D900

CanScan

OWNER'S MANUAL

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

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Introduction

WHAT IS OBD?

The D900 CanScan is designed to work on all OBD 2 compliant vehicles. All 1996 and newer vehicles (cars, light trucks and SUVs) sold in the United States are OBD 2 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. OBD 1 was designed to monitor manufacturer-specific systems on vehicles built from 1981 to 1995. Then came the development of OBD 2, which is on all 1996 and newer vehicles sold in the U.S. Like its predecessor, OBD 2 was adopted as part of a government mandate to lower vehicle emissions. But what makes OBD 2 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 OBD 2 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 diagnostic tool, such as the D900 CanScan, is required to retrieve these codes, which consumers and professionals use as a starting point for repairs.
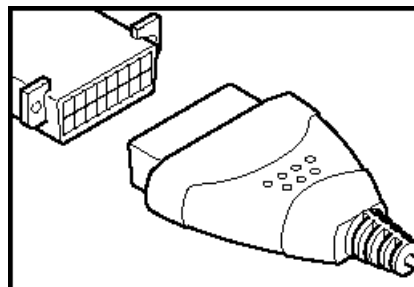
To learn more about vehicle Computer Control Systems and OBD 2, see COMPUTER ENGINE CONTROLS on page **12**.

You Can Do It!

Easy To Use ....

➢ Connect the CanScan to the vehicle's test connector.

➢ Turn the ignition key "On."

➢ Press the **LINK** button.

Easy To View ....

➢ The CanScan retrieves stored codes, Freeze Frame data and I/M Readiness status.

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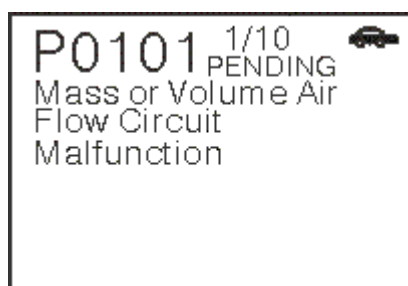
Easy To Define ....

➢ Read code definitions from the CanScan's LCD display.

➢ View Freeze Frame data.

Safety Precautions
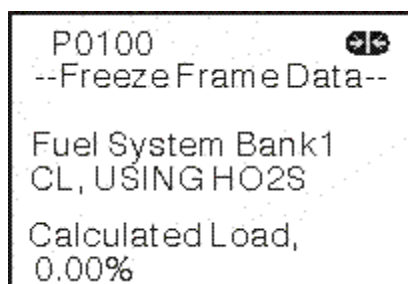
SAFETY FIRST!

To avoid personal injury, instrument damage and/or damage to your vehicle; do not use the CAN OBD2 Code Reader 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 trouble-shooting, make sure the parking brake is engaged. Put the transmission in **park** (for automatic transmission) or **neutral** (for manual transmission). Block the drive wheels with suitable blocks.

Connecting or disconnecting test equipment when the ignition is **ON** can damage test equipment and the vehicle's electronic components. Turn the ignition **OFF** before connecting the CanScan to or disconnecting the CanScan from the vehicle's Data Link Connector (DLC).
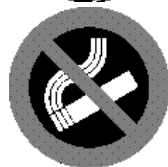
To prevent damage to the on-board computer when taking vehicle electrical measurements, always use a digital multimeter with at least 10 megOhms of impedance.

Fuel and battery vapors are highly flammable. To pre-vent an explosion, keep all sparks, heated items and open flames away from the battery and fuel / fuel vapors. DO NOT SMOKE NEAR THE VEHICLE DUR-ING 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.

About the CanScan

VEHICLES COVERED

The D900 CanScan is designed to work on all OBD 2 compliant vehicles. All 1996 and newer vehicles (cars and light trucks) sold in the United States are OBD 2 compliant.

Federal law requires that all 1996 and newer cars and light trucks sold in the United States must be OBD 2 compliant; this includes all Domestic, Asian and European vehicles.

Some 1994 and 1995 vehicles are OBD 2 compliant. To find out if a 1994 or 1995 vehicle is OBD 2 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 OBD 2 compliant, the label will state **"OBD II Certifie**d."
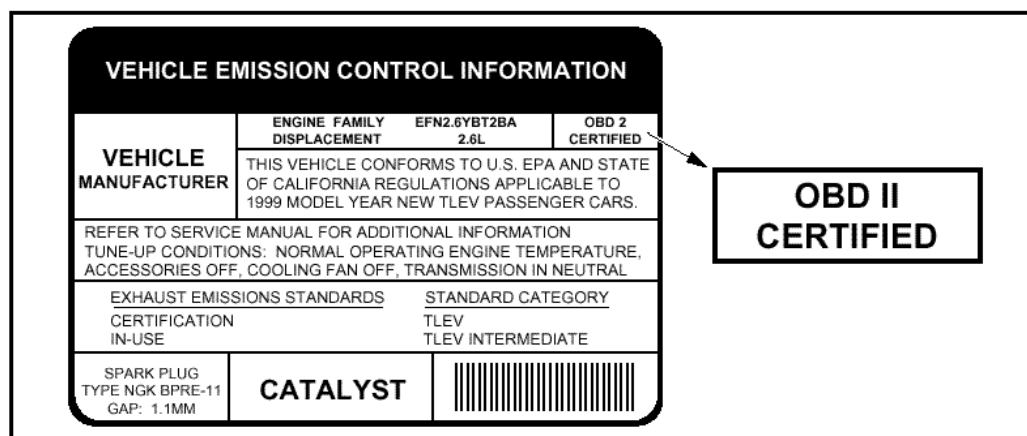

2. Government Regulations require that all OBD 2 compliant vehicles **must** have a "common" sixteen-pin **Data Link Connector (DLC)**.
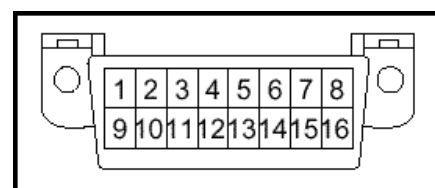
Some 1994 and 1995 vehicles have 16-pin connectors but are not OBD 2 compliant. Only those vehicles with a Vehicle Emissions Control Label stating "OBD II Certified" are OBD 2 compliant.

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
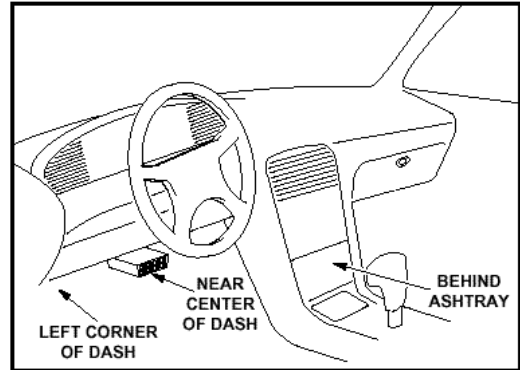
LEFT CORNER OF DASH

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

1. Locate the battery cover on the back of the CanScan.

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 CanScan.

ADJUSTMENTS AND SETTINGS

To enter the MENU Mode:

1. Press and hold the **UP** button, then press and release the **POWER/LINK** button.

➢ The adjustments and setting **MENU** displays.

2. DO NOT release the **UP** button until the adjustments and settings **MENU** is visible on the display.

**3.** Make adjustments and settings as described in the following paragraphs.

MEN U

Adjust Brightness
About....
Exit Menu

Adjusting Display Brightness

1. Use the **UP** ⬠and **DOWN** ▽buttons, as necessary, to highlight **Adjust Brightness** in the **MEN**U, then press the **ENTER/FF** button.

```
Brightness:    5

Darker  ↑
Lighter ↓

Press the ENTER
Button to exit
```

➤ The Adjust Brightness screen displays.

➤ The **Brightness** field shows the current brightness setting, from 1 to 10.
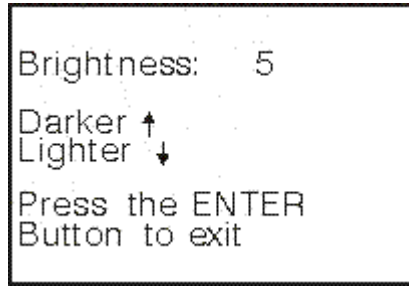
2. Press the **UP** ⬠button to decrease the brightness of the LCD display (make the display darker)

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

4. When the desired brightness is obtained, press the **ENTER/FF** button to save your changes and return to the **MENU.**

Exiting the MENU Mode

1. Use the **UP** ⬠and **DOWN** ▽buttons, as necessary, to highlight **Menu Exit** in the **MENU**, then press the **ENTER/FF** button.

➤ The LCD display returns to the DTC screen.

Changes made to Brightness will remain in the CanScan's memory as long as the batteries are not removed. If the batteries are removed (or go dead), the settings will be lost from the CanScan's memory, and they must be reset again.

CanScan Controls

CONTROLS AND INDICATORS
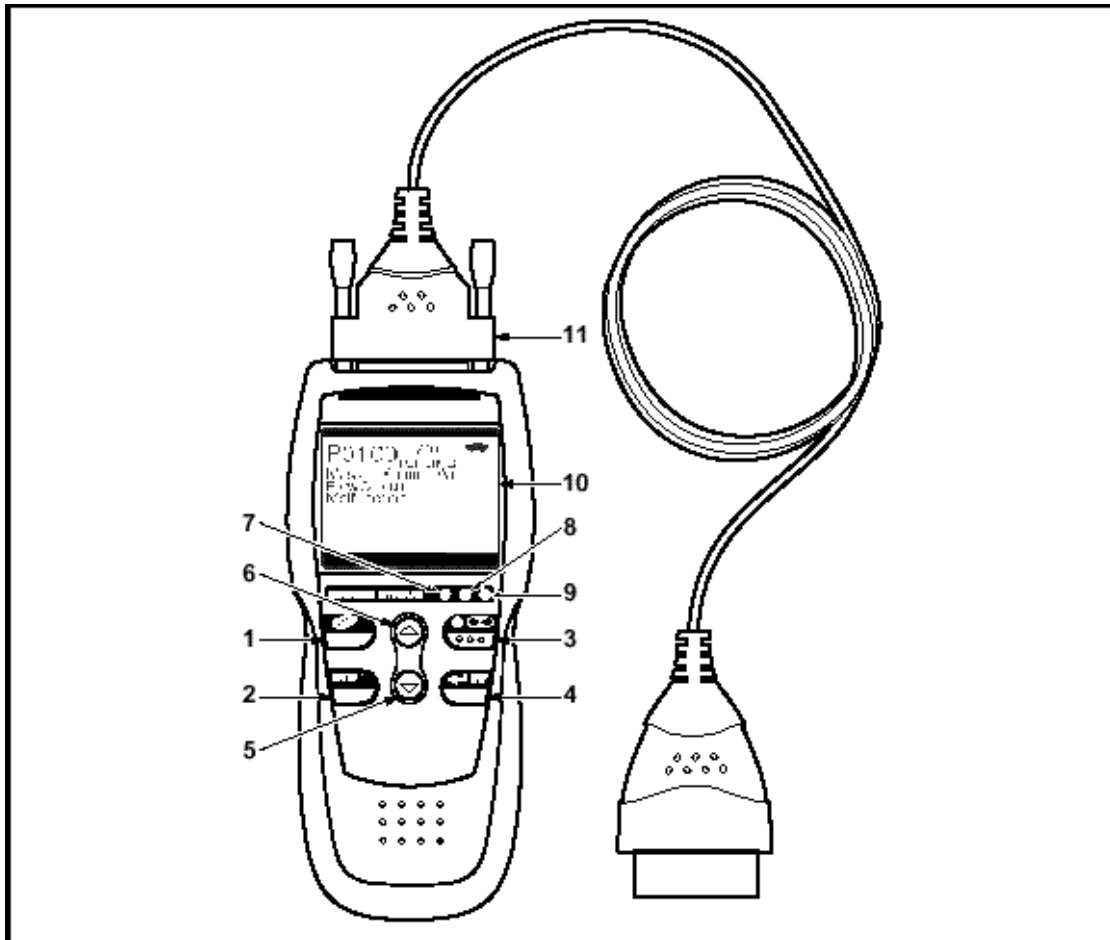
Figure 1. Controls and Indicators

See Figure 1 for the locations of items 1 through 11, below.

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

2. 🖭 **DTC SCROLL button** - Displays the DTC View screen and/or scrolls the LCD display to view DTCs when more than one DTC is present.

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

4. 🖭 **ENTER/FREEZE FRAME button** - When in MENU mode, confirms the selected option or value. When retrieving and viewing DTCs, displays Freeze Frame data for the highest priority code.

5. ⊗ **DOWN button** - When in MENU mode, scrolls DOWN through the menu and submenu selection options. When retrieving and viewing DTCs, scrolls down through the current display screen to display any additional data.

6. △ **UP button** - When in MENU mode, scrolls UP through the menu and submenu selection options. When retrieving and viewing DTCs, scrolls ups through the current display screen to display any additional data.

7. 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).

8. 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.

9. 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 CanScan's LCD display. In this case, the Multifunction Indicator ("Check Engine") lamp on the vehicle's instrument panel will light steady on.

10. LCD Display - Displays settings Menu and submenus, test results, CanScan functions. See **DISPLAY FUNCTIONS**, on next page, for more details.

11. CABLE - Connects the CanScan to the vehicle's Data Link Connector (DLC).

DISPLAY FUNCTIONS
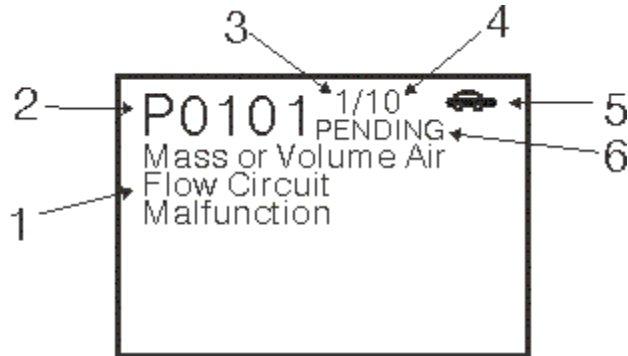
Figure 2. Display Functions

See Figure 2 for the locations of items 1 through 6, below.

1. Test Data Display Area - Displays DTC definitions, and other pertinent test information messages.

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

3. Code Number Sequence - The CanScan assigns a sequence number to each DTC that is present in the computer's memory, starting with "1." This number indicates which code is currently displayed. Code number "1" is always the highest priority code.

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

5. 🚗 **Vehicle icon /** ⬚ **Link icon /** ▭ **Internal Battery icon**

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

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

▭ **CanScan Internal Battery icon** - When visible, indicates the CanScan batteries are "low" and should be replaced.

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

Onboard Diagnostics

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**

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.
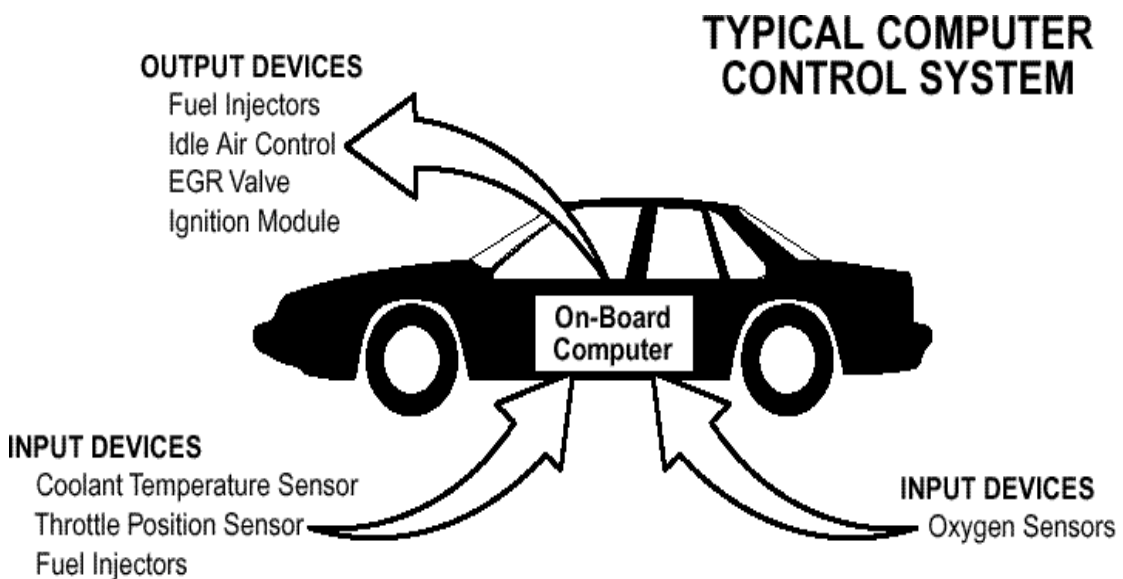
The Basic Engine Computer Control System

> **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 device**s. They provide signals representing current engine operating conditions to the computer. Actuators are **output device**s. 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.

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

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

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

On-Board Diagnostics - First Generation (OBD 1)

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

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 pro-gram would be capable of identifying emissions-related faults in a system. The first generation of Onboard Diagnostics came to be known as **OBD** 1.

OBD 1 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 missions-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 "CanScan" or a "Scan Tool."

On-Board Diagnostics - Second Generation (OBD 2)

In addition to performing all the functions of the OBD 1 System, the OBD 2 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 OBD 2 System is an enhancement of the OBD 1 System.

The California Air Resources Board **(CARB)** conducted studies on OBD 1 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 OBD 1 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 (OBD 2**)." The primary objective of the OBD 2 system is to comply with the latest regulations and emissions standards established by CARB and the EPA.

The Main Objectives of the OBD 2 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 OBD 2, DLCs were of different shapes and sizes.)

➢ To standardize the code numbers, code definitions and language used to describe faults. (Before OBD 2, 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, CanScans, etc.) and the vehicle's on-board computer.

OBD 2 Terminology

The following terms and their definitions are related to OBD 2 systems. Read and reference this list as needed to aid in the understanding of OBD 2 systems.

➢ **Powertrain Control Module (PCM)** - The PCM is the OBD 2 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 eleven Monitors are used in OBD 2 systems. Additional Monitors will be added as the OBD 2 system is further developed.

Not all vehicles support all eleven 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 **"O**n." 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 eleven 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.

➢ **OBD 2 Drive Cycle** - An OBD 2 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 OBD 2 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 OBD 2 Drive Cycle. OBD 2 Drive Cycle requirements vary from one model of vehicle to another. Vehicle manufacturers set these procedures. Consult your vehicle's service manual for OBD 2 Drive Cycle procedures.

*Do not confuse a "Trip" Drive Cycle with an OBD 2 Drive Cycle. A "Trip" Drive Cycle provides the "Enabling Criteria" for **one** specific Monitor to run and complete its diagnostic testing. An OBD 2 Drive Cycle must meet the "Enabling Criteria" for **all** Monitors on a particular vehicle to run and complete their diagnostic testing.*

➢ **Warm-up Cycle** - Vehicle operation after an engine off period where engine temperature rises at least 40°F (22°C) from its temperature before starting, **and** reaches at least 160°F (70°C). The PCM uses warm-up

cycles as a counter to automatically erase a specific code and related data from its memory. When no faults related to the original problem are detected within a specified number of warm-up cycles, the code is erased automatically.

DIAGNOSTIC TROUBLE CODES (DTCs)

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

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

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.

OBD 2 diagnostic trouble codes are made up of five characters:

➢ The 1st character is a **lette**r. It identifies the "main system" where the fault occurred (Body, Chassis, Powertrain, or Network).

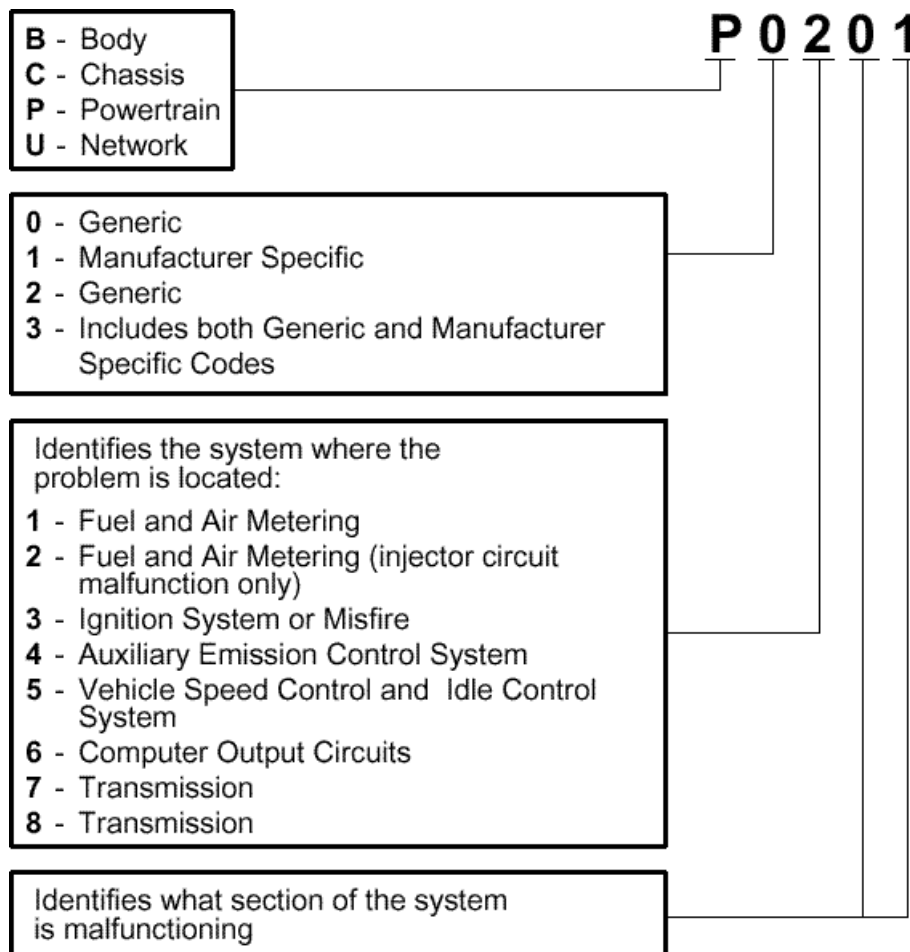➢ The 2nd character is a **numeric digi**t. It identifies the "type" of code (Generic or Manufacturer-Specific).

> *Generic DTCs* are codes that are used by all vehicle manufacturers. The standards for generic DTCs, as well as their definitions, are set by the Society of Automotive Engineers (SAE).
>
> *Manufacturer-Specific DTCs* are codes that are controlled by the vehicle manufacturers. The Federal Government does not require vehicle manufacturers to go beyond the standardized generic DTCs in order to comply with the new OBD2 emissions standards. However, manufacturers are free to expand beyond the standardized codes to make their systems easier to diagnose.

➢ The 3rd character is a **numeric digi**t. It identifies the specific sys-tem or sub-system where the problem is located.

➢ The 4th and 5th characters are **numeric digit**s. They identify the section of the system that is malfunctioning.

BD 2 DTC EXAMPLE

P0201 - Injector Circuit Malfunction, Cylinder 1

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

P 0 2 0 1

0 - Generic
1 - Manufacturer Specific
2 - Generic
3 - Includes both Generic and Manufacturer
Specific Codes

Identifies the system where the
problem is located:

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

Identifies what section of the system
is malfunctioning

Preparation for Testing

BEFORE YOU BEGIN

The D900 CanScan 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 "false" fault code. 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.

Using the CanScan

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 **Preparation for Testing** *on page* **20** *for details.*

ALWAYS observe safety precautions whenever working on a vehicle. See **Safety Precautions** *on page* **4** *for more information.*

1. Turn the ignition off.

2. Locate the vehicle's 16-pin Data Link Connector (DLC). See page **6** for connector location.
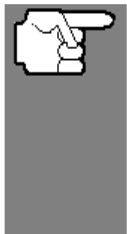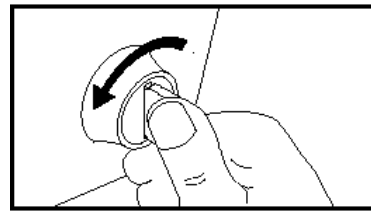
Some DLCs have a plastic cover that must be removed before connecting the CanScan cable connector.

If the CanScan is ON, turn it OFF by pressing the **POWER/LINK** *button BEFORE connecting the CanScan to the DLC.*

3. Connect the CanScan 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 CanScan. Refer to your vehicle's service manual to properly check the vehicle's DLC.

4. When the CanScan's cable connector is properly connected to the vehicle's DLC, the unit automatically turns ON, and the LCD display shows instructions for linking to the vehicle's on-board computer.

```
TO LINK:          🚗
Connect the DLC to
the vehicle
Turn the ignition on
Press the LINK button
```
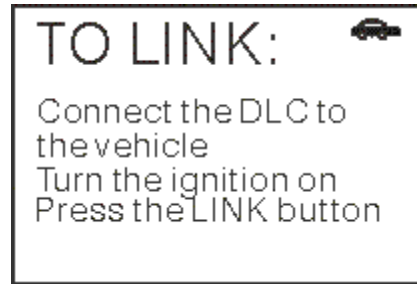
➢ If the unit does not power on automatically when connected to the vehicle's DLC connector, it usually indicates there is no power present at the vehicle's DLC connector. Check your fuse panel and replace any burned-out fuses.

➢ 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.

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

6. Press and release the CanScan's **POWER/LINK** 🔲 button.

➢ The CanScan will automatically start a check of the vehicle's computer to determine which type of communication protocol it is using. When the CanScan identifies the computer's communication protocol, a communication link is established. The protocol type used by the vehicle's computer is shown on the LCD display.

```
One moment
AUTO-LINK is in
Progress...

Detecting the
Protocol in
    1850 VPW
```
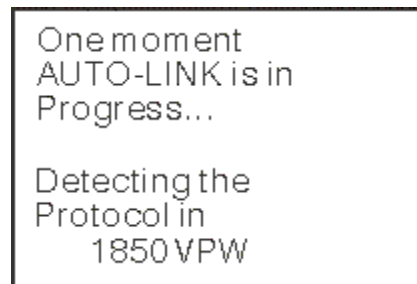
> ☞ *A PROTOCOL is a set of rules and procedures for regulating data transmission between computers, and between testing equipment and computers. As of this writing, five different types of protocols (ISO 914, Keyword 2000, J1850 PWM, 1850 VPW and CAN) are in use by vehicle manufacturers. The CanScan automatically identifies the protocol type and establishes a communication link with the vehicle's computer.*

7. After approximately 4~5 seconds, the CanScan will **retrieve** and **display** any Diagnostic Trouble Codes retrieved from the vehicle's computer memory.

➢ If the CanScan fails to link to the vehicle's computer a "Linking Failed" message shows on the CanScan's LCD display.

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

- Turn the ignition OFF, wait 5 seconds,

```
Unable to establish a
link with the vehicle

Verify the connection
at the DLC
Verify the
Ignition is ON
and Press LINK button
```
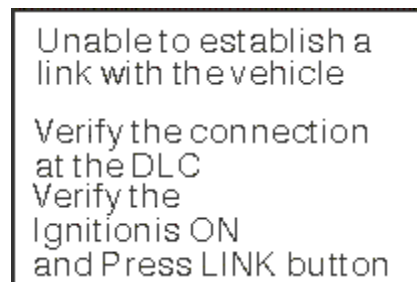
then turn back ON to reset the computer.

- Ensure your vehicle is OBD2 compliant. See **Vehicles Covered** on page 6 for vehicle compliance verification information.

➢ The CanScan will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "0" is displayed.

➢ The CanScan 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 11 for a description of LCD display elements.*

➢ A visible icon 🚗 indicates that the CanScan is being powered through the vehicle's DLC connector.

➢ A visible icon ⊞ indicates that the CanScan is linked to (communicating with) the vehicle's computer.

➢ The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display. 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 △ and ▽ buttons, as necessary, to view the additional information

```
P0101 1/10   🚗
       PENDING
Mass or Volume Air
Flow Circuit
Malfunction
```

➢ If the code being displayed is a PENDING code, the PENDING icon is shown.

➢ The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display.
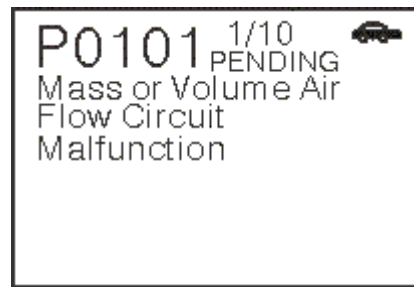
In the case of long code definitions, or when viewing Freeze Frame data, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the △ and ▽ buttons, as necessary, to view the additional information.

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

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

➢ **Green LED** – Indicates that all engine systems are "OK" and operating normally. All monitors supported by the vehicle have run and per-formed their diagnostic testing, and no trouble codes are present. A zero will show on the CanScan's LCD display.

➢ **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 CanScan's LCD display for confirmation. A Pending code is confirmed by the presence of a numeric code and the word PENDING on the CanScan's LCD display.

B. MONITOR NOT RUN STATUS – If the CanScan's LCD 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 CanScan's LCD display for confirmation.
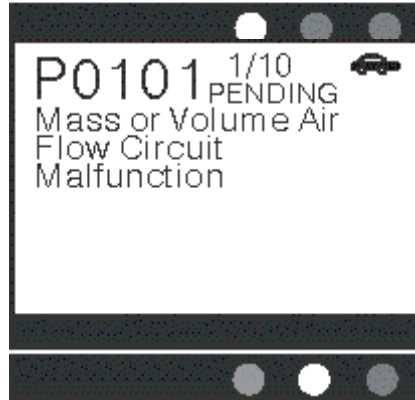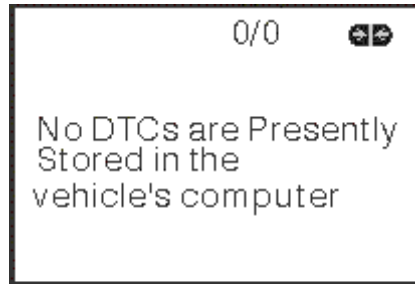
➢ **Red LED** – Indicates there is a problem with one or more of the vehicle's systems. The red LED is also used to indicate that DTC(s) are present (displayed on the CanScan's screen). In this case, the Multifunction Indicator (Check Engine) lamp on the vehicle's instrument panel will be illuminated.
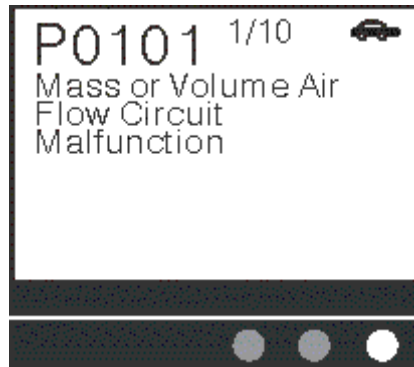
➢ DTC's that start with "P0", "P2" and some "P3" are considered Generic (Universal). All Generic DTC definitions are the same on all OBD2 equipped vehicles. The CanScan automatically displays the code definitions for Generic DTC's.

➢ DTC's that start with "P1" and some "P3" are Enhanced (Manufacturer specific) codes and their code definitions vary with each vehicle manufacturer. When an Enhanced (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/FF** button to display the correct code definition
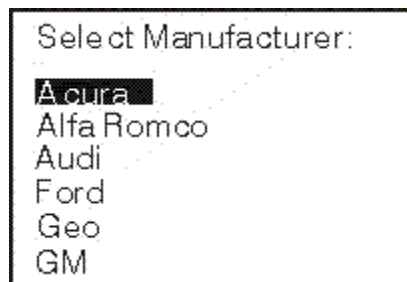
for your vehicle.

10. Freeze Frame Data (if available) can be viewed at any time (except MENU mode) by pressing the **ENTER/FF** button.

➢ 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.

```
P0100
--Freeze Frame Data--

Fuel System Bank1
CL, USING HO2S

Calculated Load,
0.00%
```
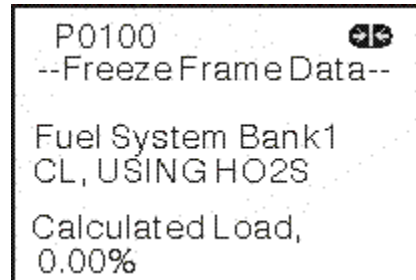
11. If more than one code was retrieved press the **DTC SCROLL** button, as necessary, to display additional codes one at a time.

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

> *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 CanScan 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.*

> *If Freeze Frame data is not available for the code shown on the LCD display when the **ENTER/FF** button is pressed, an advisoory message shows on the LCD display. Press the **DTC SCROLL** button to return to the previous code display.*

```
No Freeze Frame Data
are Presently stored
in the vehicle's
Computer
Press the DTC button
To Return
```
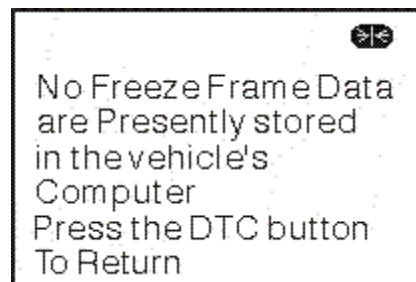
12. Determine engine system(s) condition by viewing the CanScan's LCD display for any retrieved Diagnostic Trouble Codes, code definitions, Freeze Frame data and interpreting the green, yellow and red LEDs.

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

➢ If you plan to take the vehicle to a professional to have it serviced,

complete the **Preliminary Vehicle Diagnosis Worksheet** on page 27 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 CanScan 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 CanScan's memory, and may be viewed at any time by turning the unit "On". If the CanScan's batteries are removed, or if the CanScan is relinked to a vehicle to retrieve codes/data, any prior codes/data in its memory are automatically cleared.

ERASING DIAGNOSTIC TROUBLE CODES (DTCs)

When the CanScan's ERASE function is used to erase DTCs from the vehicle's on-board computer, manufacturer- specific enhanced data are also erased.

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.

```
TO ERASE: 🚗
Connect the DLC to
the vehicle
Turn the ignition on
Press the ERASE
Button
```

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 OBD 2 Drive Cycle must be performed. Refer to your vehicle's service manual for information on how to perform an OBD 2 Drive Cycle for the vehicle under test.
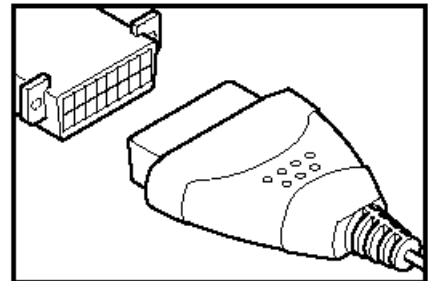
*The CanScan must be connected to the vehicle's DLC to erase the codes from the computer's memory. If you press the **ERASE** 🖫 button when the CanScan is not connected to the vehicle's DLC, the erase instruction screen displays.*
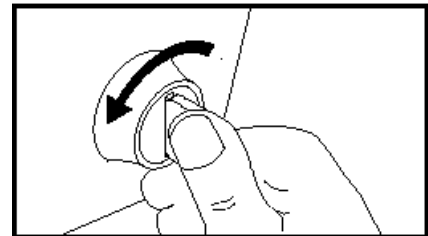
1. If not connected already, connect the CanScan to the vehicle's DLC, and turn the ignition "On." (If the CanScan is already connected and linked to the vehicle's computer, proceed directly to step 4. If not, continue to step 2.)

2. Turn the ignition on. **DO NOT** start the engine. Press and release the **POWER/LINK** 🖳 button to establish communication with the vehicle's computer.

3. Press and release the **ERASE** 🖫 button. A confirmation message shows on the LCD display.

- If you are sure you want to proceed press the **ERASE** 🖫 button again to erase DTCs from the vehicle's computer.

```
Erasing clears all DTCs
Freeze Frame Data
and resets IM Monitors

Are you sure?
Yes - Press ERASE
No - Press LINK To Exit
```

- If you do not want to continue with the erase process, press the **POWER/LINK** button to exit the erase mode.

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 LCD display. Press the **POWER/LINK** button to return to the DTC screen.

> Erase was successful!
>
> Press the LINK butten to View the current DTCs and I/M Readiness status

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

> Erase has Failed
>
> Veryfy the connection at the DLC Verify that the ignition Switch is ON

Erasing DTCs does not fix the problem(s) that caused the code(s) to be set. If proper repairs to correct the problem that caused the code(s) to be set are not made, the code(s) will appear again (and the check engine light will illuminate) as soon as the vehicle is driven long enough for its Monitors to complete their testing.