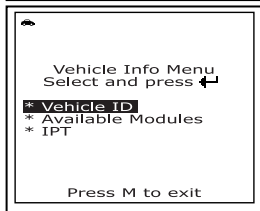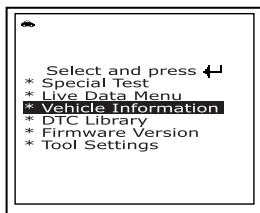
Viewing Available Modules

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

1. With the Scan Tool in OBD2 mode, press and release the **M** button.

   ■ The Main Menu displays.

2. Use the **UP** ⬆ and **DOWN** ⬇ buttons, as necessary, to highlight **Vehicle Info**, then press the **ENTER** ⏎ button.

   ■ The Vehicle Info Menu displays.

```
Select and press ↵
* Special Test
* Live Data Menu
* Vehicle Information
* DTC Library
* Firmware Version
* Tool Settings
```

3. Use the **UP** ⬆ and **DOWN** ⬇ buttons, as necessary, to highlight **Available Modules**, then press the **ENTER** ⏎ button.

4. A "One moment please..." message displays while the requested information is retrieved from the vehicle's computer.

```
Vehicle Info Menu
* Vehicle ID
* Available Modules
* IPT



Press M to exit
```

5. When the retrieval process is completed, a complete list of modules supported by the vehicle under test is shown on the Scan Tool's display. Use the **UP** ⬆ and **DOWN** ⬇ buttons, as necessary, to view the entire list.

6. When you have finished viewing the list of available modules, press the **M** button to return to exit.

```
Available Modules

Protocol ISO9141
Module# $10



Press M to exit
```
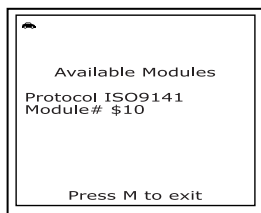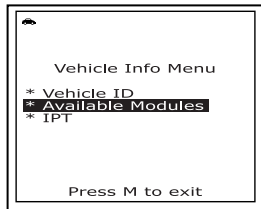
Viewing In-use Performance Tracking (IPT)

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. With the Scan Tool in OBD2 mode, press and release the **M** button.

   ■ The Main Menu displays.

2. Use the **UP** ⬆ and **DOWN** ⬇ buttons, as necessary, to highlight **Vehicle Info**, then press the **ENTER** ⏎ button.

```
Select and press ↵
* Special Test
* Live Data Menu
* Vehicle Information
* DTC Library
* Firmware Version
* Tool Settings
```

Additional Tests

■ The Vehicle Info Menu displays.

3. Use the **UP** ⊝ and **DOWN** ⊝ buttons, as necessary, to highlight **IPT**, then press the **ENTER** ⊕ button.

```
Vehicle Info Menu
  Select and press ←
* Vehicle ID
* Available Modules
* IPT

    Press M to exit
```

4. A "One moment please . . ." message displays while the requested information is retrieved from the vehicle's computer.

5. If In-use Performance Tracking is not supported by the vehicle under test, an advisory message shows on the Tool's display. Press the **M** button to exit.

```
        IPT
This vehicle does not
support IPT data



    Press M to exit
```
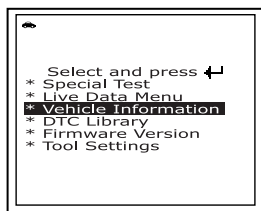
6. When the retrieved process is completed, In-use Performance Tracking statistics for monitors supported by the vehicle under test are shown on the Scan Tool's display. Use the **UP** ⊝ and **DOWN** ⊝ buttons, as necessary, to view the entire list.

7. When you have finished viewing the statistics, press the **M** button to exit.

```
        IPT      1/16
OBDCOND           89
IGNCNTR          208
CATCOMP1         114


    Press M to exit
```
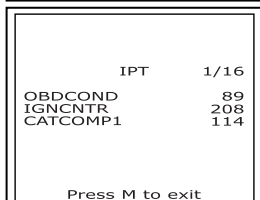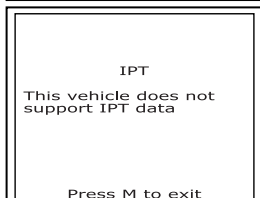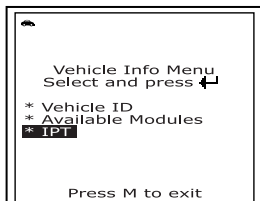
SEARCHING FOR A DTC DEFINTION USING THE DTC LIBRARY (OBD1)

1. Use the **UP** ⊝ and **DOWN** ⊝ buttons, as necessary, to highlight **DTC Library** in the Main Menu, then press the **ENTER** ⊕ button.

■ The Select Library screen displays.

```
  Select and press ←
* Special Test
* Live Data Menu
* Vehicle Information
* DTC Library
* Firmware Version
* Tool Settings
```

2. Use the **UP** ⊝ and **DOWN** ⊝ buttons, as necessary, to highlight **OBD1 Library** in the Menu, then press the **ENTER** ⊕ button.

■ The Select Manufacturer screen displays.

```
     DTC Library
Select library and press
← to continue

* OBD1 Library
* OBD2 Library


    Press M to exit
```

3. Use the **UP** ⊝ and **DOWN** ⊝ buttons, as necessary, to highlight the desired vehicle manufacturer, then press the **ENTER** ⊕ button.

■ A confirmation message shows on the LCD display.
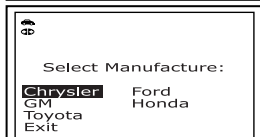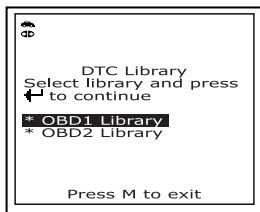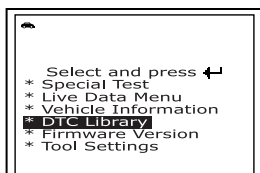
```
  Select Manufacture:

Chrysler    Ford
GM          Honda
Toyota
Exit
```

- If the correct manufacturer is shown, use the **UP** ⊖ and **DOWN** ⊝ buttons, as necessary, to highlight **Yes**, then press the **ENTER** ⊕ button to continue.

```
You have selected:
 Ford

Is this correct?
Yes
No
```

- If the correct manufacturer is now shown, use the **UP** ⊖ and **DOWN** ⊝ buttons, as necessary, to highlight **No**, then press the **ENTER** ⊕ buttons to return to the list of vehicle manufacturers.
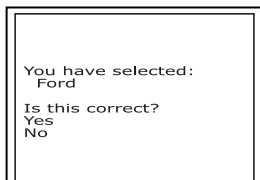
4. The Enter DTC screen displays. The screen shows the code "001", with the first "0" highlighted.

5. Use the **UP** ⊖ and **DOWN** ⊝ buttons, as necessary, to scroll to the first digit of the DTC, then press the **DTC/FF** button.

```
        DTC Library
DTC: 001
Press DTC to select
Press ↵ to view



     Press M to exit
```

- The selected character displays solid, and the next character is highlighted.

6. Select the remaining digits in the DTC in the same way, pressing the **DTC/FF** button to confirm each digit. When you have selected all the DTC digits, press the **ENTER** ⊕ button to view the DTC definition.

```
                    01/
                    02
DTC: 34 GM OBD1
Mass Air Flow Sensor
Failure
```

👉 *If a definition for the DTC you entered is not available, an advisory message shows on the Tool's display.*

```
                    01/
                    02
DTC: 36 GM OBD1
The DTC Definition is
not available, please
visit: www.innova.com
```

7. If you wish to view definitions for additional DTCs, press the **M** button to return to the Enter DTC screen, and repeat steps **5** and **6**.

8. When all desired DTCs have been viewed, press the **M** button to return to the Enter DTC screen (if necessary), then press the **M** button to exit the DTC Library.

SEARCHING FOR A DTC DEFINITION USING THE DTC LIBRARY (OBD2)

1. Use the **UP** ⊖ and **DOWN** ⊝ buttons, as necessary, to highlight **DTC Library** in the Menu, then press the **ENTER** ⊕ button.

```
   Select and press ↵
 * Special Test
 * Live Data Menu
 * Vehicle Information
 * DTC Library
 * Firmware Version
 * Tool Settings
```
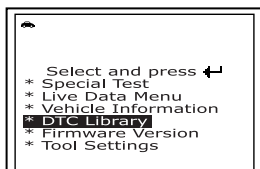
■ The Select Library screen displays.

2. Use the **UP** ⊖ and **DOWN** ⊝ buttons, as necessary, to highlight **OBD2 Library** in the Menu, then press the **ENTER** ⊕ button.

> DTC Library
> Select library and press
> ⏎ to continue
>
> * OBD1 Library
> * OBD2 Library
>
> Press M to exit

■ The Enter DTC screen displays. The screen shows the code "P0001", with the "P" highlighted.

3. Use the **DOWN** ⊝ button to scroll to the desired DTC type (P=Powertrain, U=Network, B=Body, C=Chassis), then press the **DTC/FF** button.

■ The selected character displays "solid", and the next character is highlighted.

4. Select the remaining characters in the DTC in the same way, pressing the **DTC/FF** button to confirm each character. When you have selected all the DTC characters, press the **ENTER** ⊕ button to view the DTC definition.

> DTC Library
> **DTC: P0000**
> Press DTC to select
> Press ⏎ to view
>
> Press M to exit

■ If you entered a "Generic" DTC (DTCs that start with "P0", "P2" and some "P3"):

- The selected DTC and DTC definition (if available) show on the Tool's display.
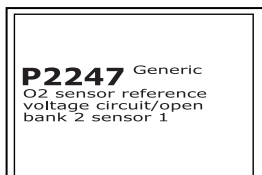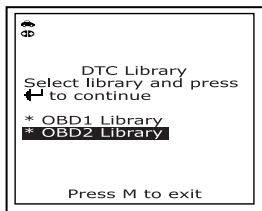
> **P2247** Generic
> O2 sensor reference
> voltage circuit/open
> bank 2 sensor 1

☞ *If a definition for the DTC you entered is not available, an advisory message shows on the Tool's display.*

■ If you entered a "Manufacturer-Specific" DTC (DTCs that start with "P1" and some "P3"):

- The "Select Manufacturer" screen displays.

- Use the **UP** ⊖ and **DOWN** ⊝ buttons, as necessary, to high-light the appropriate manufacturer, then press the **ENTER** ⊕ button to display the correct DTC for your vehicle. A confirmation message shows on the LCD display.

> Select Make:
> **More**   Acura
> Alfa Romeo Audi
> BMW   Chrysler
> Ford   Geo
> GM   Honda

- If the correct manufacturer is shown, use the **UP** ⊖ and **DOWN** ⊝ buttons, as necessary, to highlight **YES** then press the **ENTER** ⊕ button to continue.

- If the correct manufacturer is not shown, use the **UP** ⊘ and **DOWN** ⊘ buttons, as necessary, to highlight **NO** then press the **ENTER** ↵ button to return to the list of vehicle manufacturers.

☞ *If a definition for the DTC you entered is not available, an advisory message shows on the Scan Tool's display.*

P1274 Ford
The DTC definition is not available, please visit www.innova.com
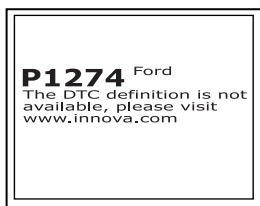
5. If you wish to view definitions for additional DTCs, press the **ENTER** ↵ button to return to the Enter DTC screen, and repeat steps **3** and **4**.

6. When all desired DTCs have been viewed, press the **M** button to return to the Enter DTC screen (if necessary), then press the **M** button to exit the DTC Library.

VIEWING THE FIRMWARE VERSION

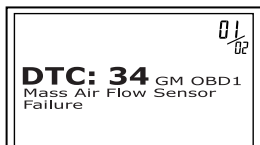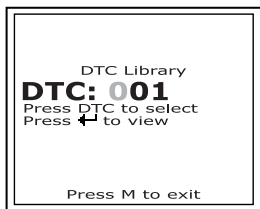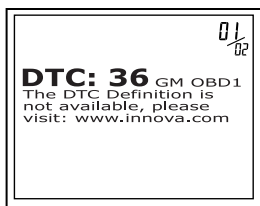**1.** Use the **UP** ⊘ and **DOWN** ⊘ buttons, as necessary, to highlight **Firmware Version** in the Menu, then press the **ENTER** ↵ button.

- The Firmware Version screen displays.

- The screen shows the Scan Tool's current firmware version, bootloader version and database version.

2. Press the **M** button to return to the Menu.

Select and press ↵
* Special Test
* Live Data Menu
* Vehicle Information
* DTC Library
* **Firmware Version**
* Tool Settings

Firmware Version:
V1.00.00
Bootloader Version:
V1.00.00
Database Version:
V1.00.00

Press M to exit
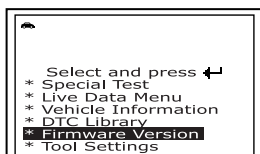
ADJUSTMENTS AND SETTINGS

The Scan Tool lets you make several adjustments and settings to configure the Tool to your particular needs. It also contains an OBD2 DTC Library that allows you to search for DTC definitions. The following functions, adjustments and settings can be performed when the Tool is in "MENU Mode":

- **Adjust Brightness**: Adjusts the brightness of the display screen.

- **Audible Tone:** Turns the Tool's audible tone "on" and "off." When turned "on," a tone sounds each time a button is pressed.

- **Display Backlight:** Turns the display backlight on and off.

- **Select Language**: Sets the display language for the Tool to English, French or Spanish.

- **Unit of Measurement**: Sets the Unit of Measurement for the Tool's display to USA or metric.

☞ *Adjustments and settings can be made only when the Tool is NOT connected to a vehicle.*

To enter the MENU Mode:

1. With the Scan Tool in OBD2 mode, press and release the **M** button.

   ■ The Main Menu displays.

2. Use the **UP** ⊝ and **DOWN** ⊝ buttons, as necessary, to highlight **Tool Settings**, then press the **ENTER** ⊕ button.

   ■ The Tool Setting Menu displays.

3. Make adjustments and settings as described in the following paragraphs.
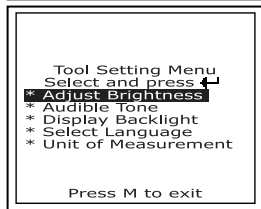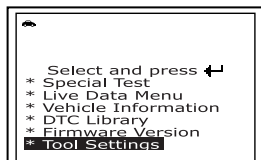
Adjusting Display Brightness

1. Use the **UP** ⊝ and **DOWN** ⊝ buttons, as necessary, to highlight **Adjust Brightness** in the Menu, then press the **ENTER** ⊕ button.

   ■ The Adjust Brightness screen displays.

   ■ The **Brightness** field shows the current brightness setting, from 1 to 4.

2. Press the **UP** ⊝ button to decrease the brightness of the display (make the display darker).

3. Press the **DOWN** ⊝ button to increase the brightness of the display (make the display lighter).

4. When the desired brightness is obtained, press the **ENTER** ⊕ button to save your changes and return to the Menu.
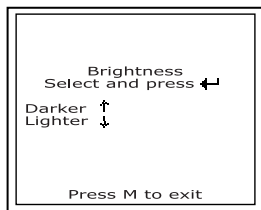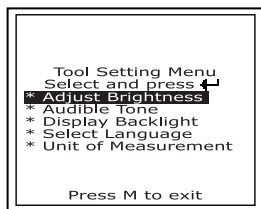
Enabling the Audible Tone

1. Use the **UP** ⊝ and **DOWN** ⊝ buttons, as necessary, to highlight **Audible Tone** in the Menu, then press the **ENTER** ⊕ button.

   ■ The Audible Tone screen displays.

2. Use the **UP** ⊝ and **DOWN** ⊝ buttons, as necessary, to highlight **ON** or **OFF** as desired.

3. When the desired option is selected, press the **ENTER** ⊕ button to save your changes and return to the Menu.

```
  Select and press ⏎
* Special Test
* Live Data Menu
* Vehicle Information
* DTC Library
* Firmware Version
* Tool Settings
```

```
  Tool Setting Menu
  Select and press ⏎
* Adjust Brightness
* Audible Tone
* Display Backlight
* Select Language
* Unit of Measurement

   Press M to exit
```

```
  Tool Setting Menu
  Select and press ⏎
* Adjust Brightness
* Audible Tone
* Display Backlight
* Select Language
* Unit of Measurement

   Press M to exit
```

```
     Brightness
  Select and press ⏎

Darker  ↑
Lighter ↓


   Press M to exit
```

```
  Tool Setting Menu
  Select and press ⏎
* Adjust Brightness
* Audible Tone
* Display Backlight
* Select Language
* Unit of Measurement

   Press M to exit
```

```
     Audible Tone
  Select and press ⏎

* ON
* OFF


   Press M to exit
```

Using the Backlight

1. Use the **UP** ⊖ and **DOWN** ⊖ buttons, as necessary, to highlight **Display Backlight** in the Menu, then press the **ENTER** ⊖ button.

   ■ The Display Backlight screen displays.

2. Use the **UP** ⊖ and **DOWN** ⊖ buttons, as necessary, to select the desired backlight mode, either **ON** or **OFF**.

3. When the desired backlight mode is selected, press the **ENTER** ⊖ button to save your changes.

   ■ The display returns to the Menu, and the backlight turns "on" or "off" as selected.

```
    Tool Setting Menu
   Select and press ←
   * Adjust Brightness
   * Audible Tone
   * Display Backlight
   * Select Language
   * Unit of Measurement

     Press M to exit
```

```
    Display Backlight
   Select and press ←

   * ON
   * OFF


     Press M to exit
```
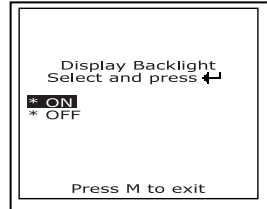
Selecting the Display Language

1. Use the **UP** ⊖ and **DOWN** ⊖ buttons, as necessary, to highlight **Select Language** in the Menu, then press the **ENTER** ⊖ button.

   ■ The Select Language screen displays.

   ■ The currently selected display **Language** is highlighted.

2. Use the **UP** ⊖ and **DOWN** ⊖ buttons, as necessary, to highlight the desired display language.

3. When the desired display language is highlighted, press the **ENTER** ⊖ button to save your changes and return to the Menu (shown in the selected display language).

```
    Tool Setting Menu
   Select and press ←
   * Adjust Brightness
   * Audible Tone
   * Display Backlight
   * Select Language
   * Unit of Measurement

     Press M to exit
```

```
       Language
   Select and press ←

   * English
   * Español
   * Français


     Press M to exit
```

Setting the Unit of Measurement

1. Use the **UP** ⊖ and **DOWN** ⊖ buttons, as necessary, to highlight **Unit of Measurement** in the Menu, then press the **ENTER** ⊖ button.

2. Use the **UP** ⊖ and **DOWN** ⊖ buttons, as necessary, to highlight the desired **Unit of Measurement**.

```
    Tool Setting Menu
   Select and press ←
   * Adjust Brightness
   * Audible Tone
   * Display Backlight
   * Select Language
   * Unit of Measurement

     Press M to exit
```

3. When the desired **Unit of Measurement** value is selected, press the **ENTER** ⏎ button to save your changes and return to the Menu.

Exiting the MENU Mode

■   Press the **M** button.

```
┌─────────────────────────┐
│                         │
│      Select Unit        │
│  █ USA                  │
│  * Metric               │
│                         │
│                         │
│     Press M to exit     │
└─────────────────────────┘
```

When you retrieve DTCs from a vehicle, the data is saved to the Scan Tool's memory.

Each time you retrieve DTCs, existing data in the Scan Tool's memory is overwritten with the new data.

VIEWING DATA IN MEMORY

When you turn the Scan Tool on while NOT connected to a vehicle, and data is currently saved in the Tool's memory, the Scan Tool enters Memory mode. You can view DTCs and Live Data stored in the Scan Tool's memory.

1. With the Scan Tool NOT connected to a vehicle. press and release the **POWER/LINK** ⊲▷⏻ button to turn the Tool on.

   ■ If the Scan Tool's batteries are low, a warning message displays. Replace the batteries before continuing.

   > Warning
   > Low battery condition. Replace batteries before continuing

2. To view DTCs in the Scan Tool's memory, press the **DTC/FF** button.

   ■ The Tool displays the "priority" DTC.

   > I/M MONITOR STATUS
   > MIS FUE CCM CAT HCA EVA HCC NOx
   > AIR O2S HTR EGR BPS EGS OPF
   > MIL 01 02 FREEZE FRAME
   >
   > **P0743** Generic
   > Torque Converter Clutch Solenoid Circuit Electrical

   If there are no OBD2 DTCs currently stored in the Scan Tool's memory, an advisory message shows on the display.
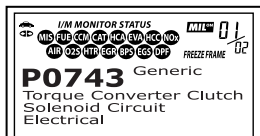
   ■ Press the **DTC/FF** button to scroll through all stored DTCs and to view Freeze Frame Data (if available).

   > No DTCs or Freeze Frame data is presently stored in the tools memory. To link to the vehicle connect the DLC, turn ignition ON

   ■ When all OBD2 DTCs have been displayed and the **DTC/FF** button is pressed, the Scan Tool displays the first enhanced DTC stored in memory. Press the **DTC/FF** button to scroll through all stored enhanced DTCs.

   > I/M MONITOR STATUS
   > MIS FUE CCM CAT HCA EVA HCC NOx
   > AIR O2S HTR EGR BPS EGS OPF
   > FREEZE FRAME
   >
   > P1639   1/50
   > LTFT Bank (2%)   2.5
   > Calc Load (%)   8.5
   > Engine (RPM)   1258
   > Coolant (°F)   158
   > Fuel Sys 1   CL
   > MAP (PSI)   123
   > Spark Adv (°)   10.0
   > TPS (%)   42.3
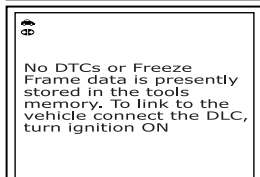
   If there are no enhanced DTCs currently stored in the Scan Tool's memory, an advisory message shows on the display.
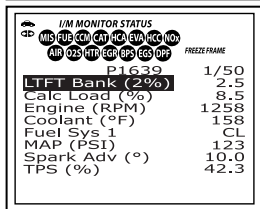
3. When you have finished viewing data in the Scan Tool's memory, press and release the **POWER/LINK** ⊲▷⏻ button to turn the Tool off.

   > No enhanced DTCs are presently stored in the tool's memory
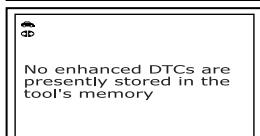
The following is a list of Generic (Global) PIDs and their descriptions.

Tool Display	Unit	Value	PID Description
ACC Pedal D	%	XXX.X	Accelerator Pedal Position D
ACC Pedal E	%	XXX.X	Accelerator Pedal Position E
ACC Pedal F	%	XXX.X	Accelerator Pedal Position F
Air Status	-	UPS, DNS, OFF	Commanded Secondary Air Status
Ambient	*C / *F	XXX	Ambient Air Temperature
Aux Input Status	-	On / Off	Auxiliary Input Status
BARO	kPa /inHg	XXX / XX.X	Barometric Pressure
Calc LOAD	%	XXX.X	Calculated LOAD Value
CAT Temp 11	*C / *F	XXXX.X	Catalyst Temperature Bank 1- Sensor 1
CAT Temp 12	*C / *F	XXXX.X	Catalyst Temperature Bank 1- Sensor 2
CAT Temp 21	*C / *F	XXXX.X	Catalyst Temperature Bank 2- Sensor 1
CAT Temp 22	*C / *F	XXXX.X	Catalyst Temperature Bank 2- Sensor 2
Command EGR	%	XXX.X	Commanded EGR
Command EVAP	%	XXX.X	Commanded Evaporative Purge
Command TAC	%	XXX.X	Commanded Throttle Actuator
Dist DTC Clr	km /mile	XXXXX	Distance since DTC Cleared
Dist MIL ON	km /miles	XXXXX	Distance Traveled while MIL ON
ECT	*C / *F	XXX / XXX	Engine Coolant Temp
ECU Volts	V	XX.XXX	Control Module Voltage
EGR Error	%	XXX.X	EGR Error
Eng RPM	min	XXXXX	Engine RPM
EQ Ratio	-	X.XXX	Commanded Equivalence Ratio
EQ Ratio 11	-	X.XXX	Bank 1 - Sensor 1 Equivalence Ratio
EQ Ratio 12	-	X.XXX	Bank 1 - Sensor 2 Equivalence Ratio
EQ Ratio 13	-	X.XXX	Bank 1 - Sensor 3 Equivalence Ratio
EQ Ratio 14	-	X.XXX	Bank 1 - Sensor 4 Equivalence Ratio

Tool Display	Unit	Value	PID Description
EQ Ratio 21	-	X.XXX	Bank 2 - Sensor 1 Equivalence Ratio
EQ Ratio 22	-	X.XXX	Bank 2 - Sensor 2 Equivalence Ratio
EQ Ratio 23	-	X.XXX	Bank 2 - Sensor 3 Equivalence Ratio
EQ Ratio 24	-	X.XXX	Bank 2 - Sensor 4 Equivalence Ratio
EVAP Press	Pa /in H2O	XXXX.XX /XX.XXX	Evap System Vapor Pressure
FP / Vac	kPa /PSI	XXXX.XXX /XXX.X	Fuel Rail Pressure relative toVacuum
Fuel Level	%	XXX.X	Fuel Level Input
Fuel Press	kPa /PSI	XXX / XX.X	Fuel Rail Pressure
Fuel Press	kPa /PSI	XXXXX /XXXX.X	Fuel Rail Pressure
Fuel Sys 1	-	OL	Fuel System 1 Status
Fuel Sys 1	-	CL	Fuel System 1 Status
Fuel Sys 1	-	OL-Drive	Fuel System 1 Status
Fuel Sys 1	-	OL-Fault	Fuel System 1 Status
Fuel Sys 1	-	CL-Fault	Fuel System 1 Status
Fuel Sys 2	-	OL	Fuel System 2 Status
Fuel Sys 2	-	CL	Fuel System 2 Status
Fuel Sys 2	-	OL-Drive	Fuel System 2 Status
Fuel Sys 2	-	OL-Fault	Fuel System 2 Status
Fuel Sys 2	-	CL-Fault	Fuel System 2 Status
IAT	*C / *F	XXX / XXX	Intake Air Temperature
LOAD Value	%	XXX.X	Absolute Load Value
LTFT B1	%	XXX.X	Long Term Fuel Trim-Bank 1
LTFT B2	%	XXX.X	Long Term Fuel Trim-Bank 2
LTFT B3	%	XXX.X	Long Term Fuel Trim-Bank 3
LTFT B4	%	XXX.X	Long Term Fuel Trim-Bank 4
MAF	g/s ;l b/min	XXX.XX /XXXX.X	Air Flow Rate from Mass Air Flow Sensor
MAP	kPa /PSI	XXX / XX.X	Intake Manifold Absolute Pressure
MIL On Time	hrs, min	XXXX, XX	Engine Run Time while MIL ON
Monitor Status	-	ICONS on Display	Monitor Status this Driving Cycle
O2S B1 S1	V	X.XXX	Bank 1 - Sensor 1
O2S B1 S1 mA	mA	X.XXX	Bank 1 - Sensor 1 O2S Current

Tool Display	Unit	Value	PID Description
O2S B1 S1 V	V	X.XXX	Bank 1 - Sensor 1 O2S Voltage
O2S B1 S2	V	X.XXX	Bank 1 - Sensor 2
O2S B1 S2 mA	mA	X.XXX	Bank 1 - Sensor 2 O2S Current
O2S B1 S2 V	V	X.XXX	Bank 1 - Sensor 2 O2S Voltage
O2S B1 S3	V	X.XXX	Bank 1 - Sensor 3
O2S B1 S3 mA	mA	X.XXX	Bank 1 - Sensor 3 O2S Current
O2S B1 S3 V	V	X.XXX	Bank 1 - Sensor 3 O2S Voltage
O2S B1 S4	V	X.XXX	Bank 1 - Sensor 4
O2S B1 S4 mA	mA	X.XXX	Bank 1 - Sensor 4 O2S Current
O2S B1 S4 V	V	X.XXX	Bank 1 - Sensor 4 O2S Voltage
O2S B2 S1	V	X.XXX	Bank 2 - Sensor 1
O2S B2 S1 mA	mA	X.XXX	Bank 2 - Sensor 1 O2S Current
O2S B2 S1 V	V	X.XXX	Bank 2 - Sensor 1 O2S Voltage
O2S B2 S2	V	X.XXX	Bank 2 - Sensor 2
O2S B2 S2 mA	mA	X.XXX	Bank 2 - Sensor 2 O2S Current
O2S B2 S2 V	V	X.XXX	Bank 2 - Sensor 2 O2S Voltage
O2S B2 S3	V	X.XXX	Bank 2 - Sensor 3
O2S B2 S3 mA	mA	X.XXX	Bank 2 - Sensor 3 O2S Current
O2S B2 S3 V	V	X.XXX	Bank 2 - Sensor 3 O2S Voltage
O2S B2 S4	V	X.XXX	Bank 2 - Sensor 4
O2S B2 S4 mA	mA	X.XXX	Bank 2 - Sensor 4 O2S Current
O2S B2 S4 V	V	X.XXX	Bank 2 - Sensor 4 O2S Voltage
O2S Location	-	O2S11	Oxygen Sensor, Bank 1, Sensor 1
O2S Location	-	O2S12	Oxygen Sensor, Bank 1, Sensor 2
O2S Location	-	O2S13	Oxygen Sensor, Bank 1, Sensor 3
O2S Location	-	O2S14	Oxygen Sensor, Bank 1, Sensor 4
O2S Location	-	O2S21	Oxygen Sensor, Bank 2, Sensor 1
O2S Location	-	O2S22	Oxygen Sensor, Bank 2, Sensor 1
O2S Location	-	O2S23	Oxygen Sensor, Bank 2, Sensor 3
O2S Location	-	O2S24	Oxygen Sensor, Bank 2, Sensor 4
O2S Location	-	O2S11	Oxygen Sensor, Bank 1, Sensor 1
O2S Location	-	O2S12	Oxygen Sensor, Bank 1, Sensor 2
O2S Location	-	O2S21	Oxygen Sensor, Bank 2, Sensor 1
O2S Location	-	O2S22	Oxygen Sensor, Bank 2, Sensor 2
O2S Location	-	O2S31	Oxygen Sensor, Bank 3, Sensor 1
O2S Location	-	O2S32	Oxygen Sensor, Bank 3, Sensor 2
O2S Location	-	O2S41	Oxygen Sensor, Bank 4, Sensor 1
O2S Location	-	O2S42	Oxygen Sensor, Bank 4, Sensor 2
OBD Support	-	OBD2	OBD Requirements

Tool Display	Unit	Value	PID Description
OBD Support	-	OBD	OBD Requirements
OBD Support	-	OBD and OBD2	OBD Requirements
OBD Support	-	OBD1	OBD Requirements
OBD Support	-	No OBD	OBD Requirements
OBD Support	-	EOBD	OBD Requirements
OBD Support	-	EOBD and OBD2	OBD Requirements
OBD Support	-	EOBD and OBD	OBD Requirements
OBD Support	-	EOBD, OBD and OBD2	OBD Requirements
OBD Support	-	JOBD	OBD Requirements
OBD Support	-	JOBD and OBD2	OBD Requirements
OBD Support	-	JOBD and EOBD	OBD Requirements
OBD Support	-	JOBD, EOBD and OBD2	OBD Requirements
PTO Status	-	On / Off	Power Take Off Status
Rel TPS	%	XXX.X	Relative Throttle Position
Spark Adv	deg	XX	Ignition Timing Advance #1 Cylinder
STFT B1	%	XXX.X	Short Term Fuel Trim-Bank 1
STFT B1 S1	%	XXX.X	Bank 1 - Sensor 1
STFT B1 S2	%	XXX.X	Bank 1 - Sensor 2
STFT B1 S3	%	XXX.X	Bank 1 - Sensor 3
STFT B1 S4	%	XXX.X	Bank 1 - Sensor 4
STFT B2	%	XXX.X	Short Term Fuel Trim-Bank 2
STFT B2 S1	%	XXX.X	Bank 2 - Sensor 1
STFT B2 S2	%	XXX.X	Bank 2 - Sensor 2
STFT B2 S3	%	XXX.X	Bank 2 - Sensor 3
STFT B2 S4	%	XXX.X	Bank 2 - Sensor 4
STFT B3	%	XXX.X	Short Term Fuel Trim-Bank 3
STFT B4	%	XXX.X	Short Term Fuel Trim-Bank 4
Time DTC Clr	hrs, min	XXXX, XX	Time since DTC Cleared
Time Since Start	sec	XXXX	Time Since Engine Start
TPS	%	XXX.X	Absolute Throttle Position
TPS B	%	XXX.X	Absolute Throttle Position B
TPS C	%	XXX.X	Absolute Throttle Position C

Generic (Global) OBD2 PID List

Tool Display	Unit	Value	PID Description
Veh Speed	km/h / mph	XXX / XXX	Vehicle Speed Sensor
Warm-up DTC Clr	-	XXX	# Warm-ups since DTC Cleared

VEHICLE APPLICATIONS – MAKES COVERED

The Scan Tool has the ability to retrieve and erase ABS codes. Vehicle Makes supported by the Scan Tool are shown below. Please visit www.innova.com for a complete list of vehicles covered.

BUICK	JEEP
CADILLAC	LEXUS
CHEVROLET	LINCOLN
CHRYSLER	MERCURY
DODGE	OLDSMOBILE
FORD	PONTIAC
GMC	SCION
HUMMER	TOYOTA

VEHICLE APPLICATIONS – MAKES COVERED

The Scan Tool has the ability to retrieve and erase SRS codes. Vehicle Makes supported by the Scan Tool are shown below. Please visit www.innova.com for a complete list of vehicles covered.

BUICK	JEEP
CADILLAC	LEXUS
CHEVROLET	LINCOLN
CHRYSLER	MERCURY
DODGE	OLDSMOBILE
FORD	PONTIAC
GMC	SCION
HUMMER	TOYOTA

GLOSSARY OF TERMS AND ABBREVIATIONS

CARB – California Air Resources Board

CCM – Central Control Module

Computer Control System – An electronic control system, consisting of an on-board computer and related sensors, switches and actuators, used to ensure peak performance and fuel efficiency while reducing pollutants in the vehicle's emissions.

DIY – Do-It-Yourself

DLC – Data Link Connector

Drive Cycle – An extended set of driving procedures that takes into consideration the various types of driving conditions encountered in real life.

Driving Condition – A specific environmental or operation condition under which a vehicle is operated; such as starting the vehicle when cold, driving at steady speed (cruising), accelerating, etc.

DTC(s) – Diagnostic Trouble Code(s)

EGR – Exhaust Gas Recirculation

EPA – Environmental Protection Agency

EVAP – Evaporative Emissions System

Fault Code – See DTCs

Freeze Frame – A digital representation of engine and/or emissions system conditions present when a fault code was recorded.

FTP – Fuel Tank Pressure

Generic Code – A DTC that applies to all OBD2 compliant vehicles.

I/M Readiness – An indication of whether or not a vehicle's emissions-related system are operating properly and are ready for Inspection and Maintenance testing.

I/M Test / Emissions Test / Smog Check – A functional test of a vehicle to determine if tailpipe emissions are within Federal/State/Local requirements.

LCD – Liquid Crystal Display

LED – Light Emitting Diode

LTFT – Long Term Fuel Trim, is a program in the vehicle's computer designed to add or subtract fuel from the vehicle to compensate for operating conditions that vary from the ideal A/F ratio (long term).

Manufacturer Specific Code – A DTC that applies only to OBD2 compliant vehicles made by a specific manufacturer.

MIL – Malfunction Indicator Lamp (also referred to as "Check Engine" light

OBD1 – On-Board Diagnostics Version 1 (also referred to as "OBD I")

OBD2 – On-Board Diagnostics Version 2 (also referred to as "OBD II")

On-Board Computer – The central processing unit in the vehicle's computer control system.

PCM – Powertrain Control Module

Pending Code – A code recorded on the "first trip" for a "two-trip" code. If the fault that caused the code to be set is not detected on the second trip, the code is automatically erased.

PID – Parameter Identification

STFT – Short Term Fuel Trim, is a program in the vehicle's computer designed to add or subtract fuel from the vehicle to compensate for operating conditions that vary from the ideal A/F ratio. The vehicle uses this program to make minor fuel adjustments (fine tune) on a short-term basis.

Trip Drive Cycle – Vehicle operation that provides the necessary driving condition to enable a vehicle Monitor to run and complete its diagnostic testing.

VECI – Vehicle Emission Control Information Decal

LIMITED ONE 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 one (1) year from the date of original purchase.

If the unit fails within the one (1) 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:

(800) 544-4124 (6:00 AM-6:00 PM PST, 7 days a week)

All others: (714) 241-6802 (6:00 AM-6:00 PM PST, 7 days a week)

FAX: (714) 432-3979 (24 hr.)

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