OBD1200 CodeConnect®

BOSCH

en User guide

Serial No: _____

SW ID: _____

HW Ver: _____

Boot Ver: _____

Prod ID: _____

Board ID: _____

Burn Date: _____

Record the above information about your tool. The information is available at Main Menu --> System Setup --> Tool Information. Provide this information when contacting technical support.

If you have questions or concerns contact Technical Support:

Phone: 800-228-7667

E-mail: tech@boschdiagnostics.com

The information, specifications and illustrations in this guide are based on the latest information available. Bosch reserves the right to make changes at any time without notice.

Bosch Automotive Service Solutions Inc.

Table of Contents

1   Safety Precautions

For your safety, read this manual thoroughly before operating your scan tool. Always refer to and follow safety messages and test procedures provided by the manufacturer of the vehicle or equipment being tested. The safety messages presented below and throughout this user's manual are reminders to the operator to exercise extreme care when using this test instrument.

1.1   Read All Instructions
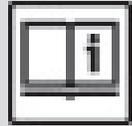
Read and understand the user guide before operating the tool.

Read, understand, and follow all safety messages and instructions in this manual and on the test equipment. Safety messages in this section of the manual contain a signal word with a three-part message and, in some instances, an icon.

1.2   Safety Messages

Safety messages are provided to help prevent personal injury and equipment damage. All safety messages are introduced by a signal word. The signal word indicates the level of the hazard in a situation. The types of safety messages are.

DANGER
Indicates a possible hazardous situation which, if not avoided, will result in death or serious injury to operator or bystanders.

WARNING
Indicates a possible hazardous situation which, if not avoided, could result in death or serious injury to operator or bystanders.

CAUTION
Indicates a possible hazardous situation which, if not avoided, may result in moderate or minor injury to operator or bystanders.

IMPORTANT
Indicates a condition which, if not avoided, may result in damage to test equipment or vehicle.

2   Important Safety Warnings and Instructions

WARNING

Risk of electric shock.
- Do not exceed voltage limits between inputs indicated in the Specifications.
- Use extreme caution when working with circuits that have voltage greater than 60 volts DC or 24 volts AC.

Electric shock can cause injury.

WARNING

Risk of poisoning.
- Safety goggles and protective clothing must be worn by the operator and any bystanders.
  - Even if everyday glasses have impact resistant lenses, they are NOT safety glasses, and may not provide adequate protection.
- Do not use this scan tool in environments where explosive vapors may collect. These areas include:
  - below-ground pits.
  - confined areas.
  - areas that are less than 18 inches above floor.
- Use this scan tool in locations with mechanical ventilation providing at least 4 air changes per hour.
- Flammable fuel and vapors can ignite.
- Do not smoke, strike a match, or cause a spark in the vicinity of the battery. Battery gases can ignite.
- Avoid making an accidental connection between the battery terminals. Do not place uninsulated metal tools on the battery.
- When removing battery cables, remove the ground cable first.
- Avoid sparks when connecting or disconnecting power leads to the battery.
- Make sure ignition is off, headlights and other accessories are off and vehicle doors are closed before disconnecting the battery cables.
  - This also helps prevent damage to on-board computer systems.
- Always disconnect the battery ground connections before servicing electrical system components.

Explosion can cause injury.

WARNING

Risk of poisoning.
- Use this scan tool in locations with mechanical ventilation providing at least 4 air changes per hour. Engine exhaust contains odorless gas which can be lethal.
- Route the exhaust outside while testing with the engine running.

Poisoning can result in death or serious injury.

WARNING

Battery acid is a highly corrosive sulfuric acid.
- Safety goggles and protective gloves must be worn by the operator and any bystanders.
  - Even if your everyday glasses have impact resistant lenses, they are NOT safety glasses, and may not provide adequate protection.
- Make sure someone can hear you or is close enough to provide aid when working near a battery.
- Have plenty of fresh water and soap nearby.
  - If battery acid contacts skin, clothing, or eyes, flush exposed area with soap and water for 10 minutes. Seek medical help.
- Do not touch eyes while working near battery.

Battery acid can burn eyes and skin.

WARNING

Risk of fire.
- Safety goggles and protective clothing must be worn by the operator and any bystanders.
  - Even if your everyday glasses have impact resistant lenses, they are NOT safety glasses, and may not provide adequate protection.
- Do not position your head directly in front of or over the throttle body.
- Do not pour gasoline down the throttle body when cranking or running the engine, when working with fuel delivery systems or any open fuel line.
  - Engine backfire can occur when the air cleaner is out of position.
- Do not use fuel injector cleaning solvents when performing diagnostic testing.
- Keep cigarettes, sparks, open flame and other sources of ignition away from vehicle.
- Keep a dry chemical (Class B) fire extinguisher rated for gasoline, chemical and electrical fires in work area.

Fire can cause death or serious injury.

WARNING

Risk of flying particles.
- Safety goggles and protective gloves must be worn by the operator and any bystanders while using electrical equipment.
  - Electrical equipment or rotating engine parts can cause flying particles.
  - Even if your everyday glasses have impact resistant lenses, they are NOT safety glasses, and may not provide adequate protection.

Flying particles can cause eye injury.

WARNING

Risk of burns.
- Batteries can produce a short-circuit current high enough to weld jewelry to metal.
  - Remove jewelry such as rings, bracelets and watches before working near batteries.

Short circuits can cause injury.

WARNING

Risk of burns.
- Do not remove radiator cap unless engine is cold.
  - Pressurized engine coolant may be hot.
- Do not touch hot exhaust systems, manifolds, engines, radiators, sample probe.
- Wear insulated gloves when handling hot engine components.
- Tester leads can become hot after extended testing in close proximity to manifolds.

Hot components can cause injury.

WARNING

Risk of expelling fuel, oil vapors, hot steam, hot toxic exhaust gases, acid, refrigerant and other debris.
- Safety goggles and protective clothing must be worn by the operator and any bystanders.
  - Even if your everyday glasses have impact resistant lenses, they are NOT safety glasses, and may not provide adequate protection.
- Engine systems can malfunction, expelling fuel, oil vapors, hot steam, hot toxic exhaust gases, acid, refrigerant and other debris.

Fuel, oil vapors, hot steam, hot toxic exhaust gases, acid, refrigerant and other debris can cause serious injury.

WARNING

Engine compartment contains electrical connections and hot or moving parts.
- Keep yourself, test leads, clothing and other objects clear of electrical connections and hot or moving engine parts.
- Do not wear watches, rings, or loose fitting clothing when working in an engine compartment.
- Do not place tools or test equipment on fenders or other places in engine compartment.
- Barriers are recommended to help identify danger zones in test area.
- Prevent personnel from walking through test area.

Contacting electrical connections and hot or moving parts can cause injury.

WARNING

Risk of injury.
- The scan tool should be operated by qualified personnel only.
- Use the scan tool only as described in the user's manual.
- Use only manufacturer's recommended attachments.
- Do not operate the scan tool with damaged cables.
- Do not operate the scan tool if it has been dropped or damaged, until examined by a qualified service representative.

Operation of the scan tool by anyone other than qualified personnel may result in injury.

WARNING

Risk of unexpected vehicle movement.
- Block drive wheels before performing a test with engine running.
- Unless instructed otherwise:
  - set parking brake
  - put gear selector in neutral for manual transmissions
  - put gear selector in park for automatic transmissions
  - disconnect release mechanism on the automatic parking brake release for testing and reconnect when testing is completed.
- Do not leave a running engine unattended.

A moving vehicle can cause injury.

CAUTION

Risk of equipment or circuit damage.
- Unless specifically directed by manufacturer, make sure ignition is off before connecting or disconnecting connectors or any vehicle electrical terminals.
- Do not create a short between battery terminals with a jumper wire or tools.

Improper equipment use can cause equipment or circuit damage.

CAUTION

Misdiagnosis may lead to incorrect or improper repair and/or adjustment.
- Do not rely on erratic, questionable, or obviously erroneous test information or results.
  - If test information or results are erratic, questionable, or obviously erroneous, make sure all connections and data entry information are correct and test procedures were performed correctly.
  - If test information or results are still suspicious, do not use them for diagnosis.

Improper repair and/or adjustment may cause vehicle or equipment damage or unsafe operation.

DANGER

Some vehicles are equipped with air bags.
- Follow service manual warnings when working around air bag components or wiring.
  - If service manual instructions are not followed, an air bag may deploy unexpectedly, resulting in injury.
  - Note an air bag can still deploy several minutes after ignition key is off (or even if vehicle battery is disconnected) because of a special energy reserve module.

An air bag opening can cause injury.

3   Getting Started

3.1   Introduction

The scan tool was developed by experts in the automotive service industry to help diagnose vehicles and assist in troubleshooting procedures.

The scan tool monitors vehicle events and retrieves codes from the vehicle's control modules to help pinpoint problem areas.

All information, illustrations and specifications contained in this manual are based on the latest information available from industry sources at the time of publication.

No warranty (expressed or implied) can be made for its accuracy or completeness, nor is any responsibility assumed by the manufacturer or anyone connected with it for loss or damages suffered through reliance on any information contained in this manual or misuse of accompanying product. The manufacturer reserves the right to make changes at any time to this manual or accompanying product without obligation to notify any person or organization of such changes.

3.2   Download Scanning Suite

1. Go to www.boschdiagnostics.com/downloads to download the Scanning Suite PC application.
    Scanning Suite is NOT required to operate the scan tool.
2. Install the downloaded Scanning Suite application before connecting the scan tool to the PC.
    Some items included with the Scanning Suite are:
    •   Tool update software
    •   Print Capture
    •   Other product information
    To be able to use Scanning Suite the PC must meet the following minimum requirements:
    •   Microsoft Windows 7, 8, and 10.
    •   Adobe Acrobat Reader
    •   Screen Resolution of 800 x 600
        –   If screen resolution is 800 x 600, in Display Properties, Settings Tab, set Font Size to Small Fonts.
3. Use Scanning Suite to determine if any updates are available for your tool by clicking Check for Update button.
4. Check for updates to Use Scanning Suite by clicking on the Check For Scanning Suite Update button. This should be done before checking for Tool Updates.

You can also configure the Scanning Suite Frequency (SS Frequency) to automatically check every xx minutes. The default frequency is 7 days.

Refer to instructions provided on www.boschdiagnostics. com/downloads for how to install Scanning Suite and Tool updates.

3.3   OBDII

On-board diagnostics version II (OBDII) is a system that the Society of Automotive Engineers (SAE) developed to standardize automotive electronic diagnosis.

Beginning in 1996, most new vehicles sold in the United States were fully OBDII compliant.

Technicians can now use the same tool to test any OBDII compliant vehicle without special adapters. SAE established guidelines that provide:
•   A universal OBDII data link connector, called the DLC, with dedicated pin assignments.
•   A standard location for the DLC, visible under the dash on driver's side.
•   A standard list of diagnostic trouble codes (DTCs) used by all manufacturers.
•   A standard list of parameter identification (PID) data used by all manufacturers.
•   Ability for vehicle systems to record operating conditions when a fault occurs.
•   Expanded diagnostic capabilities that records a code whenever a condition occurs that affects vehicle emissions.
•   Ability to clear stored codes from the vehicle's memory with a scan tool.

3.4   SAE Publications

SAE has published hundreds of pages of text defining a standard communication protocol that establishes hardware, software, and circuit parameters of OBDII systems. Unfortunately, vehicle manufacturers have different interpretations of this standard communications protocol. As a result, the generic OBDII communications scheme varies, depending on the vehicle. SAE publishes recommendations, not laws, but the Environmental Protection Agency (EPA) and California Air Resources Board (CARB) made many of SAE's recommendations legal requirements that vehicle manufacturers were required to phase in over a three-year period. Beginning in 1994, vehicles with a new engine management computer (about 10% of each manufacturers fleet) were supposed to comply with OBDII standards. For 1995, OBDII systems were to appear on about 40% of the new vehicles sold in the United States. Some of the 1994-1995 OBDII systems were not fully compliant, so the Government granted waivers to give manufacturers time to fine-tune their systems. Beginning in 1996, most of the new vehicles sold in the United States were fully OBDII compliant.

3.5   OBDII Data Link Connector (DLC)

The OBDII data link connector (DLC) allows the scan tool to communicate with the vehicle's computer(s). Beginning in 1996, vehicles sold in the United States use the J1962 (OBDII) DLC, a term taken from a physical and electrical specification number assigned by the SAE (J1962). The DLC should be located under the dashboard on the driver's side of the vehicle. If the DLC is not located under the dashboard as stated, a decal describing its location should be attached to the dashboard in the area the DLC should have been located. For

more information on OBDII connectors, go to http://www.obdclearinghouse.com/oemdb.
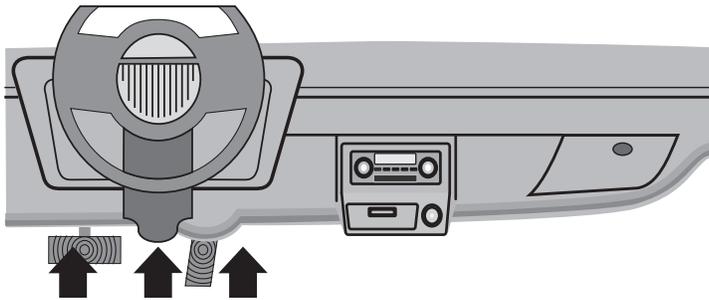
OBD II Data Link Connector (DLC) Pins
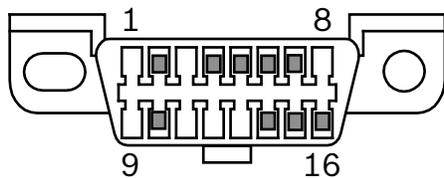
1. Manufacturer reserved
2. J1850 bus+
3. Manufacturer reserved
4. Chassis ground
5. Signal ground
6. CAN high, J-2284
7. K line, ISO 9141-2 & ISO/DIS 14230-4
8. Manufacturer reserved
9. Manufacturer reserved
10. J1850 Bus-
11. Manufacturer reserved
12. Manufacturer reserved
13. Manufacturer reserved
14. CAN low, J-2284
15. L line, ISO 9141-2 & ISO/DIS 14230-4
16. Battery power

3.6   OBDII Diagnostic Trouble Codes (DTCs)

J2012 and ISO 15031-6 are standards for all DTCs, established by the SAE, International Organization for Standardization (ISO) and other governing bodies.

- Codes and definitions assigned by these specifications are known as Generic OBDII codes.
- OBDII requires compliance to these standards for all cars, light trucks, APVs, MPVs, and SUVs sold in the United States.
- Codes not reserved by the SAE are reserved for the manufacturer and referred to as Manufacturer Specific Codes.

DTCs are used to help determine the cause of a problem or problems with a vehicle.

- DTCs consist of a five-digit alphanumeric code.
- The DTCs format and general code types are shown below.
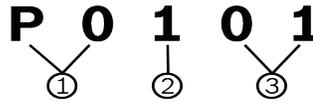
1. Bx = Body
   Cx = Chassis
   Px = Powertrain
   Ux = Network communication
   x - 0, 1, 2, or 3
2. Vehicle specific system
3. Specific fault designation

Example:
P0101 = Mass or volume air flow circuit range/performance problem

Powertrain Codes

Code	Type
P0xxx	Generic (SAE)
P1xxx	Manufacturer specific
P2xxx	Generic (SAE)
P30xx–P33xx	Manufacturer specific
P34xx–P39xx	Generic (SAE)

Chassis Codes

Code	Type
C0xxx	Generic (SAE)
C1xxx	Manufacturer specific
C2xxx	Manufacturer specific
C3xxx	Generic (SAE)

Body Codes

Code	Type
B0xxx	Generic (SAE)
B1xxx	Manufacturer specific
B2xxx	Manufacturer specific
B3xxx	Generic (SAE)

Network Communication Codes

Code	Type
U0xxx	Generic (SAE)
U1xxx	Manufacturer specific
U2xxx	Manufacturer specific
U3xxx	Generic (SAE)

4   Using the Scan Tool

4.1   The Scan Tool

1. DLC Cable - provides connection for vehicle interface.
2. USB Port - provides a USB connection for the computer.
3. CodeConnect® - allows the operator to access vehicle-specific repair information.
4. LEFT and RIGHT arrow keys - selects YES or NO and selects data parameters for custom data list.
5. ENTER key - selects displayed items.
6. ON/OFF key - turns power ON or OFF.
7. BACK key - goes to the previous screen or level.
8. MORE INFO key - displays the Diagnostic Trouble Code (DTC) definition when viewing Freeze Frame Data. It will display the code setting criteria when viewing DTC definition.
9. UP and DOWN arrow keys - moves selection up or down.
10. LCD display (color, backlit, QVGA resolution).
11. Serial Number Plate (on back; not shown) - Located inside battery compartment, provides serial number of Scan Tool.
12. Battery Compartment (on back; not shown) - pro-

vides power to the scan tool when reprogramming from a personal computer or off-vehicle reviewing of codes and printing.

4.2   Specifications

Display	Color, backlit, QVGA resolution
Operating Temperature	0 to 50°C (32 to 122°F)
Storage Temperature	-20 to 70°C (-4 to 158°F)
Internal Power	4-AAA batteries
External Power	7 to 16 Volts

A minimum of 8.0 V is required for most control modules to operate properly in a vehicle.

Dimensions

Height	Width	Depth
6.5 inches	3.75 inches	1.13 inches
165.1 mm	95.25 mm	28.7 mm

4.3   Display

The display has a large viewing area for displaying messages, instructions, and diagnostic information.
The back-lit liquid crystal display (LCD) is a QVGA pixel display. Display icons used to help operate the scan tool are:

- √ Indicates information is available for an item or multiple items.

- ⬆ Indicates additional information is available by scrolling up.

- ⬇ Indicates additional information is available by scrolling down.

- Indicates internal batteries need replacing or are not installed.
- **CODE** Indicates CodeConnect is active.

- Indicates graphical viewing of data items is available in View Data.
- Indicates the MORE INFO key is active.

Keypad

The keypad is used to move through the different menus of the scan tool. The scan tool's software is designed for ease in operating and navigating through menus.
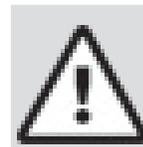
> ⚠️ **CAUTION**
>
> Do not use solvents such as alcohol to clean keypad or display. Use a mild nonabrasive detergent and a soft, cotton cloth.

> **CAUTION**
>
> Do not soak keypad as water might find its way inside the scan tool.

4.4   Power

Internal Battery

* Battery power is not required to use tool.
* [⏻] **ON/OFF** button on Scan Tool turns tool on and off.
* Press and hold [⏻] **ON/OFF** for at least 1 second to turn on Scan Tool.
* The Scan Tool will automatically turn OFF after a user-selectable period of inactivity when powered from the internal batteries. The default is 2 minutes.
* When powered from the internal batteries, the Scan Tool will dim display backlighting.
* The Scan Tool must be attached to the vehicle to perform diagnostic functions. The Scan Tool disables the diagnostic functions when powered from the internal batteries.
* Each time the Scan Tool is powered up, voltage of the internal battery is checked.
    – If voltage is low, the Low Battery Symbol (🔋) displays on screen.
    – Replace the battery using instructions provided in Battery Replacement

> **CAUTION**
>
> If the Scan Tool will not be used for an extended period of time, remove the batteries to prevent battery leakage from damaging the battery compartment.

Vehicle Power

When the scan tool is connected to the vehicle's DLC, the tool is powered by the vehicle and will automatically turn on once connected.

USB Power

When the tool is connected to a PC via a USB cable (not provided), the tool will automatically power up. Refer to "6.2   Scan Tool Does Not Power Up" on page 43 if there are problems.

4.5   System Setup

System Setup allows:

* Measurement units to be changed.
* Auto-Power off time to be changed.
* Print Header to be turned ON or OFF.
* Scan tool information to be viewed.
* Display to be checked.
* Operation of the keypad to be checked.
* Memory of the tool to be checked.
* Scan tool to be upgraded.
* Language to be changed.

* Quick Test to be turned ON, OFF, or set to the desired method.
* Long PID names to be turned ON or OFF.
* Change the number of Pre-Trigger frames when recording data.

From the **Diagnostic Menu**:

1. Select **System Setup**.
    * Use the ▼ **DOWN** key until **System Setup** is highlighted.
    * Press [ENTER].

```
Diagnostic Menu
Datastream
Diagnostic Codes
Special Tests
Component Locator
Acronyms
Review Data
Print Data
Code Lookup
System Setup
```
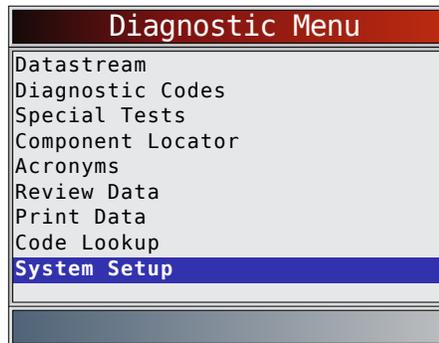
Changing Measurement Units

English is the default measurement unit. Measurement units can be changed in **View and Record Data**.

From **System Setup** screen:

1. Select **English/Metric**.
    * Use the ▲ **UP** and ▼ **DOWN** keys until **English/Metric** is highlighted.
    * Press [ENTER].

```
System Setup
English/Metric
Auto-Power Off
Quick Test
Print Header
Language Setup
Long PID Names
Pre-Trigger Setup
Tool Information
Display Test
                    ⬇
```
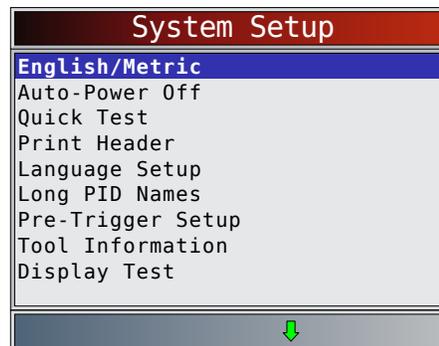
2. Select desired measurement unit.
    * Use the ▲ **UP** and ▼ **DOWN** keys until the desired unit is highlighted.
    * Press [ENTER].

```
┌─────────────────────────────────┐
│      Measurement Units          │
├─────────────────────────────────┤
│ English                         │
│ Metric                          │
│                                 │
│                                 │
│                                 │
│                                 │
└─────────────────────────────────┘
```
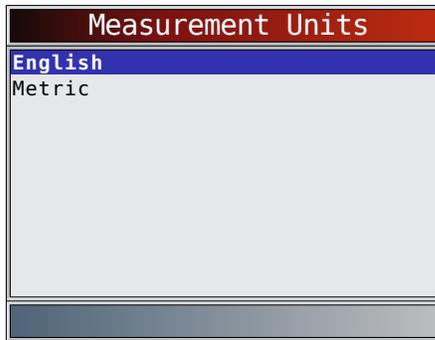
3. Save measurement setting.
    • Press **ENTER**.

Changing Auto-Power Off

The Auto-Power Off feature allows the tool to turn off automatically after a selected amount of time when tool is not being used. The Auto-Power Off feature will only turn the tool off when it is operating on battery power.
From **System Setup** screen:
1. Select **Auto-Power Off**.
    • Use the ▲ **UP** and ▼ **DOWN** keys until **Auto-Power Off** is highlighted.
    • Press **ENTER**.

```
┌─────────────────────────────────┐
│        System Setup             │
├─────────────────────────────────┤
│ English/Metric                  │
│ Auto-Power Off                  │
│ Quick Test                      │
│ Print Header                    │
│ Language Setup                  │
│ Long PID Names                  │
│ Pre-Trigger Setup               │
│ Tool Information                │
│ Display Test                    │
│                      ⇩          │
└─────────────────────────────────┘
```
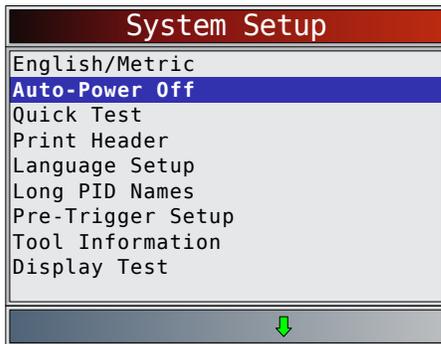
2. Increase or decrease **Auto-Power Off** time.
    • Use the ▲ **UP** key to increase time.
    • Use the ▼ **DOWN** key to decrease time.

```
┌─────────────────────────────────┐
│       Auto-Power Off            │
├─────────────────────────────────┤
│                                 │
│      2 minute(s)                │
│                                 │
│    ▲ Increase time              │
│    ▼ Decrease time              │
│                                 │
│   Press ENTER to continue       │
│                                 │
└─────────────────────────────────┘
```
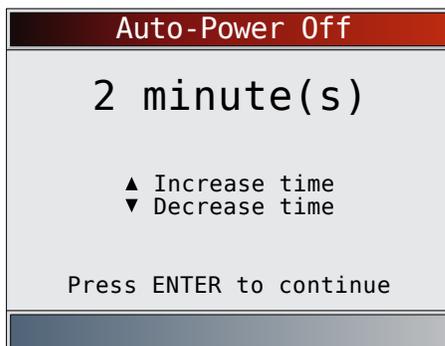
3. Save **Auto-Power Off** time.
    • Press **ENTER**.

Quick Test

Quick Test is a feature of the tool that occurs the first time the tool establishes communication with the vehicle after vehicle selection. Quick Test will display the results of I/M Monitors and Read Codes.
From **System Setup** screen:
1. Select **Quick Test**.
    • Use the ▲ **UP** and ▼ **DOWN** keys until **Quick Test** is highlighted.
    • Press **ENTER**.

```
┌─────────────────────────────────┐
│        System Setup             │
├─────────────────────────────────┤
│ English/Metric                  │
│ Auto-Power Off                  │
│ Quick Test                      │
│ Print Header                    │
│ Language Setup                  │
│ Long PID Names                  │
│ Pre-Trigger Setup               │
│ Tool Information                │
│ Display Test                    │
│                      ⇩          │
└─────────────────────────────────┘
```
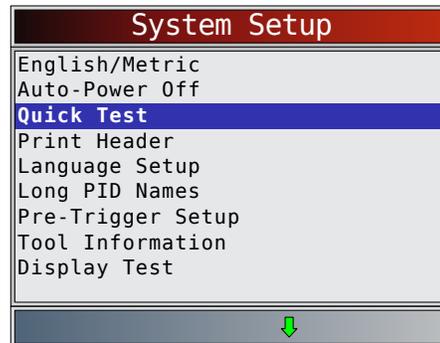
2. Select desired **Quick Test** choice.
    • Use the ▲ **UP** and ▼ **DOWN** keys until desired choice is highlighted.
    • Select **QuickCheck™** to see the results of I/M Monitors and Read Codes.
    • Select **Read All Codes** to see the results of all codes and associated **CodeConnect®** information. This selection is enabled by default.

```
┌─────────────────────────────────┐
│        Quick Test               │
├─────────────────────────────────┤
│ Disabled                        │
│ QuickCheck                      │
│ Read All Codes                  │
│                                 │
│                                 │
│                                 │
│                                 │
└─────────────────────────────────┘
```
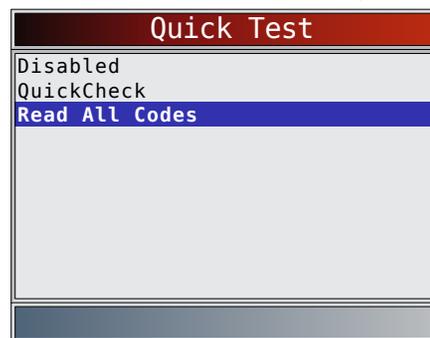
3. Save **Quick Test** setting.
    • Press **ENTER**.

Print Header

Print Header selection allows the user to turn off the Scan Tool printing the currently-selected vehicle prior to the retrieved vehicle data when selecting items from the **Print Data** menu.
For example, if your currently-selected vehicle is a 2008 Chevrolet Corvette W = 6.2L, this information would print at the top of the page for the data you are printing
From **System Setup** screen:
1. Select **Print Header**.
    • Use the ▲ **UP** and ▼ **DOWN** keys until **Print Header** is highlighted.

- Press **ENTER**.

```
System Setup
English/Metric
Auto-Power Off
Quick Test
Print Header
Language Setup
Long PID Names
Pre-Trigger Setup
Tool Information
Display Test
⬇
```
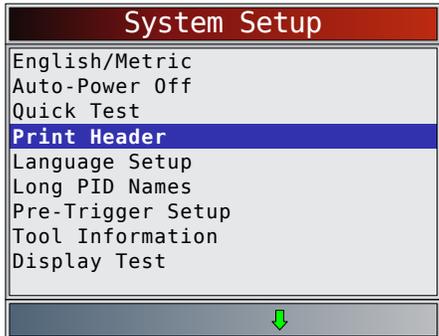
2. Select desired **Print Header** choice.
   - Use the ▲ **UP** and ▼ **DOWN** keys until desired choice is highlighted.

```
Print Header
ON
OFF
```
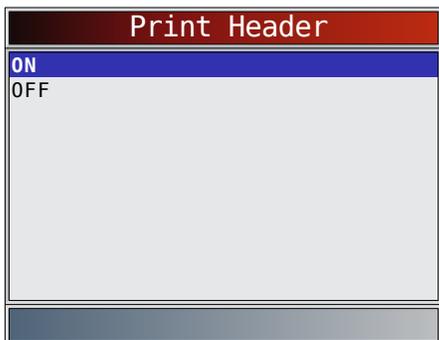
3. Save **Print Header** setting.
   - Press **ENTER**.

Language Setup

Language Setup selection allows the user to change the language used by the Tool. English is the default language.
From **System Setup** screen:
1. Select **Language Setup**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until **Language Setup** is highlighted.
   - Press **ENTER**.

```
System Setup
English/Metric
Auto-Power Off
Quick Test
Print Header
Language Setup
Long PID Names
Pre-Trigger Setup
Tool Information
Display Test
⬇
```
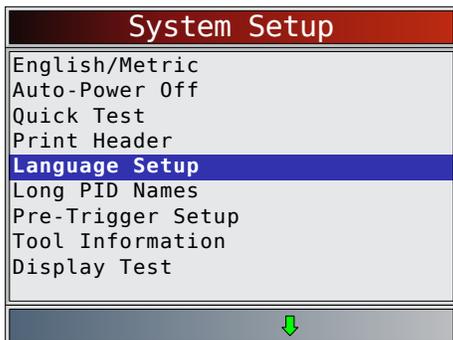
2. Select desired **Language Setup** choice.
   - Use the ▲ **UP** and ▼ **DOWN** keys until the desired language is highlighted.
   - Press **ENTER**.

```
Language Setup
English
Español
Francais
```
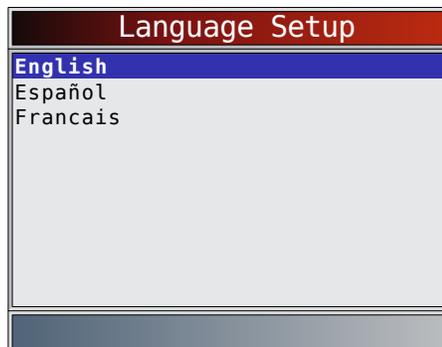
3. Save **Language Setup** setting.
   - Press **ENTER**.

NOTE: When Spanish or French translation is not known, English will be shown.

Long PID Names

Long PID Names allows the user to enable/disable the tool scrolling the complete PID name on the bottom line of the display while viewing Live Data or viewing Freeze Data.
From **System Setup** screen:
1. Select **Long PID Names**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until **Long PID Names** is highlighted.
   - Press **ENTER**.

```
System Setup
English/Metric
Auto-Power Off
Quick Test
Print Header
Language Setup
Long PID Names
Pre-Trigger Setup
Tool Information
Display Test
⬇
```
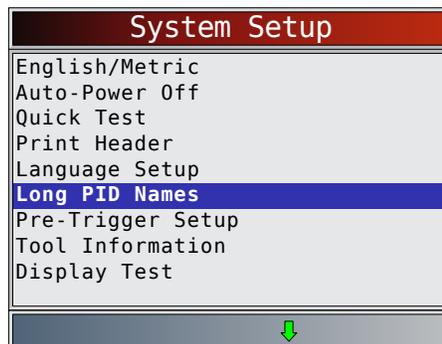
2. Select **ON** or **OFF**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until the desired option is highlighted.
   - Press **ENTER**.

```
Long PID Names
ON
OFF
```
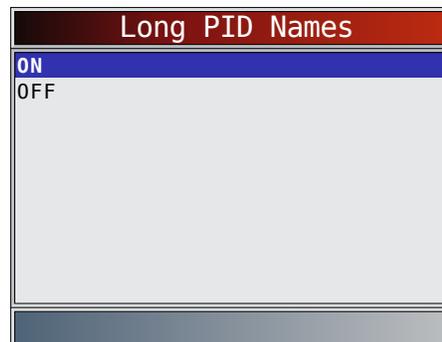
3. Save **Long PID Names** setting.
   - Press **ENTER**.

Pre-Trigger Setup

This function is used to configure how many Pre-Trigger frames are stored prior to beginning a recording. Pre-Trigger frames are the negative frames when you are playing back a recording.

From **System Setup** screen:

1. Select **Pre-Trigger Setup**.
    *   Use the ▲ **UP** and ▼ **DOWN** keys until **Pre-Trigger Setup** is highlighted.
    *   Press `ENTER`.

```
┌─────────────────────────────────┐
│        System Setup             │
├─────────────────────────────────┤
│ English/Metric                  │
│ Auto-Power Off                  │
│ Quick Test                      │
│ Print Header                    │
│ Language Setup                  │
│ Long PID Names                  │
│ Pre-Trigger Setup               │
│ Tool Information                │
│ Display Test                    │
│                                 │
│               ⇩                 │
└─────────────────────────────────┘
```
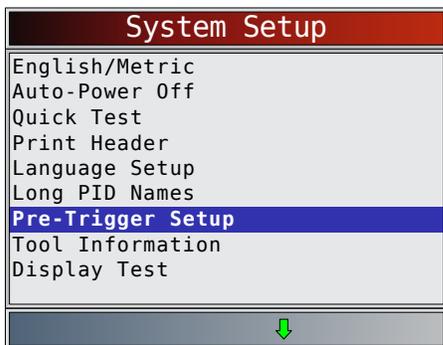
2. Increase or Decrease Pre-Trigger Frames.
    *   Use the ▲ **UP** key to increase frames.
    *   Use the ▼ **DOWN** key to decrease frames.
    *   Press `ENTER`.

```
┌─────────────────────────────────┐
│      Pre-Trigger Frames         │
├─────────────────────────────────┤
│                                 │
│        5 frame(s)               │
│                                 │
│       ▲ Increase frame          │
│       ▼ Decrease frame          │
│                                 │
│   Press ENTER to continue       │
│                                 │
└─────────────────────────────────┘
```
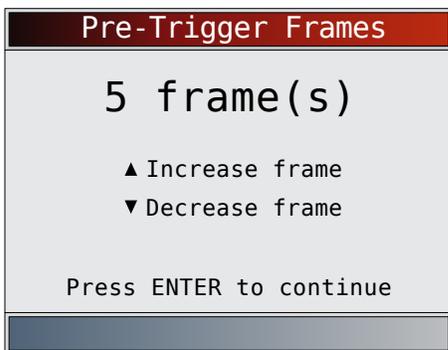
3. Save **Pre-Trigger** frames setting.
    *   Press `ENTER`.

Tool Information

Tool Information allows the user to view specific tool information that may be needed when contacting customer service.

From **System Setup** screen:

1. Select **Tool Information**.
    *   Use the ▲ **UP** and ▼ **DOWN** keys until **Tool Information** is highlighted.
    *   Press `ENTER`.

```
┌─────────────────────────────────┐
│        System Setup             │
├─────────────────────────────────┤
│ English/Metric                  │
│ Auto-Power Off                  │
│ Quick Test                      │
│ Print Header                    │
│ Language Setup                  │
│ Long PID Names                  │
│ Pre-Trigger Setup               │
│ Tool Information                │
│ Display Test                    │
│                                 │
│               ⇩                 │
└─────────────────────────────────┘
```
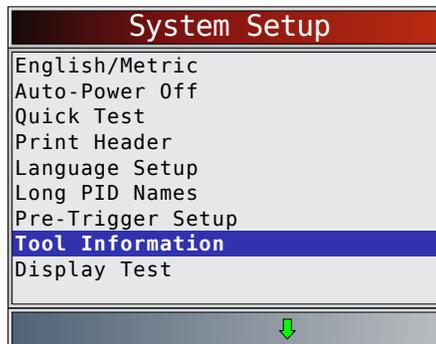
2. View information.
    *   Serial Number (Serial No:)
    *   Software ID (SW ID:)
    *   Hardware Version (HW Ver:)
    *   Boot Version (Boot Ver:)
    *   Product ID (Prod ID:)
    *   Board ID (Board ID:)
    *   Burn Date (Burn Date:)
    *   Burn Location (Burn Loc:)

```
┌─────────────────────────────────┐
│      Tool Information           │
├─────────────────────────────────┤
│ Serial No            1284168    │
│ SW ID                   5126    │
│ HW Ver                    01    │
│ Boot Ver                  02    │
│ Prod ID                   21    │
│ Board ID                  33    │
│ Burn Date         12/04/14      │
│ Burn Loc                  04    │
│                                 │
└─────────────────────────────────┘
```

3. Record **Tool Information**.
    *   Space is provided inside the front cover of this manual to write down the scan tool information.
4. Return to **System Setup** menu.
    *   Press `BACK`
    or
    *   press `ENTER`.

Display Test

The **Display Test** is used to check the display. The test fills every pixel of the display with a solid color.

From **System Setup** screen:

1. Select **Display Test**.
    *   Use the ▲ **UP** and ▼ **DOWN** keys until **Display Test** is highlighted.
    *   Press `ENTER`.

```
        System Setup
English/Metric
Auto-Power Off
Quick Test
Print Header
Language Setup
Long PID Names
Pre-Trigger Setup
Tool Information
Display Test
              ⬇
```
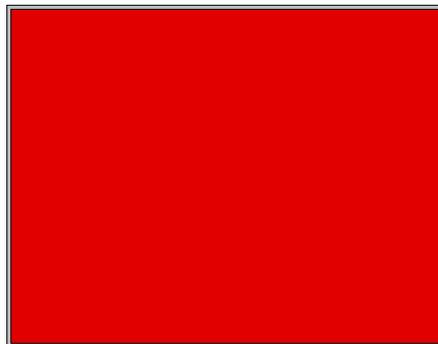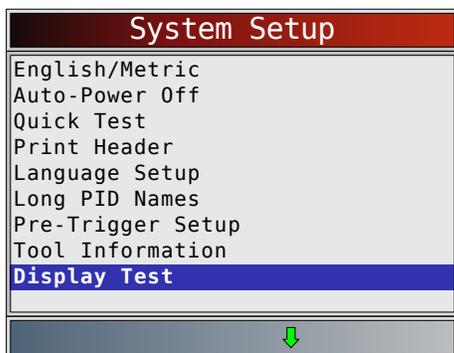
2. Start **Display Test**.
    • Press ⬗ENTER.
3. Look for missing spots.
    • The first screen displayed says, "Check for missing spots in the display."

```
        Display Test

              ⓘ

    Check for spots in the
            display

      Press BACK to exit
```

• Solid red, green, and blue screens are displayed.

• These four screens will continue in succession until ⬗BACK is pressed.
4. Press ⬗BACK to exit the test and return to the **System Setup** menu.

Keypad Test

The **Keypad Test** is used to verify that the keys are working correctly.
From **System Setup** screen:
1. Select **Keypad Test**.
    • Use the ▲ **UP** and ▼ **DOWN** keys until **Keypad Test** is highlighted.
    • Press ⬗ENTER.

```
┌────────────────────────────────┐
│        System Setup            │
├────────────────────────────────┤
│ Quick Test                     │
│ Print Header                   │
│ Language Setup                 │
│ Long PID Names                 │
│ Pre-Trigger Setup              │
│ Tool Information               │
│ Display Test                   │
│ Keypad Test                    │
│ Memory Test                    │
├────────────────────────────────┤
│         ⬆         ⬇            │
└────────────────────────────────┘
```
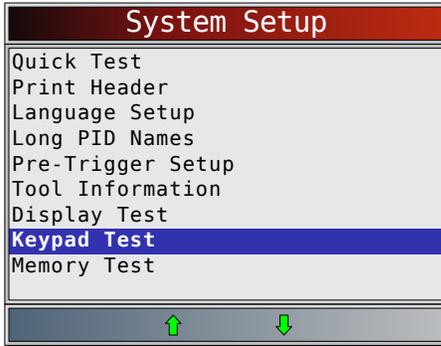
2. Press a key.
   - Key name or scroll direction should inverse colors on display.
   - **BACK** will return the tool to the **System Setup** screen.

```
┌────────────────────────────────┐
│        Keypad Test             │
├────────────────────────────────┤
│   [ i ]      [▲]      [CODE]    │
│   [◄]                 [►]       │
│  [BACK]      [▼]     [ENTER]    │
│             [⏻]                │
│                                │
│      Press BACK to exit        │
├────────────────────────────────┤
│                                │
└────────────────────────────────┘
```

Memory Test

The **Memory Test** will test RAM and flash ROM. Run the **Memory Test** if the tool has trouble:
- Playing back recorded data.
- Displaying trouble code definitions.

From **System Setup** screen:
1. Select **Memory Test**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until **Memory Test** is highlighted.
   - Press **ENTER**.

```
┌────────────────────────────────┐
│        System Setup            │
├────────────────────────────────┤
│ Print Header                   │
│ Language Setup                 │
│ Long PID Names                 │
│ Pre-Trigger Setup              │
│ Tool Information               │
│ Display Test                   │
│ Keypad Test                    │
│ Memory Test                    │
│ Program Mode                   │
├────────────────────────────────┤
│              ⬆                 │
└────────────────────────────────┘
```
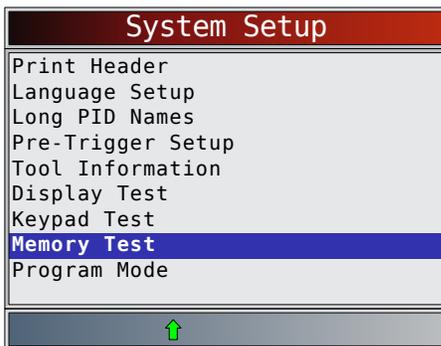
- **Memory Test** may take several minutes to complete.
- **Memory Test** results display:

- If no problems were detected, then "Passed" is displayed.
- If RAM fails, an error message is shown.
- If FLASH fails, a checksum is shown.

```
┌────────────────────────────────┐
│        Memory Test             │
├────────────────────────────────┤
│ INT RAM              Passed    │
│ INT FLASH              10ca    │
│                                │
│                                │
│                                │
│      Press BACK to exit        │
├────────────────────────────────┤
│                                │
└────────────────────────────────┘
```
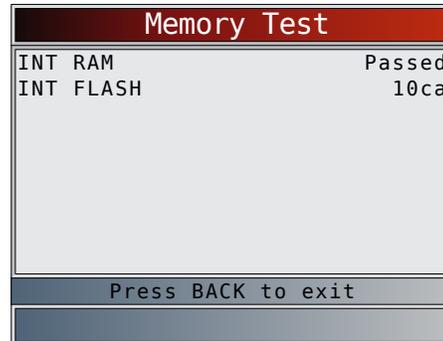
2. Return to **System Setup** menu.
   - Press **BACK**.

Program Mode

The **Program Mode** is used for updating the scan tool. Instructions are provided with upgrades. Refer to "3.2 Download Scanning Suite" on page 8.

```
┌────────────────────────────────┐
│        System Setup            │
├────────────────────────────────┤
│ Print Header                   │
│ Language Setup                 │
│ Long PID Names                 │
│ Pre-Trigger Setup              │
│ Tool Information               │
│ Display Test                   │
│ Keypad Test                    │
│ Memory Test                    │
│ Program Mode                   │
├────────────────────────────────┤
│              ⬆                 │
└────────────────────────────────┘
```

```
┌────────────────────────────────┐
│         PROGRAM MODE           │
│        See User Manual         │
│                                │
│                                │
│       Connect Tool to PC       │
│         with USB Cable         │
│                                │
└────────────────────────────────┘
```
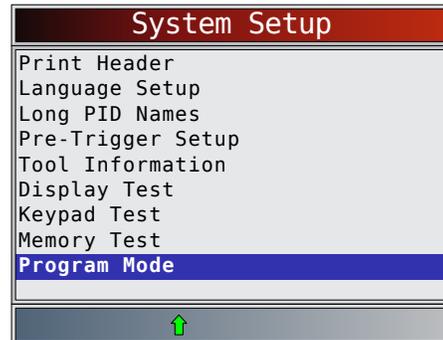
- If the **Program Mode** is entered, **BACK** is not operational. The tool must be powered off to exit **Program Mode** and then restarted to continue.

4.6   Vehicle-Specific Features

Review Data

The **Review Data** function allows the user to view the information from the previous vehicle tested. The scan

tool can be powered from vehicle or PC using USB to use the **Review Data** function.

1. Select **Review Data**.
    *   Use the ▲ **UP** and ▼ **DOWN** keys until **Review Data** is highlighted.
    *   Press 〈ENTER〉.

```
         Main Menu
┌──────────────────────────┐
│Vehicle Diagnostics       │
│Acronyms                  │
│Review Data               │
│Print Data                │
│Code Lookup               │
│System Setup              │
│                          │
└──────────────────────────┘
```
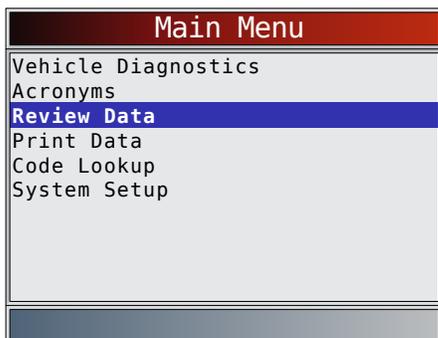
If Review Data is selected from the Main Menu, a Select Vehicle menu is shown. This menu contains up to 5 previous vehicles, so select which vehicle you wish to review data.

```
       Select Vehicle
┌──────────────────────────┐
│Prev: 06 Accord           │
│Prev: 04 Express 1500     │
│                          │
│                          │
│                          │
└──────────────────────────┘
```
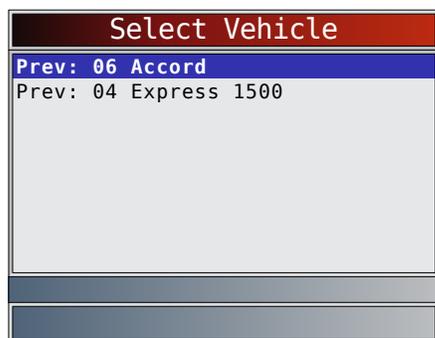
2. Follow prompts and instructions provided by scan tool and then select item whose data you wish to review.
    *   The **Review Data** menu shows a checkmark next to the item(s) that has data.
    *   If there is not a checkmark next to the item, then this item can't be selected until the appropriate function is run from the **Diagnostic Menu**.
    *   See "Recording" on page 17 for detailed instructions on this function.

```
         Review Data
┌──────────────────────────┐
│✓I/M Monitors             │
│✓DTCs (Codes)             │
│✓State OBD Check          │
│✓Recording                │
│ View Freeze Data         │
│✓O2 Monitor Tests         │
│✓Diagnostic Monitor Tests │
│ Vehicle Information       │
│ Modules Present           │
└──────────────────────────┘
```

This function is very similar to **View Data**. The only difference is that **View Data** is real-time viewing of PIDs, while **Recording** is a viewing of previously recorded PIDs.

From the **Review Data** menu:

1. Select **Recording**.
    *   Use the ▲ **UP** and ▼ **DOWN** keys until **Recording** is highlighted.
    *   The tool can keep up to 5 recordings per vehicle. If the tool has more than one recording, select a recording to playback.
    *   Press 〈ENTER〉.

```
         Review Data
┌──────────────────────────┐
│✓I/M Monitors             │
│✓DTCs (Codes)             │
│ State OBD Check          │
│✓Recording                │
│ View Freeze Data         │
│ O2 Monitor Tests         │
│ Diagnostic Monitor Tests │
│ Vehicle Information       │
│ Modules Present           │
└──────────────────────────┘
```
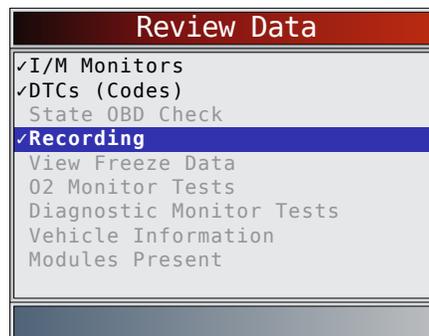
2. Select **Playback Recording**.
    *   Use the ▲ **UP** and ▼ **DOWN** keys until **Playback Recording** is highlighted.
    *   Press 〈ENTER〉.

```
       Playback Options
┌──────────────────────────┐
│Playback Recording        │
│Long PID Names            │
│English/Metric            │
│                          │
│                          │
└──────────────────────────┘
```

*   The recording has frame number and timestamp (in seconds).
    –   Negative frames and timestamps indicate data recorded before trigger event.
    –   Positive frames and timestamps indicate data recorded after trigger event.
    –   Use the ▲ **UP** and ▼ **DOWN** keys to view recorded PID data within each frame.
    –   Use the ◀ **LEFT** and ▶ **RIGHT** keys to scroll back and forth through frames.
    –   See Appendix A for PID Definitions.

Recording

The **Recording** function is used to play back a recording.

```
ABSLT TPS(%)              0.0
CALC LOAD(%)              3.5
COOLANT(°F)               95
ENG SPEED(RPM)            692
FUEL SYS 1              OPEN
FUEL SYS 2              OPEN
IAT(°F)                   75
IGN ADV(°)               4.5
LT FTRM1(%)              3.1

Frame:  0        Time:  0.0
Throttle position
```

- If graphing is available for selected PID, the

  "📈" icon is located on the side of the screen.
  - Press **ENTER** to select PIDS to graph.
  - Use the ▲ **UP** and ▼ **DOWN** arrow keys to highlight the second PID to graph and then press the ▶ **RIGHT** arrow to select. A maximum of two PIDs can be graphed. Press **ENTER** to see graph.
- The triangle below the graph indicates the position of the frame in the graph.
  - Use the ◀ **LEFT** and ▶ **RIGHT** arrow keys to scroll back and forth through graph.
  - Use the ▲ **UP** and ▼ **DOWN** keys to toggle back and forth between PIDs.
- Different vehicles communicate at different speeds and support a different number of PIDs. Therefore, the maximum number of frames that can be recorded varies.

```
Select PIDs to Graph
 ABSLT TPS(%)
✓CALC LOAD(%)
 COOLANT(°F)
 ENG SPEED(RPM)
 IAT(°F)
 MAF(LB/M)
 MAP("HG)
 VEH SPEED(MPH)

Calculated Engine Load
```

```
CALC LOAD(%)            19.2
19.4┌
    │
    │
    │
17.5└
Frame: 21       Time: 26.8
```
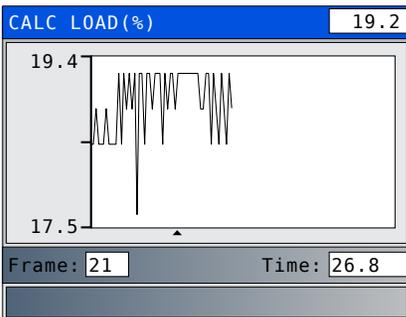
3. Return to **Review Data** menu.
   - Press **BACK**.

Print Data

The **Print Data** function allows the printing of diagnostic information stored in the Scan Tool.
  - The Scan Tool's internal battery power can be used to print data.
  - Use the **Print Data** function to turn On/Off printing vehicle information prior to printing data.
  - Make sure you have previously installed the PC software in Download Scanning Suite.
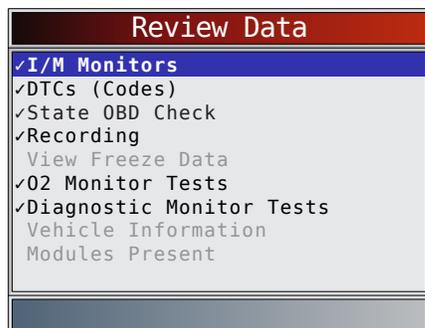 - Launch Scanning Suite and then start printing application.
  - Follow all instructions on PC.
1. Select **Print Data**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until **Print Data** is highlighted.

   - Press **ENTER**.

```
Main Menu
Vehicle Diagnostics
Acronyms
Review Data
Print Data
Code Lookup
System Setup
```

```
Print Data
          ⓘ

  Launch PC printing software
        application.

   Press ENTER to continue
```

   - On the **Print Data** menu, **Print All** prints all data collected by the Scan Tool.

```
Print Data
✓Print All
✓I/M Monitiors
✓DTCs (Codes)
 State OBD Check
 Recording
 View Freeze Data
 O2 Monitor Tests
 Diagnostic Monitor Tests
 Vehicle Information
```

   - When printing a Recording, Start Frame and End Frame need to be defined.
2. Select **Data to Be Printed**.

- Use the ▲ **UP** and ▼ **DOWN** keys.
- Press `ENTER`.
- The Print Data menu shows a check mark next to the items that have data.
- If there isn't a checkmark next to the item, then this item can't be selected until the appropriate function is run from the Diagnostic Menu.

3. Return to **Select Print Data** screen.
   - Press `ENTER`.

4.7   Code Lookup

Code Lookup is used to look up definitions of DTCs stored in the scan tool.

- If Code Lookup is selected from the Main Menu, the tool will display Vehicle Selection. Selecting a vehicle in Code Lookup from the Main Menu does not change the current (previously selected) vehicle. It is only a temporary change to allow you to lookup DTC for a vehicle other than the previous vehicle.
- When selecting Code Lookup from the Diagnostic Menu, the tool goes to the Select Module screen, if the selected vehicle supports more than one module. Select the desired module to access the Enter Code screen, since the vehicle was already selected.
- The Scan Tool does not require power from the vehicle to perform this function.

From the **Main** menu:

1. Select **Code Lookup**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until **Code Lookup** is highlighted.
   - Press `ENTER`.

```
           Main Menu
Vehicle Diagnostics
Acronyms
Review Data
Print Data
Code Lookup
System Setup
```
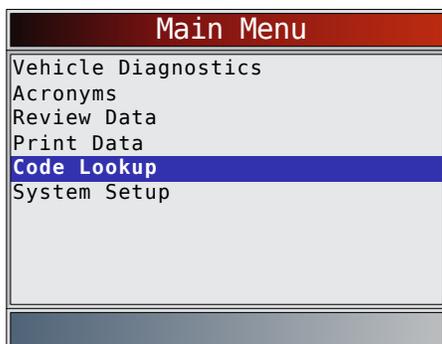
2. Select a specific vehicle from US, Europe, or Asia. If the vehicle is not in the list for the locations listed, select OBDII/EOBD.
   - To select a specific vehicle, see "Vehicle Selection" section.

```
           Vehicle?
OBDII/EOBD
US
Europe
Asia
Prev: 06 Accord
Prev: 04 Express 1500
Prev: 04 Express 1500
Prev: 04 Express 1500
```
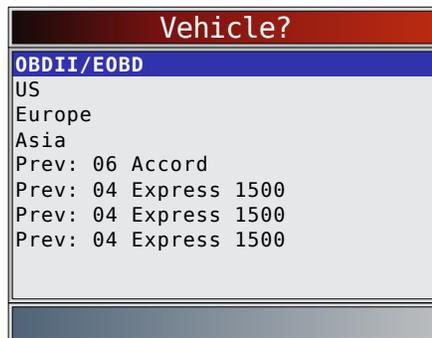
3. Enter code.
   - All characters must be entered.
   - Only one character can be changed at a time.
   - Use the ◀ **LEFT** and ▶ **RIGHT** keys to scroll to desired digit.
   - Use the ▲ **UP** and ▼ **DOWN** keys to change the selected digit.
   - Press `ENTER`.

```
           Code Lookup
            P 0 0 0 0

       Enter desired code using
              ▲▼◄► keys

        Press ENTER when done
```

```
 P0575

Cruise Control Input Circuit
```
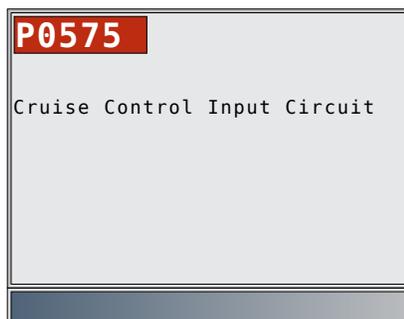
- Some vehicles may have an additional screen asking in which system to look for a code.
- If the definition could not be found, the scan tool displays "No DTC Definition Found." See Service Manual.

```
 P1575

No DTC definition found. See
service manual
```
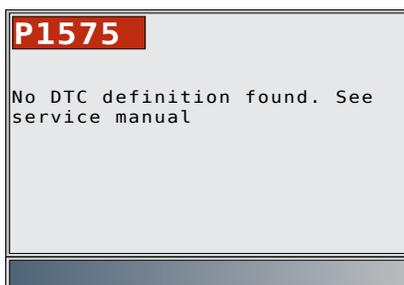
4. To look up another DTC, press `BACK`.

5. Press ⬛**BACK** again to return to the **Diagnostic Menu**.

4.8 Locating the OBD II Data Link Connector (DLC)

• The OBDII data link connector (DLC) is usually located under the driver's side dash.
• Refer to vehicle user manual for DLC location.
• For more information, go to http://www.obdclearinghouse.com/oemdb.

NOTE: When tool is connected to the vehicle's DLC, power to the tool comes from the vehicle

4.9 Connect the Tool

1. Locate the OBDII data link connector under the steering column. If the connector is not there, a label should be there indicating the whereabouts of the connector.
2. If necessary, remove the cover from the vehicle connector.
3. Turn the ignition switch to the ON position. Do not start the engine.
4. Plug the OBDII connector attached to the Tool into the Data Link Connector.
5. The tool will attempt to identify the vehicle. If successful, the vehicle identified will be displayed. If vehicle couldn't be identified, menus will be shown for you to select the vehicle manually.
   The tool can support up to 5 previous vehicles in the garage. If you already have 5 previous vehicle in your garage, the tool will display a menu asking you which previous vehicle to replace with the currently identified vehicle.
6. Review Quick Test results.
7. Go to **Diagnostic Menu** by pressing ⬛**ENTER**.

4.10 Vehicle Selection

AutoID™ uses the VIN to determine the type of vehicle the tool is connected to. Vehicle manufactures began programming the VIN into the vehicle controller in 2000, but it was not an OBD II mandate until 2005. Vehicles between 2000 and 2004 may or may not support AutoID™, but vehicles after 2005 should support AutoID™. If the tool is on a vehicle newer than database coverage, the tool will AutoID™ as MY OBD II / EOBD, or 2012 OBD II / EOBD.

From the **Main Menu**:

1. Use the ▲ **UP** and ▼ **DOWN** keys until **Vehicle Diagnostics** is highlighted.
   • Press ⬛**ENTER**.

```
┌─────────────────────────────┐
│        Main Menu            │
├─────────────────────────────┤
│ Vehicle Diagnostics         │
│ Acronyms                    │
│ Review Data                 │
│ Print Data                  │
│ Code Lookup                 │
│ System Setup                │
│                             │
│                             │
└─────────────────────────────┘
```
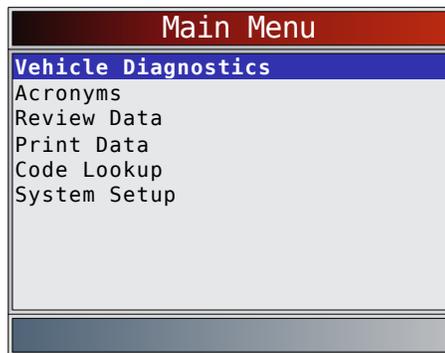
2. Use the ▲ **UP** and ▼ **DOWN** keys to select **AutoID™, Manual** or **Prev.**:
   • If the vehicle is a model year 2000 or newer, select **AutoID™**.
   • If the vehicle is 1999 or older, or if the vehicle is 2000 to 2004 but does not support AutoID™, select **Manual** and go to Step 3.
   • If the previously tested vehicle listed after **Prev:** is desired, select **Prev:**. If this is the first time the tool has been used, the space after **Prev:** will be blank.

```
┌─────────────────────────────┐
│      Select Vehicle         │
├─────────────────────────────┤
│ AutoID (>=2000)             │
│ Manual (<=1999)             │
│ Prev: 06 Accord             │
│ Prev: 04 Express 1500       │
│ Prev: 04 Express 1500       │
│ Prev: 04 Express 1500       │
│                             │
│ 2000-04 vehicles may support Aut │
│                             │
└─────────────────────────────┘
```
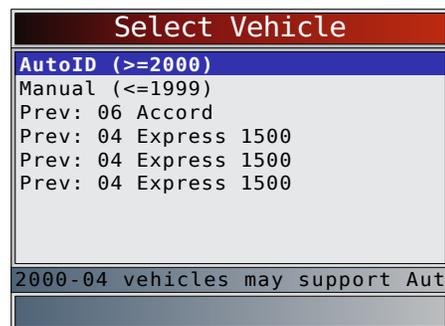
• Press ⬛**ENTER**.
• A **Turn Key Off** screen will display.

```
┌─────────────────────────────┐
│      Turn Key Off           │
├─────────────────────────────┤
│            ⓘ                │
│                             │
│    Please turn the key off for │
│  10 seconds then turn the key │
│            on.              │
│                             │
│    Press ENTER to continue  │
│                             │
└─────────────────────────────┘
```
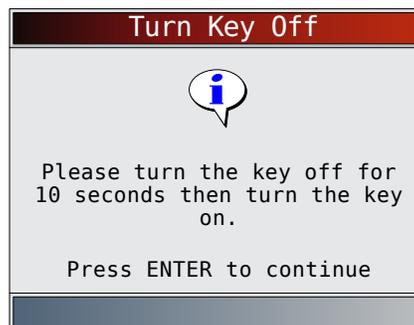
3. After 10 seconds, turn key ON.
   • If the vehicle is supported, the VIN number and essential vehicle data will display.
4. Use the ◀ **LEFT** and ▶ **RIGHT** key to select YES or NO.
   • If YES is selected, the Tool may display more selections to further select the vehicle because not every aspect of vehicle identification is contained in the VIN.

- If NO is selected, the Tool proceeds to manual selection.
- Press **ENTER**.

VIN 1GCFG15T541238036

?

2004 Chevrolet
Express 1500
5.3

Is this correct?

| Yes | No |
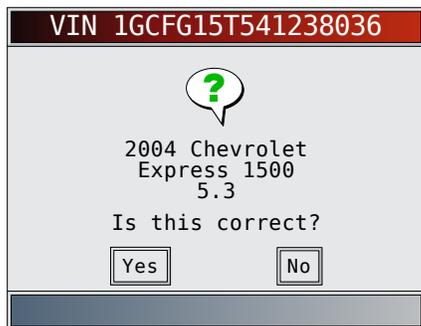
5. If **Manual** was selected in Step 1, use the ▲ **UP** and ▼ **DOWN** keys to select:
    - **OBDII/EOBD**
    - **US**
    - **Europe**
    - **Asia**
    - **Previous Vehicle:**
    - Press **ENTER**.

Vehicle?

OBDII/EOBD
US
Europe
Asia
Prev: 06 Accord
Prev: 04 Express 1500
Prev: 04 Express 1500
Prev: 04 Express 1500
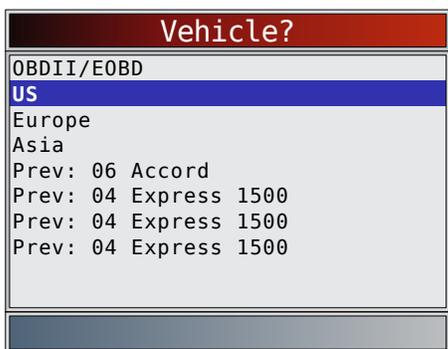
The OBDII/EOBD selection is provided for vehicles that are not listed, however, selection of the specific vehicle is recommended for maximum tool utility.

The previously selected vehicle will appear as the **Prev:** menu selection after **Asia**.

- To select a vehicle other than the previous vehicle, choose between OBDII/EOBD, US, Europe, or Asia, and continue making selections until the vehicle selection is complete.

The following screen only displays when power comes from vehicle.

- Turn vehicle key OFF for 10 seconds.
- Turn vehicle key back to the ON position.
- Press **ENTER**.

Turn Key Off

i

Please turn the key off for
10 seconds then turn the key
on.

Press ENTER to continue
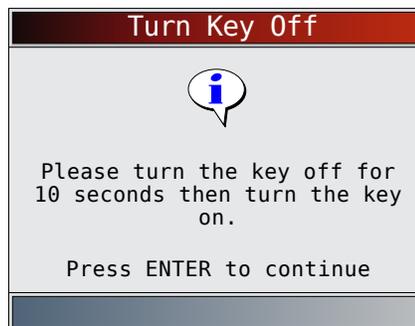
- If vehicle power is not detected, a screen is shown to verify tool connection.

Vehicle Required

i

Please verify the tool is
connected to the vehicle with
the ignition key turned on.

Press ENTER to continue

- If you already have 5 vehicles in your garage, the tool will display a menu asking you which previous vehicle to replace with the currently identified vehicle.

Garage Full

Prev: 05 Tahoe 2WD
Prev: 06 Lancer
Prev: 06 Lancer
Prev: 13 Silverado 2500 HD
Prev: 06 Lancer

Select vehicle To replace
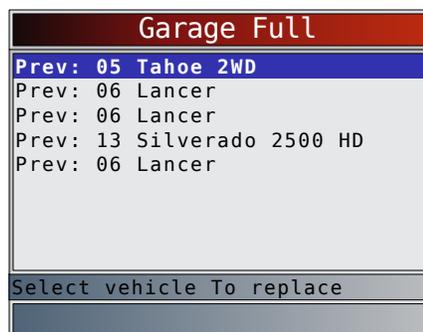
- If the previous vehicle is selected, all stored vehicle data will be retained until it is overwritten by the corresponding function selected from the **Diagnostic Menu**.

4.11 CodeConnect® Feature

CodeConnect® is an experience-based database derived from millions of phone calls from technicians seeking assistance diagnosing repair problems on their vehicles. **CodeConnect®** brings the technology of professional technicians to a DIY scan tool. Don't waste time trying to find the answer. With the information **CodeConnect®** offers, it takes vehicle repairs to the next level. Since you now know the most probable fix for your problem, you can decide if you want to tackle the repair yourself, or bring the vehicle to a local automotive repair facility. **IMPORTANT: For CodeConnect® to work, you must select your specific vehicle during vehicle selection. A Global OBD II vehicle selection will not provide any**

CodeConnect® information. The power of CodeConnect® is that repair information is vehicle and trouble code specific and is based on the largest experience-based database available.

CodeConnect® information is available whenever `CODE` is visible on the display. It has the potential of being displayed while trouble codes are being displayed from Read Codes or while Viewing Freeze Frame data. Also, when you print codes to your PC, the **CodeConnect®** information, if available, will also be printed.

CodeConnect® information is currently only available in English, so if your tool is set to Spanish or French, don't be alarmed if your DTC text is in one language and your **CodeConnect®** information is shown in English.

How to use **CodeConnect®**:

1. When `CODE` is shown on the display, press the `CODE CONNECT` key.
2. Scroll through the code-specific repair information.
    *   Use the ▲ **UP** and ▼ **DOWN** keys to scroll one line at a time.
    *   Use the ◀ **LEFT** and ▶ **RIGHT** arrow keys to scroll one screen at a time.

There are 3 levels of reported fixes:

Fix Level	Description
Top Reported Fix	More likely to be the solution over other choices provided
Frequently Reported Fix	As likely as other solutions
Also Reported Fix	Less likely than other solutions provided, but worth considering.

```
┌─────────────────────────────────┐
│ P0102                      1/2   │
│                        ECM $10   │
│                                  │
│ Mass Or Volume Air Flow A        │
│ Circuit Low Input                │
│                                  │
│ CURRENT                          │
│                                  │
│ MIL            NOT REQUESTED     │
│ Since last key cycle  PASS/FAIL  │
│ Since DTCs erased     PASS/FAIL  │
│  (i)          CODE   ⬇           │
└─────────────────────────────────┘
```

```
┌─────────────────────────────────┐
│ TOP REPORTED FIX                 │
│ 1-Replaced Mass Air Flow (MAF)   │
│   Sensor                         │
│                                  │
│ FREQ REPORTED FIXES              │
│ 1-Replaced Oxygen (O2) Sensor(   │
│   s)                             │
│ 2-Replaced Heated Oxygen Sensor  │
│   (HO2S) Bank 1 Sensor 1 (B1S1)  │
│                                  │
│ ALSO REPORTED FIXES              │
│ 1-Replaced ENG 1 Fuse            │
│                                  │
│               ⬇                  │
└─────────────────────────────────┘
```

```
┌─────────────────────────────────┐
│ 2-Replaced Evaporative           │
│   Emissions (EVAP) Canister      │
│   Vent Solenoid/Valve            │
│ 3-Replaced Ignition Switch       │
│ 4-Replaced Intake Manifold       │
│ 5-Repaired Mass Air Flow (MAF)   │
│   Sensor Connector               │
│ 6-Replaced Powertrain Control    │
│   Module (PCM)                   │
│ 7-Programmed Powertrain Control  │
│   Module (PCM)                   │
│ 8-Cleaned Throttle Body          │
│                                  │
│               ⬆                  │
└─────────────────────────────────┘
```

3. To return to the screen from which you pressed the `CODE CONNECT` key, press `BACK`.

4.12 Code Criteria

The Code Criteria feature will detail the conditions required for a DTC to be set by the vehicle. The vehicle is constantly running self-tests on its systems. Code Criteria will describe the conditions under which the vehicle can initiate the test. These are called "Enable" criterion. Code Criteria will also describe the the conditions that will cause a DTC to set. These are called "Failure" criterion. Code Criteria is not available for every DTC. Code Criteria is currently only available in English, so if your tool is set to Spanish or French, don't be alarmed if your DTC text is in one language and your Code Criteria information is shown in English.

How to use **Code Criteria**.

1. When the (i) icon is shown on the display, press the key.
2. Scroll through the Code Criteria information noting. If a vehicle has multiple sets of criteria for the DTC, a menu is displayed, so that the tool can provide the most accurate criteria for your specific vehicle.
3. Use the ▲ **UP** and ▼ **DOWN** keys to scroll one line at a time.
4. Use the ◀ **LEFT** and ▶ **RIGHT** arrow keys to scroll a whole screen at a time.
    *   To return to the DTC definition screen, press `BACK`.

```
┌─────────────────────────────────┐
│ P0102                      1/2   │
│                        ECM $10   │
│                                  │
│ Mass Or Volume Air Flow A        │
│ Circuit Low Input                │
│                                  │
│ CURRENT                          │
│                                  │
│ MIL            NOT REQUESTED     │
│ Since last key cycle  PASS/FAIL  │
│ Since DTCs erased     PASS/FAIL  │
│  (i)          CODE   ⬇           │
└─────────────────────────────────┘
```
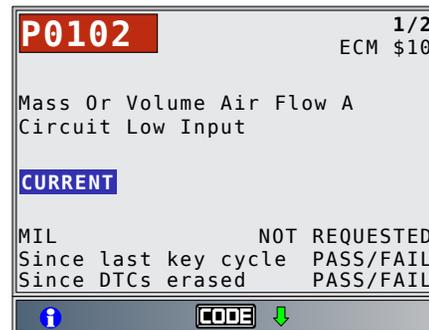
4.13 Acronyms

The **Acronyms** function allows the user to view acronyms and abbreviations used by the scan tool.

From the **Main Menu** or **Diagnostic Menu**.

1. Select **Acronyms**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until **Acronyms** is highlighted.
   - Press ENTER.

```
           Main Menu
Vehicle Diagnostics
Acronyms
Review Data
Print Data
Code Lookup
System Setup
```
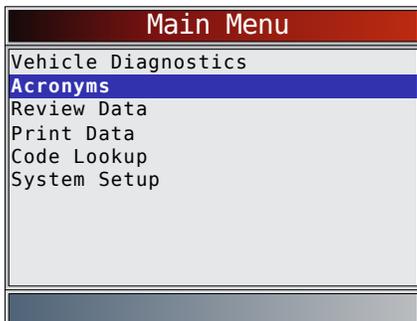
2. Select the alphabetical group range for the desired acronym.
   - Use the ▲ **UP** and ▼ **DOWN** keys until the desired group range is highlighted.
   - Press ENTER.

```
            Acronyms
# - 24X C
24X S - 5
A - AF 1/1
AF 1/2 - AI
Al - B-
BA - CA
Ca - CL
Cl - c
C - DIA
                      ⬇
```
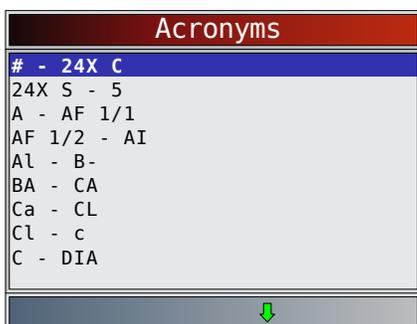
3. Select the acronym.
   - Use the ▲ **UP** and ▼ **DOWN** keys until the desired acronym is highlighted.
   - Press ENTER.

```
            Acronyms
# Of Emiss
# Of Pwrt
#CMP/CKP LOSS
#TRP SNC MISF
#TRPS SNC MISF
% Alcohol
% GRADE
% METHANOL
% of Pdl
                      ⬇
```
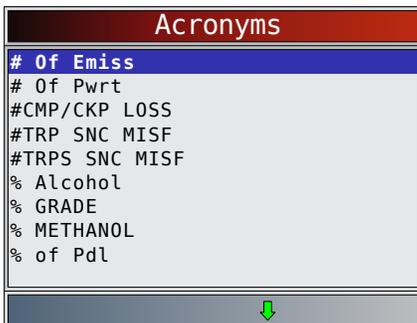
4. View selected acronym.
   - Press ENTER to return to the **Diagnostic Menu**.

```
           # Of Emiss
Number Of Emission Related DTC
```

4.14 Component Locator

Component Locator provides a vehicle-specific location of components found on the selected vehicle. It is a useful companion function to **CodeConnect®**. **CodeConnect®** will indicate components that repaired a problem associated with a DTC, and **Component Locator** provides the location of the component

Component Locator can be selected from the **Diagnostic Menu**. Because **Component Locator** provides vehicle-specific component locations, a previous vehicle must be stored in the scan tool.

From the **Diagnostic Menu**.

1. Select **Component Locator**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until **Component Locator** is highlighted.
   - Press ENTER.

```
         Diagnostic Menu
Datastream
Diagnostic Codes
Special Tests
Component Locator
Acronyms
Review Data
Print Data
Code Lookup
System Setup
```
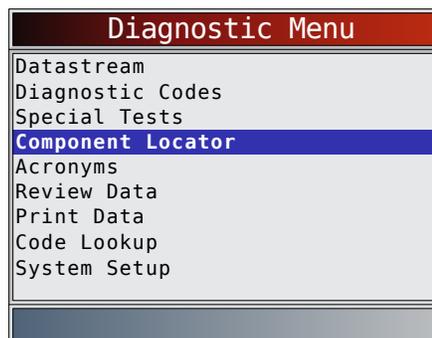
2. Select the alphabetical group range for the desired component.
   - Use the ▲ **UP** and ▼ **DOWN** keys until the desired group range is highlighted.
   - Press ENTER.

```
        Component Locator
A - Fuel Injector (No 4
Fuel Injector (No 5 - K
M - W
```
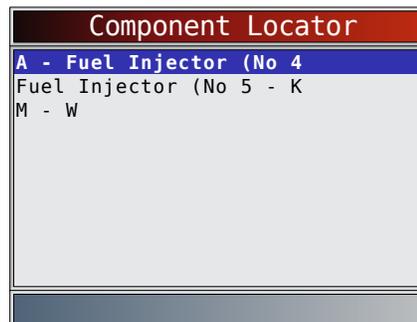
3. Select the component.
   - Use the ▲ **UP** and ▼ **DOWN** keys until the desired component is highlighted.
   - Full component name will scroll on bottom of screen for the highlighted component.
   - Press ◢ENTER◣.

```
        Component Locator
Accelerator Pedal position Sens
Camshaft Position Sensor (Early
Camshaft Position Sensor (Late
Crankshaft Position Sensor
Electronic Brake Control Module
Electronic Brake Control Module
Engine Coolant Temperature Sens
Engine Coolant Temperature Sens

Accelerator Pedal Position Senso
                  ↓
```
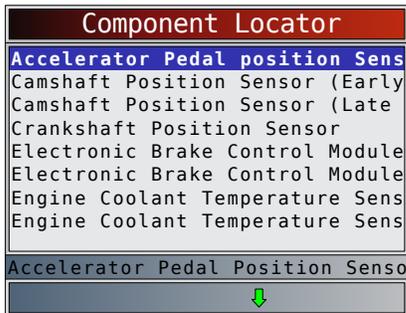
4. View selected component location.
   - Press ◢ENTER◣ to return to the **Diagnostic Menu**.

```
        Component Locator
Accelerator Pedal Position
Sensor
- - - - - - - - - - - - - - - - - - - - - - - - - -
Behind Gas Pedal
```
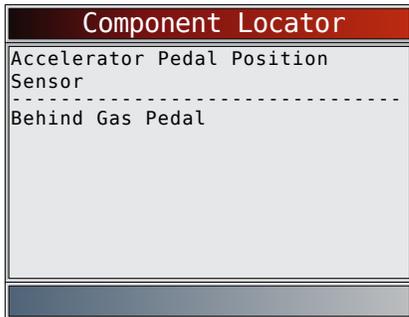
5   Diagnostic Menu

The first time the scan tool links to the vehicle, the communication protocol is automatically detected, and is used until the scan tool is turned off or another vehicle is diagnosed.

If an error message displays, make sure the OBDII connector is attached and the ignition key is on. Cycle ignition key to OFF for 10 seconds, then ON. This may be required to reset computer. If required, select YES to try again. If problem still exists, refer to "Error Messages" in Troubleshooting.

The scan tool keeps data received from the previous 5 vehicle's selected until any of the following occurs:

- A new vehicle is selected when you already have 5 in your garage forcing you to select which vehicle you want to remove from your garage to create space.
- Scan tool is flash programmed to update software.

On initial link to vehicle, scan tool checks the status of I/M Monitors no matter which function is selected.

> **IMPORTANT**
> **Review Data, Print Data, Code Lookup,** and **System Setup** are covered in Section 4 of this manual. These items are not covered in this section.

The **Diagnostic Menu** is broken down into the following selections:

- Datastream
  - View Data
  - Record Data
  - Component Locator
  - Acronyms
  - Review Data
  - Print Data
  - Code Lookup
  - System Setup
- Diagnostic Codes
  - Read Codes
  - Erase Codes
  - View Freeze Data
  - Component Locator
  - Acronyms
  - Review Data
  - Print Data
  - Code Lookup
  - System Setup
- Special Tests
  - I/M Monitors
  - Drive Cycle Monitor
  - State OBD Check
  - MIL Status
  - O2 Monitor Tests
  - Diagnostic Monitor Tests
  - On-Board Systems
  - Vehicle Information
  - Oil Light Reset
  - Battery Reset
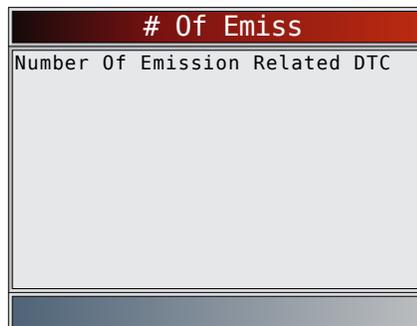 - Charging System Monitor
  - Modules Present
  - Component Locator
  - Acronyms
  - Review Data
  - Print Data
  - Code Lookup
  - System Setup
- Component Locator
- Acronyms
- Review Data
- Print Data
- Code Lookup
- System Setup

Not every function will be on the menus for every vehicle. Some functions are vehicle specific, so they will not appear on every menu.

5.1   I/M Monitors (Emissions)

The **I/M Monitors** (Inspection / Maintenance) function is used to view a snapshot of the operations for the emission system on OBDII vehicles. **I/M Monitors** is a very useful function. To guarantee no faults exist make sure all monitors are ok or n/a and no DTCs exist. Refer to the vehicles service manual for the drive cycle operation.

During normal driving conditions, the vehicle computer scans the emission system. After a specific amount of drive time (each monitor has specific driving conditions and time required), the computer monitors decide if the vehicles emission system is working correctly or not as well as detecting out of range values. When the monitor status is:

- ok - vehicle was driven enough to complete the monitor.
- inc (Incomplete) - vehicle was not driven enough to complete the monitor.
- n/a (not applicable)- vehicle does not support that monitor.

Depending on vehicle, disconnecting or a discharged battery may erase DTCs and clear monitor status. Monitors may be reset by:

- Erasing codes
- Vehicle control modules losing power

The **I/M Monitors** function can be run key on engine running (KOER) or key on engine off (KOEO).

Extreme weather and/or road conditions can prevent a monitor from running. Also, some monitors may require a cold start to complete.

From the **Special Tests Menu**.

1. Select **I/M Monitors**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until **I/M Monitors** is highlighted.
   - Press ENTER.

```
┌─────────────────────────────┐
│        Special Tests        │
├─────────────────────────────┤
│ I/M Monitors                │
│ Drive Cycle Monitor         │
│ State OBD Check             │
│ MIL Status                  │
│ O2 Monitor Tests            │
│ Diagnostic Monitor Tests    │
│ On-Board Systems            │
│ Vehicle Information         │
│ Oil Light Reset             │
├─────────────────────────────┤
│              ⬇              │
└─────────────────────────────┘
```
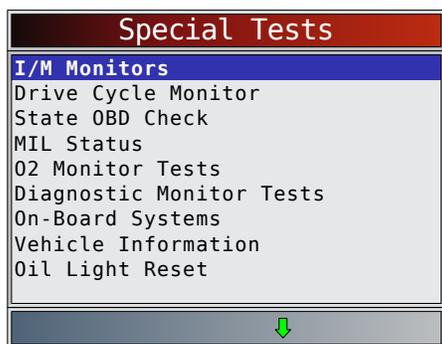
Two types of **I/M Monitors** test are:

- **Since DTCs Cleared** - shows status of the monitors since the DTCs were last erased.
- **This Drive Cycle** - shows status of monitors since the start of the current drive cycle. Refer to the vehicle service manual for more detailed information on emission-related monitors and their status.

Some vehicles do not support **This Drive Cycle**. If vehicle supports both types of monitors the I/M Monitors Menu displays.

```
┌─────────────────────────────┐
│         I/M Monitors        │
├─────────────────────────────┤
│ Since DTCs Cleared          │
│ This Drive Cycle            │
│                             │
│                             │
│                             │
│                             │
├─────────────────────────────┤
│                             │
└─────────────────────────────┘
```
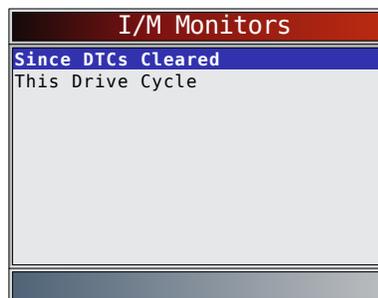
2. View summary of monitor status.
   - Use the ▲ **UP** and ▼ **DOWN** keys (if required).

Depending on monitor test, one of these two screens will be present.

```
┌─────────────────────────────┐
│     Since DTCs Cleared      │
├─────────────────────────────┤
│ Misfire Monitor          ok │
│ Fuel System Mon          ok │
│ Comp Component           ok │
│ Catalyst Mon             ok │
│ Htd Catalyst            n/a │
│ Evap System Mon         inc │
│ Sec Air System          n/a │
│ A/C Refrig Mon          n/a │
│ Oxygen Sens Mon          ok │
├─────────────────────────────┤
│              ⬇              │
└─────────────────────────────┘
```

OR

```
┌─────────────────────────────┐
│       This Drive Cycle      │
├─────────────────────────────┤
│ Misfire Monitor          ok │
│ Fuel System Mon          ok │
│ Comp Component           ok │
│ Catalyst Mon            inc │
│ Htd Catalyst            n/a │
│ Evap System Mon         dis │
│ Sec Air System          n/a │
│ A/C Refrig Mon          n/a │
│ Oxygen Sens Mon         inc │
├─────────────────────────────┤
│              ⬇              │
└─────────────────────────────┘
```
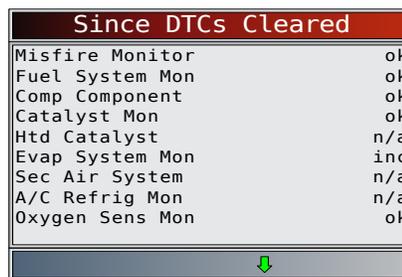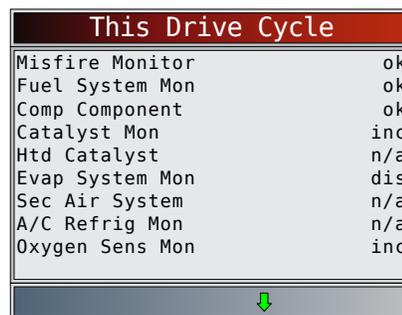
Abbreviations and names for OBDII monitors supported by the scan tool are shown below. They are required by the United States Environmental Protection Agency (EPA). Not all monitors are supported by all vehicles.

Monitors	Expanded Name
Misfire Monitor	Misfire monitor
Fuel System Mon	Fuel System Monitor
Comp Component	Comprehensive components monitor
Catalyst Mon	Catalyst monitor
Htd Catalyst	Heated catalyst monitor
Evap System Mon	Evaporative system monitor
Sec Air System	Secondary air system monitor
A/C Refrig Mon	Air conditioning refrigerant monitor
Oxygen Sens Mon	Oxygen sensor monitor
Oxygen Sens Htr	Oxygen sensor heater monitor
EGR/VVT Sys Mon	Exhaust gas recirculation or variable valve timing monitor
NMHC Cat Mon	Non-methane hydrocarbon catalyst monitor
NOX Treat Mon	Nitrogen oxide treatment monitor
Boost Pres Mon	Boost pressure monitor
Exhst Gas Sensr	Exhaust gas sensor

PM Filter Mon	Particulate matter filter monitor

3. Return to **Special Tests Menu**.
    • Press [BACK].

5.2   Read Codes

The **Read Codes** function allows the scan tool to read the DTCs from the vehicle's control modules. DTCs are used to help determine the cause of a problem or problems with a vehicle. These codes cause the control module to illuminate the malfunction indicator lamp (MIL) when emission-related or driveability fault occurs. When referring to the engine control module, MIL is also known as service engine soon or check engine lamp. **Read Codes** can be done with the key on engine off (KOEO) or with the key on engine running (KOER).

From the **Diagnostic Codes Menu**:

1. Select **Read Codes**.
    • Use the ▲ **UP** and ▼ **DOWN** keys until **Read Codes** is highlighted.
    • Press [ENTER].
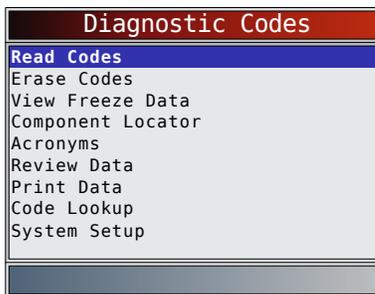
```
          Diagnostic Codes
  Read Codes
  Erase Codes
  View Freeze Data
  Component Locator
  Acronyms
  Review Data
  Print Data
  Code Lookup
  System Setup
```

2. If more than one module is supported, a menu is displayed.
    • Use the ▲ **UP** and ▼ **DOWN** keys until the desired choice is highlighted.
    • Press [ENTER].

```
           Select Module
  OBDII/EOBD
  Engine
  ABS
  Airbag
  All of the Above
```
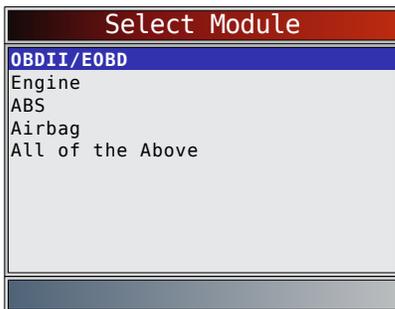
If no DTCs are present, a message stating "System Pass: No Faults Detected" is displayed. If **All of the Above** is selected from the **Select Module** menu, all of the codes will be displayed as if all menu items were selected individually.

```
            Read Codes
                (i)

           No codes found

       Press ENTER to continue
```
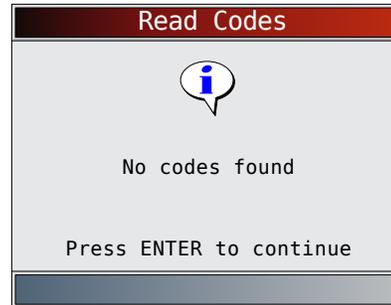
3. View and write down the DTCs.
    • Use the ▲ **UP** and ▼ **DOWN** keys until the desired choice is highlighted.

This screen indicates where the **Read Codes** information is located.

```
  DTC#                    X/Y
                        Module

  DTC Description

  DTC Type


              CODE  ⬇
```
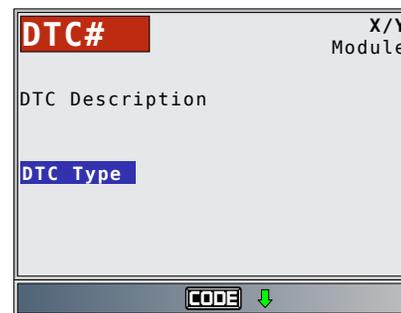
DTC Number - number of the trouble code found in vehicle service information.

X of Y - Indication that code x of y is being viewed, where x is the code being viewed of the total y.

Module - The name of the module (e.g. ABS) or address of the module (e.g. Mod $28) or both are shown (ABS $28) in this field. The table below describes modules supported.

Module	Description
ECM	Engine or powertrain module
TCM	Transmission control module
TCCM	Transfer case control module
ABS	Anti-lock brake system module
HPCM	Hybrid powertrain control module
MOD $XX	Module address for the OBDII/EOBD module reporting the DTC
SRS	Supplemental restraint system module

DTC Description - This area is reserved for the text describing the trouble code listed in the DTC number field.

DTC Type - This area is reserved for providing additional information about the DTC. Multiple DTC types may be possible for a given DTC number. Not all vehicles support DTC types. This table describes possible DTC types.

DTC Type	Description
History	Intermittent codes placed in the vehicle's memory when the trouble originally occurred, and will remain there even if the trouble has been corrected. If no trouble after 50 engine warm-up cycles, the DTC will be erased.

Confirmed	Confirmed codes are reported when a component, sensor, or other part of the vehicle is indication a malfunction is present.
Current	Codes transmitted through the PCMs data stream when a trouble condition is active and cannot be erased. The problem must be repaired to remove the DTC.
Intermittent	Indicates the current code has been set at least once but possibly not enough to cause a history code to be stored.
MIL	Indicates that this DTC has turned on the MIL light.
Pending	Pending codes are also referred to as continuous monitor or maturing codes. An intermittent fault causes the control module to store a code in memory. If the fault does not occur within a certain number of warm-up cycles (depending on vehicle), the code clears from memory. If fault occurs a specific number of times, the code matures into a DTC and the MIL illuminates or blinks. This function can be used with KOEO or KOER.
Non-MIL	DTC that is not emission-related and did not turn on the MIL light.
MIL Code	This DTC type also has a number with it indicating that this is the code number turning on the MIL. Vehicle service manuals may refer to this number instead of the one listed in the DTC number field.
Permanent	Permanent codes are a special type of confirmed code. Permanent codes began being reported by vehicles around 2010, and therefore not supported by every vehicle. While Confirmed Codes can be erased by the Tool, Permanent Codes cannot. Permanent Codes are erased by the vehicle when the vehicle has determined the fault is no longer present.
SCI Hex	On some vehicles, the code returned by the vehicle is not known by the Scan Tool. If this happens, the Scan Tool will display this type along with the code number.
Active	DTC that was present at the time of scan tool request.
Stored	DTC that was not present at the time of scan tool request.

Examples of Read Codes information screens follow. In this example, module (MOD) $18 is reporting the DTCs.
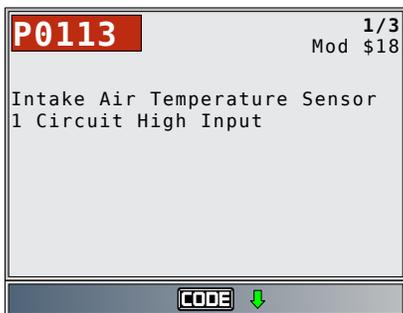
In this example, the Engine Module is reporting a History Code. The $10 is the engine module address.

MIL indicates that this DTC has turned on the MIL light.

Pending indicates a global OBDII/EOBD pending code.
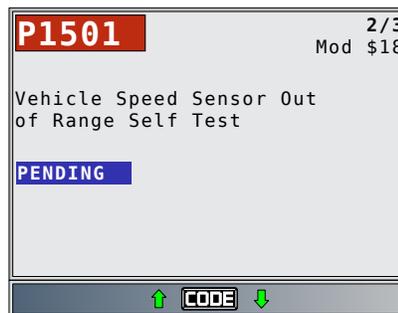
CODE icon indicates that the CODE CONNECT key is active. Press the CODE CONNECT key to display repair information. Refer to **CodeConnect®** in section 3.

Non-MIL is a DTC that is not emission-related and did not turn on the MIL light.

The screen below shows dashes for the DTC number and a MIL code of 213. The dashes will be shown if a DTC number does not exist for the MIL code.

```
- - - - -                    1/1
                             ECM

EGR Position High


MIL CODE 213
```
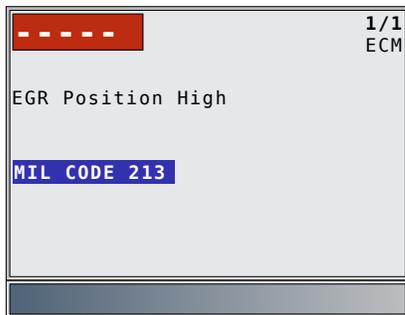
Active is a DTC that was present at the time of scan tool request.

```
P0113                        1/1
                             ECM

Intake Air Temperature Sensor
1 Circuit High

ACTIVE
```

4. Return to **Diagnostic Codes Menu**.
    •   Press **BACK**.

5.3   Erase Codes

The **Erase Codes** function deletes DTCs and resets I/M Monitor data from vehicle's control module(s). Perform this function key on engine off (KOEO). Do not start the engine.

The **Erase Codes** function may also erase View Freeze Data, O2 Monitor Tests, and Diagnostic Monitor Test results depending on vehicle.

The **Erase Codes** function sets monitors to inc.

Perform **Erase Codes** function only after systems have been checked completely and DTCs have been written down.

After servicing the vehicle, erase stored DTCs and verify no codes have returned. If a DTC returns, problem has not been fixed or other faults are present.

Permanent DTCs cannot be erased with the Erase Codes function.

Depending on which monitor sets a code the vehicle may need to be driven and the monitor ran before concluding that the fault is repaired.

From **Diagnostic Codes Menu**:

1. Select **Erase Codes**.
    •   Use the ▲ **UP** and ▼ **DOWN** keys until **Erase Codes** is highlighted.
    •   Press **ENTER**.

```
Diagnostic Codes
Read Codes
Erase Codes
View Freeze Data
Component Locator
Acronyms
Review Data
Print Data
Code Lookup
System Setup
```
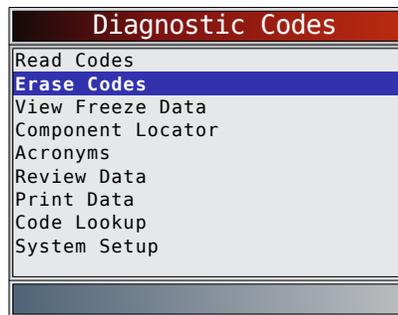
•   If diagnostic results and codes are not to be erased select **NO** and press **ENTER**.

```
Erase Codes
          ?

   Are you sure you want to
 erase diagnostic results and
            codes?

   Yes                No
```
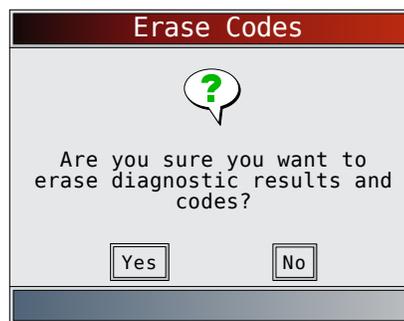
•   Selecting **NO** displays a "Command canceled" message.

```
Erase Codes
          i


       Command canceled


   Press ENTER to continue
```
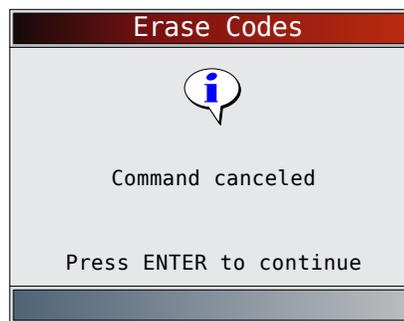
2. Select **YES** to erase diagnostic results and codes.
    •   Use the ◄ **LEFT** arrow key.
    •   Press **ENTER**.
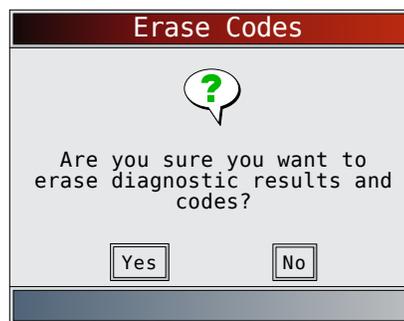
```
Erase Codes
          ?

   Are you sure you want to
 erase diagnostic results and
            codes?

   Yes                No
```

3. If more than one module is supported, a menu is displayed.
    •   Use the ▲ **UP** and ▼ **DOWN** keys until the desired choice is highlighted.
   •   Press **ENTER**.

```
┌─────────────────────────────────┐
│        Select Module            │
├─────────────────────────────────┤
│ OBDII/EOBD                      │
│ Engine                          │
│ ABS                             │
│ Airbag                          │
│                                 │
│                                 │
│                                 │
└─────────────────────────────────┘
```
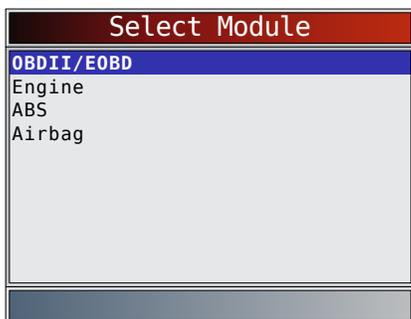
4. Observe "Command sent" message is displayed.
    - Press **ENTER**.

```
┌─────────────────────────────────┐
│          Erase Codes            │
├─────────────────────────────────┤
│              (i)                │
│                                 │
│         Command sent            │
│       Codes remaining:0         │
│                                 │
│     Press ENTER to continue     │
│                                 │
└─────────────────────────────────┘
```
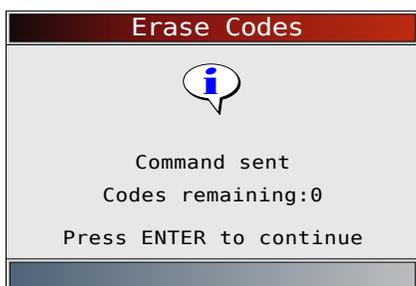
5. Return to **Diagnostic Codes Menu**.

    - Press **BACK**.

5.4   MIL Status

From **Special Tests Menu**:

1. Select **MIL Status**.
    - Use the ▲ **UP** and ▼ **DOWN** keys until **MIL Status** is highlighted.
    - Press **ENTER**.

```
┌─────────────────────────────────┐
│          Special Tests          │
├─────────────────────────────────┤
│ I/M Monitors                    │
│ Drive Cycle Monitor             │
│ State OBD Check                 │
│ MIL Status                      │
│ O2 Monitor Tests                │
│ Diagnostic Monitor Tests        │
│ On-Board Systems                │
│ Vehicle Information             │
│ Oil Light Reset                 │
│                          ⬇      │
└─────────────────────────────────┘
```
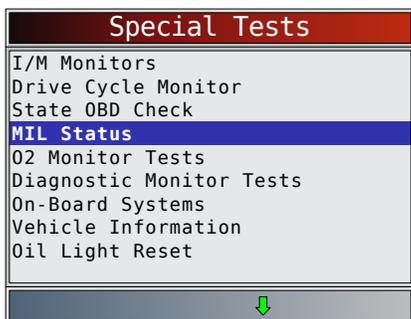
2. View **MIL Status**.
    - Press **ENTER** to return to **Special Tests Menu**.

```
┌─────────────────────────────────┐
│            MIL is ON            │
├─────────────────────────────────┤
│              (i)                │
│                                 │
│      MIL lamp should be ON if   │
│        engine is running        │
│                                 │
│     Press ENTER to continue     │
│                                 │
└─────────────────────────────────┘
```

```
┌─────────────────────────────────┐
│            MIL is OFF           │
├─────────────────────────────────┤
│              (i)                │
│                                 │
│      MIL lamp should be OFF     │
│        engine is running        │
│                                 │
│     Press ENTER to continue     │
│                                 │
└─────────────────────────────────┘
```

5.5   State OBD Check

The **State OBD Check** function is used to display a basic status of the vehicles OBD system.

- Malfunction indicator lamp (MIL) status
- Codes found
- I/M monitors

Erase Codes deletes DTCs and resets I/M monitors from vehicle's computer module(s).

The **State OBD Check** function has the following areas:

- MIL Status ON or OFF
- Number of Codes Found
- Number of Monitors OK
- Number of Monitors Inc
- Number of Monitors N/A

State OBD Check should be done with the key on engine running (KOER) due to showing MIL status.

The number of codes found are only Global OBD II codes and not pending codes.

The number of monitors that are either ok, inc, or na are only Since DTCs Cleared and not This Drive Cycle.

Refer to **Read Codes** and **I/M Monitors** for more detailed information about the results.

From **Special Tests Menu**:

1. Select **State OBD Check**.
    - Use the ▲ **UP** and ▼ **DOWN** keys until **State OBD Check** is highlighted.
    - Press **ENTER**.

```
┌─────────────────────────────────┐
│          Special Tests          │
├─────────────────────────────────┤
│ I/M Monitors                    │
│ Drive Cycle Monitor             │
│ State OBD Check                 │
│ MIL Status                      │
│ O2 Monitor Tests                │
│ Diagnostic Monitor Tests        │
│ On-Board Systems                │
│ Vehicle Information             │
│ Oil Light Reset                 │
│                          ⬇      │
└─────────────────────────────────┘
```
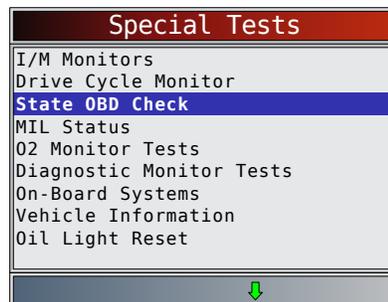
2. View **State OBD Check** display.

```
         State OBD Check
 MIL Status                   OFF
 Codes Found                    0
 Monitors OK                    3
 Monitors Inc                   4
 Monitors N/A                   4
```
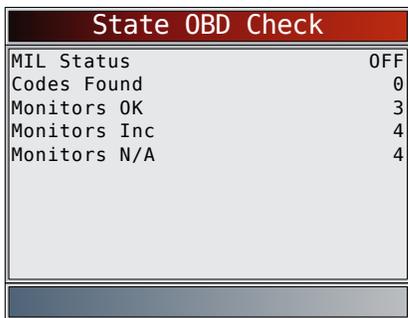
3. Return to **Special Tests Menu**.
   • Press BACK.

5.6   View Data

The **View Data** function allows real time viewing of the vehicle's computer module's parameter identification (PID) data. As the computer monitors the vehicle, information is simultaneously transmitted to scan tool.
View Data allows the following items to be viewed on the scan tool:
• Sensor data
• Operation of switches
• Operation of solenoids
• Operation of relays
View Data can be shown as:
• Entire Data List
• Custom Data List

Apart from **Read Codes**, **View Data** is the most useful diagnostic function for isolating the cause of a vehicle operation problem.
From **Datastream Menu**:
1. Select **View Data**.
   • Use the ▲ **UP** and ▼ **DOWN** keys until **View Data** is highlighted.
   • Press ENTER.

```
           Datastream
 View Data
 Record Data
 Component Locator
 Acronyms
 Review Data
 Print Data
 Code Lookup
 System Setup
```
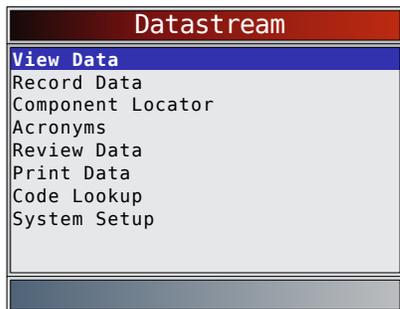
2. Observe while the scan tool validates PID MAP.
   • PID MAP validation is the tool asking the vehicle which PIDs are supported. See Appendix A for a complete list of PIDs supported by the tool.
   • Multiple PIDs may be sent if vehicle is equipped with more than one computer module (for example a powertrain control module [PCM] and a transmission control module [TCM]). The scan tool identifies them by their identification names (ID) assigned by manufacturer (i.e. $10 or $1A).

• If one or more control module stops responding, the scan tool displays a message.
   – If continuing, dashes will replace data in right-hand column.
   – If **NO** is selected, then the scan tool attempts to re-establish communication with that module.

```
         Validating PIDs


        Waiting for vehicle to
              respond


            Please Wait
```

```
         Validating PIDs


         Validating PID List

            PID 19/329


            Please Wait
```
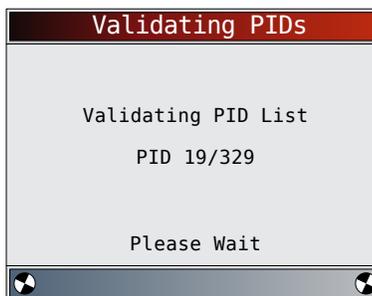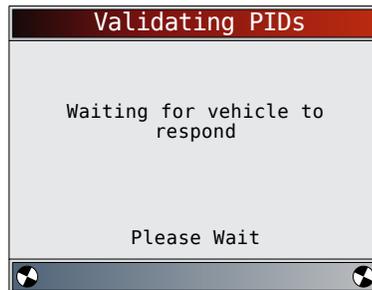
View Entire List

View Entire List shows all supported PID data for the vehicle being tested
From **Select Data to View** menu:
1. Select **Entire Data List**.
   • Use the ▲ **UP** and ▼ **DOWN** keys until **Entire Data List** is highlighted.
   • Press ENTER.
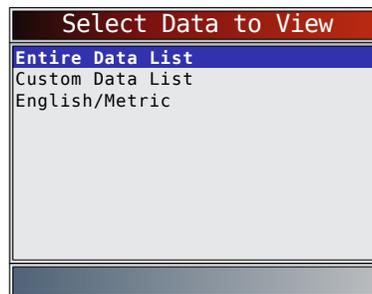
```
        Select Data to View
 Entire Data List
 Custom Data List
 English/Metric
```

2. View PIDs on scan tool.
   • Use the ▲ **UP** and ▼ **DOWN** keys.
   • See Appendix A for PID definitions.

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```
┌──────────────────────────────┐
│ ABS LOAD(%)             0.0   │
│ ABSLT TPS($01)          6.3   │
│ ABSLT TPS($07)          6.3   │
│ ACC POS D(%)            0.0   │
│ BARO PRS("HG)          29.2   │
│ CALC LOAD(%)            0.0   │
│ CALC LOAD(%)            0.0   │
│ CAT TEMP11(°F)           73   │
│ CLR DIST(mi)            499   │
│ CLR DIST(mi)            513   │
│ Absolute Load Value           │
│            ┌──┐  ↓             │
└──────────────────────────────┘
```
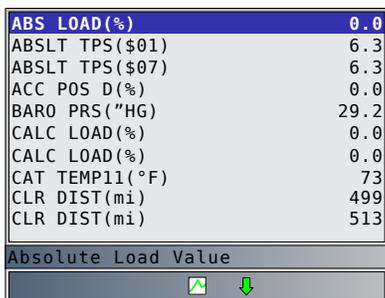
If Long PID Names is turned ON, the expanded text for the PID will scroll on the bottom line of display. See "Long PID Names" in section 3.

If the 〜 icon displays while a PID is selected press ENTER to select PIDs to graph. A maximum of 2 PIDs can be graphed.

```
┌──────────────────────────────┐
│      Select PIDs to Graph     │
│ ✓ABSLT TPS(%)                 │
│  CALC LOAD(%)                 │
│  COOLANT(°F)                  │
│  ENG SPEED(RPM)               │
│  EQ RATIO11                   │
│  IAT(°F)                      │
│  IGN ADV(°)                   │
│  LT FTRM1(%)                  │
│ Throttle Position             │
│               ↓               │
└──────────────────────────────┘
```
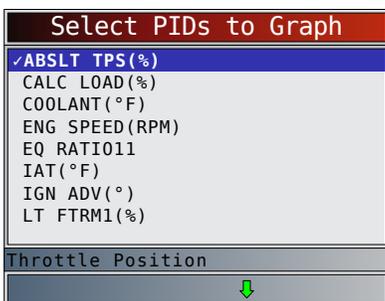
- Use the ▶ **RIGHT** arrow key to select/deselect PIDs. The highlighted PID from when ENTER was pressed is already selected
- Use the ◀ **LEFT** arrow key to deselect all PIDs.
- Press ENTER to view graph of selected PIDs.
- When graphing two PIDs, use the ▲ **UP** and ▼ **DOWN** keys to highlight the desired PID, which will also display the appropriate scale.
- Press the ENTER key to pause the graph. Press the ENTER key again to continue graphing.

- If the 〜 icon displays while a PID is selected press ENTER to view graph.
3. Return to PID screen.
   - Press BACK.
4. Return to **Select Data to View** menu.
   - Press BACK.
5. Return to **Datastream Menu**.
   - Press BACK.

Custom List Select

The Custom Data List allows certain PIDs from the View Entire Data List, such as those PIDs that apply to a specific driveability symptom or system, to be selected. From **Select Data to View** menu:
1. Select **Custom List Select**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until **Custom Data List** is highlighted.
   - Press ENTER.

```
┌──────────────────────────────┐
│      Select Data to View      │
│ Entire Data List              │
│ Custom Data List              │
│ English/Metric                │
│                               │
│                               │
│                               │
│                               │
└──────────────────────────────┘
```

2. Select View Instructions or Not.
   - Use the ◀ **LEFT** and ▶ **RIGHT** keys.
   - Press ENTER.

```
┌──────────────────────────────┐
│         Custom Setup          │
│            ( ? )              │
│      Do you want to view      │
│   instructions for creating a │
│        custom data list?      │
│                               │
│     ┌─────┐      ┌────┐        │
│     │ Yes │      │ No │        │
│     └─────┘      └────┘        │
└──────────────────────────────┘
```

3. Select PIDs to View.
   - Use the ▲ **UP** and ▼ **DOWN** keys to move up and down list.
   - The ▶ **RIGHT** arrow selects or deselects data parameter. All selected data values are marked with a √ symbol.
   - The ◀ **LEFT** arrow deselects all marked data parameters.
   - The ENTER key starts recording data or displaying selected data parameters.
   - If Long PID Names is turn ON, the expanded text for the PID will scroll on the bottom line of display. See "Long PID Names" in section 3.
   - Selected PIDs are kept until you exit View Data and return to the **Datastream Menu**.

```
┌──────────────────────────────┐
│      Select Custom List       │
│ MIL STATUS                    │
│ O2S11(V)                      │
│ O2S12(V)                      │
│ O2S21(V)                      │
│ O2S22(V)                      │
│ OBD2 STAT                     │
│ PTO STATUS                    │
│ ST FTRM11(%)                  │
│ Malfunction Indicator Lamp Statu│
│       ↑         ↓             │
└──────────────────────────────┘
```
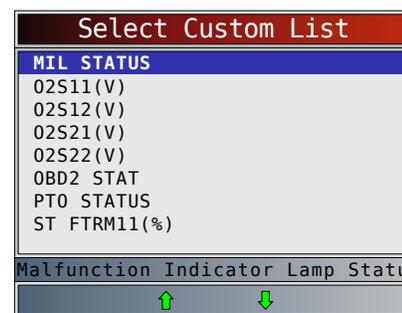
4. View PIDs on Scan Tool.
   - Use the ▲ **UP** and ▼ **DOWN** arrow key.
   - See Appendix A for PID Definitions.

```
ABS TPS B(%)                 0.0
MIL STATUS                   Off




Throttle Position B
               ⬘
```
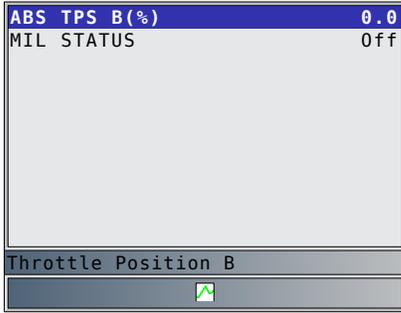
If the ⬘ icon displays while a PID is selected press
ENTER to view graph. Press **BACK** to Return to PID
Screen.
Refer to "View Entire List." on page 4-19 for instructions
on how to select PIDs to graph and how to view graph.

5.   Return to Select Data to View Menu.
   •   Press **BACK** .
6.   Return to **Datastream Menu**.
   •   Press **BACK** .

5.7   Record Data

The **Record Data** function records PIDs while vehicle is
parked or being driven. The **Record Data** function is
mainly used for diagnosing intermittent driveability
problems that cannot be isolated by any other method.
The recording time varies. A recording consists of frames
of data before the trigger and several frames after the
trigger.

⚠ **CAUTION**
Two people must be in vehicle when driving.
One to drive and the other to operate the
scan tool.

From **Datastream Menu**:
1.   Select **Record Data**.
   •   Use the ▲ **UP** and ▼ **DOWN** keys until **Record
       Data** is highlighted.
   •   Press **ENTER** .

```
Datastream
View Data
Record Data
Component Locator
Acronyms
Review Data
Print Data
Code Lookup
System Setup
```
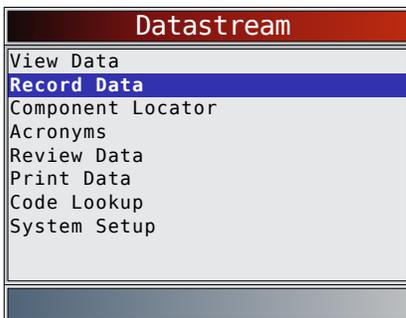
2.   Follow all instructions on display.
   •   The Scan Tool can maintain 5 recordings per
       vehicle. If there are already 5 recordings stored,
       the Scan Tool will ask which recording to over-
       write.
   •   Scan tool validates list of global PIDs from
       vehicle.

```
Validating PIDs


Validating PID List

PID 116/329


Please Wait
```
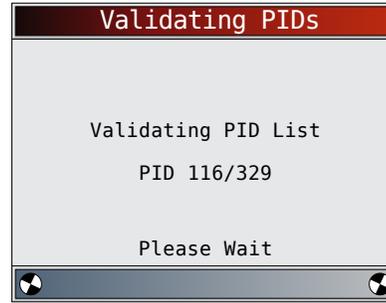
3.   Refer to **View Data** to setup **Custom List** or **View
     Entire List** and **Pre-Trigger Setup** to set the number
     of frames to keep prior to triggering the recording.

```
Select Data to Record
Entire Data List
Custom Data List
Pre-Trigger Setup
```
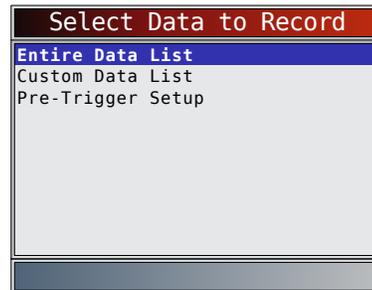
4.   Press **ENTER** to begin recording.
   •   Data continues to be saved until either:
       –   Record memory is full.
       –   Operator presses **ENTER** .
   •   Scan tool recording times vary. A recording
       consists of frames of data before trigger and
       several frames after trigger.

```
Recording
ⓘ


Collecting pretrigger data

Press ENTER to trigger
recording
```

```
Recording
ⓘ


Collecting data for frame #4


Press ENTER to end recording
```

5.   After recording, scan tool displays a prompt to
     Playback Data.
   •   Select **NO** to return to **Datastream Menu**.
   •   Select **YES** to display recorded data.
   •   Refer to "Recording" on page 17 for instruc-
       tions on how to play back data.

```
┌─────────────────────────────┐
│        Record Data          │
├─────────────────────────────┤
│                             │
│            (?)              │
│                             │
│       Playback data?        │
│                             │
│                             │
│    ┌─────┐       ┌────┐     │
│    │ Yes │       │ No │     │
│    └─────┘       └────┘     │
│                             │
└─────────────────────────────┘
```

5.8   View Freeze Data

When an emission-related fault occurs, certain vehicle conditions are recorded by the on-board computer. This information is referred to as freeze frame data. **View Freeze Data** is a snapshot of the operating conditions at the time of an emission-related fault. **View Freeze Data** can be overwritten by faults with a higher priority. If codes were erased, **View Freeze Data** may not be stored in vehicle memory depending on vehicle.

From **Diagnostic Codes Menu**:

1. Select **View Freeze Data**.
    *   Use the ▲ **UP** and ▼ **DOWN** keys until **View Freeze Data** is highlighted.
    *   Press ⌷ENTER⌷.

```
┌─────────────────────────────┐
│      Diagnostic Codes       │
├─────────────────────────────┤
│ Read Codes                  │
│ Erase Codes                 │
│ View Freeze Data            │
│ Component Locator           │
│ Acronyms                    │
│ Review Data                 │
│ Print Data                  │
│ Code Lookup                 │
│ System Setup                │
│                             │
└─────────────────────────────┘
```
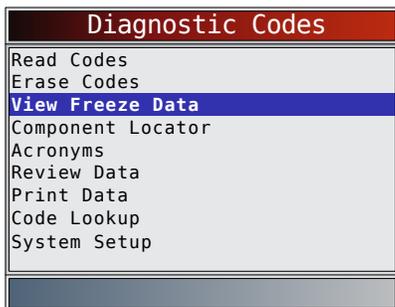
2. Select frame, if more than one frame is present.
    *   Use the ▲ **UP** and ▼ **DOWN** keys until the desired frame is highlighted.
    *   Press ⌷ENTER⌷.

```
┌─────────────────────────────┐
│     Select Data to View     │
├─────────────────────────────┤
│ P0102 (MOD $10)             │
│ Long PID Names              │
│ English/Metric              │
│                             │
│                             │
│                             │
│                             │
│           CODE              │
└─────────────────────────────┘
```
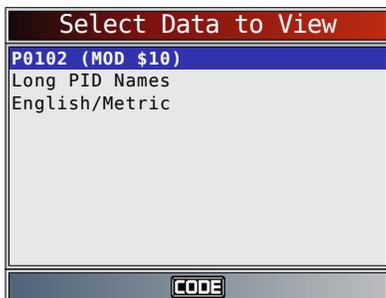
3. View PIDs on scan tool.
    *   Use the ▲ **UP** and ▼ **DOWN** keys.
    *   See Appendix A for PID definitions.

```
┌─────────────────────────────┐
│ TROUB CODE            P2122  │
│ FUEL SYS 1              N/A  │
│ FUEL SYS 2              N/A  │
│ CALC LOAD(%)           0.0   │
│ COOLANT (°F)           -40   │
│ ST FTRM1(%)            0.0   │
│ LT FTRM1(%)            0.0   │
│ MAP("HG)              28.1   │
│ ENG SPEED(RPM)           0   │
│ VEH SPEED(MPH)           0   │
├─────────────────────────────┤
│ Definition that caused Freeze Fra │
│  (i)              ↓          │
└─────────────────────────────┘
```

*   If Long PID Names is turned on, the expanded text for the PID will scroll on the bottom line of the display. See "Long PID Names" on page 13.
*   ⌷CODE⌷ icon indicates that the ⌷CODE CONNECT⌷ key is active. Press the ⌷CODE CONNECT⌷ key to display repair information. Refer to "**CodeConnect®**" in section 3.
*   (i) indicates that the ⌷(i)⌷ key is active. Press the ⌷(i)⌷ key to display the DTC definition of the DTC that created the Freeze Frame.

4. Select another frame to view (if available).
    *   Press ⌷BACK⌷.
5. Return to **Diagnostic Codes Menu**.
    *   Press ⌷BACK⌷.

5.9   Drive Cycle Monitor

The **Drive Cycle Monitor** function is very similar to **I/M Monitors** though the **Drive Cycle Monitor** is used to view real-time operations of the emissions system on OBDII vehicles. **Drive Cycle Monitor** continuously updates as the vehicle reports operations of the emission system.

> ⚠ **CAUTION**
> Two people must be in vehicle when driving. One to drive and the other to operate the scan tool.

*   Refer to the vehicle service manual for the drive cycle operation.

Drive Cycle Monitor can be used if you want to drive the vehicle until all of the monitors are OK.

During normal driving conditions, the vehicle computer scans the emission system. After a specific amount of drive time (each monitor has specific driving conditions and time requirements), the computer monitors will decide if the vehicle emissions system is working correctly or not as well as detecting out a range of values. When the monitor status is:

*   "ok" - vehicle has been driven enough for function.
*   "inc" (incomplete) - vehicle was not driven enough to complete all of the monitors.
*   "n/a" (not applicable) - vehicle does not support that monitor.

Reset monitors by:

*   Erasing codes.

- Vehicle computer module losing power (on some vehicles).

From **Special Tests Menu**:

1. Select **Drive Cycle Monitor**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until **Drive Cycle Monitor** is highlighted.
   - Press ENTER.

```
┌─────────────────────────────────┐
│          Special Tests          │
├─────────────────────────────────┤
│ I/M Monitors                    │
│ Drive Cycle Monitor             │
│ State OBD Check                 │
│ MIL Status                      │
│ O2 Monitor Tests                │
│ Diagnostic Monitor Tests        │
│ On-Board Systems                │
│ Vehicle Information             │
│ Charging System Monitor         │
├─────────────────────────────────┤
│                ⬇                │
└─────────────────────────────────┘
```
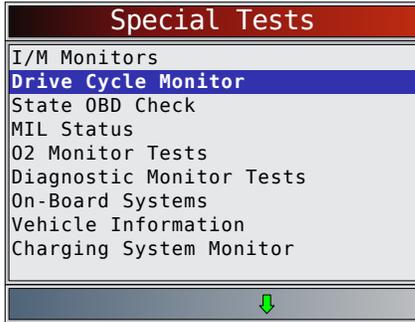
- Two types of drive cycle monitors are:
  - **Since DTCs Cleared** shows status of the monitors since the Diagnostic Trouble Codes were last erased.
  - **This Drive Cycle** shows status of monitors since start of current drive cycle. Refer to the vehicle service manual for more detailed information on emission-related monitors and their status.
  - Some vehicles do not support **Drive Cycle Monitor**. If vehicle supports both types of drive cycle monitors the **Drive Cycle Monitor** menu will display.

```
┌─────────────────────────────────┐
│       Drive Cycle Monitor       │
├─────────────────────────────────┤
│ Since DTCs Cleared              │
│ This Drive Cycle                │
│                                 │
│                                 │
│                                 │
│                                 │
│                                 │
├─────────────────────────────────┤
│                                 │
└─────────────────────────────────┘
```
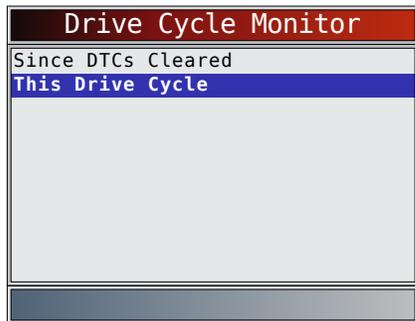
2. View summary of monitor status.
   - Use the ▲ **UP** and ▼ **DOWN** keys (if required).
3. Depending on the drive cycle monitors, either the **This Drive Cycle** or the **Since DTCs Cleared** screen will display.

```
┌─────────────────────────────────┐
│        This Drive Cycle         │
├─────────────────────────────────┤
│ Catalyst Mon               inc  │
│ Oxygen Sens Mon            inc  │
│ Oxygen Sens Htr            inc  │
│ EGR/VVT Sys Mon            inc  │
│                                 │
│                                 │
│                                 │
├─────────────────────────────────┤
│                                 │
└─────────────────────────────────┘
```

OR

```
┌─────────────────────────────────┐
│       Since DTCs Cleared        │
├─────────────────────────────────┤
│ Misfire Monitor             ok  │
│ Fuel System Mon             ok  │
│ Comp Component              ok  │
│ Catalyst Mon                ok  │
│ Htd Catalyst               n/a  │
│ Evap System Mon            inc  │
│ Sec Air System             n/a  │
│ A/C Refrig Mon             n/a  │
│ Oxygen Sens Mon             ok  │
├─────────────────────────────────┤
│                ⬇                │
└─────────────────────────────────┘
```
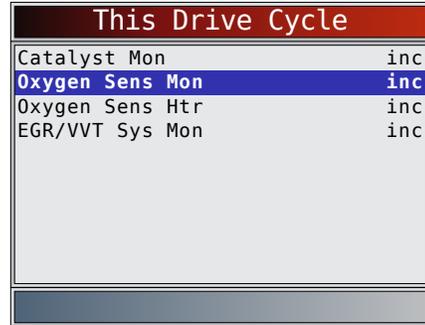
- The scan tool display is continuously updated. Monitors that are "ok" will disappear and only the "inc" monitors will remain displayed. Monitors designated "n/a" are not displayed.
- When all Monitors are "OK" a screen stating "All supported monitors are OK" will display.

```
┌─────────────────────────────────┐
│        This Drive Cycle         │
├─────────────────────────────────┤
│               (i)               │
│                                 │
│   All supported monitors are OK │
│                                 │
│    Press ENTER to continue      │
├─────────────────────────────────┤
│                                 │
└─────────────────────────────────┘
```

OR

```
┌─────────────────────────────────┐
│       Since DTCs Cleared        │
├─────────────────────────────────┤
│               (i)               │
│                                 │
│   All supported monitors are OK │
│                                 │
│    Press ENTER to continue      │
├─────────────────────────────────┤
│                                 │
└─────────────────────────────────┘
```
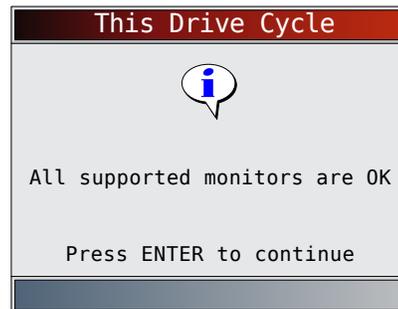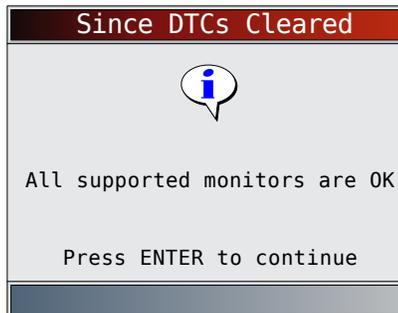
4. Return to **Special Tests Menu**.
   - Press BACK.

5.10   O2 Monitor Tests

OBDII regulations require applicable vehicles monitor and test oxygen (O2) sensors to determine problems related to fuel and emissions. The O2 Monitor Tests allows retrieval of completed O2 sensors monitor test results.

- The **O2 Monitor Tests** is not an on-demand test. O2 sensors are not tested when selected via the menu. O2 sensors are tested when engine operating conditions are within specified limits.
- If the vehicle communicates using a controller area network (CAN), **O2 Monitor Tests** are not supported by vehicle. A message is displayed. See "Diagnostic Monitor Tests" in this section to see O2 monitor data.
- O2 sensors are located before (upstream) and after (downstream) catalyst(s). Sensors are named (xy) for their position to both cylinder banks and catalysts.
  - The O2 sensor for cylinder bank 1 has prefix 1y while O2 sensor for cylinder bank 2 has prefix 2y.
  - The O2 sensor upstream of catalyst (closest to engine) has suffix x1 while O2 sensor downstream of catalyst has suffix x2. If vehicle contains more catalysts, O2 sensor downstream of second catalyst has suffix x3 and O2 sensor downstream of next catalyst has suffix x4.
  - For example, O2S21 is upstream O2 sensor for cylinder bank 2.

The following O2 Sensor Tests are available:

- Rich-to-lean sensor threshold voltage
- Lean-to-rich sensor threshold voltage
- Low sensor voltage for switch time
- High sensor voltage for switch time
- Rich-to-lean sensor switch time
- Lean-to-rich sensor switch time
- Minimum sensor voltage test cycle
- Maximum sensor voltage test cycle
- Time between sensor transitions
- Sensor period
- Manufacturer specific tests

From **Special Tests Menu**:
1. Select **O2 Monitor Tests**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until **O2 Monitor Tests** is highlighted.
   - Press ENTER.

```
        Special Tests
  I/M Monitors
  Drive Cycle Monitor
  State OBD Check
  MIL Status
  O2 Monitor Tests
  Diagnostic Monitor Tests
  On-Board Systems
  Vehicle Information
  Charging System Monitor

                  ⬇
```
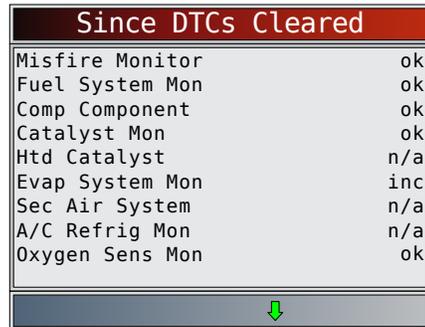
2. Select O2 sensor.

- Use the ▲ **UP** and ▼ **DOWN** keys until the desired O2 monitor is highlighted.
- Press ENTER.

```
      Select O2 Sensor
  O2 Bank1 Sensor1




```

- The O2 sensors located upstream (before catalyst) may perform differently than ones located downstream (after catalyst).
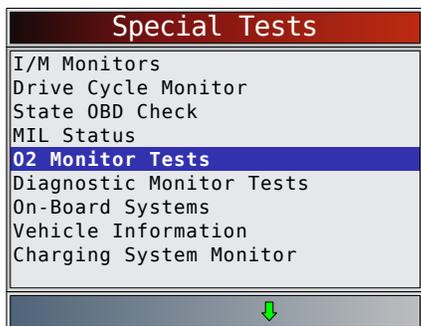- Test IDs are shown for unknown O2 sensor tests.

3. View results of selection.
   - Use the ▲ **UP** and ▼ **DOWN** keys.

```
      O2 Bank1 Sensor1
  Test    $86
  MOD                    $09
  MAX                    128
  MEAS                   128
  MIN                    128

  Test    $8D
  MOD                    $09
  MAX                    255
  MEAS                   128
  MIN                    128

                  ⬇
```

4. Return to **O2 Sensor Tests** menu.
   - Press BACK.
5. Return to **Special Tests Menu**.
   - Press BACK.

5.11   Diagnostic Monitor Tests

The **Diagnostic Monitor Test** function is useful after servicing or after erasing a vehicle's memory. Test results do not necessarily indicate a faulty component or system.

- Non-CAN vehicles **Diagnostic Monitor Test** receives test results for emission-related powertrain components and systems that are not continuously monitored.
- CAN vehicles **Diagnostic Monitor Test** receives test results for emission-related powertrain components and systems that are and are not continuously monitored.
- Vehicle manufacturer is responsible for assigning test and component IDs.

From **Special Tests Menu**:
1. Select **Diagnostic Monitor Tests**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until **Diagnostic Monitor Tests** is highlighted.
   - Press ENTER.

```
        Special Tests
┌──────────────────────────────┐
│ I/M Monitors                 │
│ Drive Cycle Monitor          │
│ State OBD Check              │
│ MIL Status                  │
│ O2 Monitor Tests            │
│ Diagnostic Monitor Tests    │
│ On-Board Systems            │
│ Vehicle Information         │
│ Charging System Monitor     │
│                              │
│              ⬇              │
└──────────────────────────────┘
```
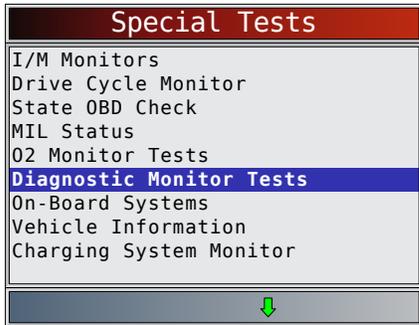
- Applicable diagnostic monitor tests are displayed.
2. Review test results displayed on scan tool.
    - Use the ▲ **UP** and ▼ **DOWN** keys until desired result is highlighted.
    - Press ENTER.

```
      Select Diag Mon Test
┌──────────────────────────────┐
│ Test $03                     │
│ Test $49                     │
│ Test $4A                     │
│ Test $62                     │
│ Test $76                     │
│ Test $78                     │
│ Test $81                     │
│ Test $9A                     │
│ Test $9B                     │
│              ⬇              │
└──────────────────────────────┘
```

Or, refer to appropriate vehicle service manual for test IDs and definitions.

```
      Select Diag Mon Test
┌──────────────────────────────┐
│ O2 Sensor B1S1               │
│ O2 Sensor B1S2               │
│ O2 Sensor B2S1               │
│ O2 Sensor B2S2               │
│ Catalyst B1                  │
│ Catalyst B2                  │
│ EGR Mon B1                   │
│ EVAP (0.090")                │
│ EVAP (0.020")                │
│              ⬇              │
└──────────────────────────────┘
```
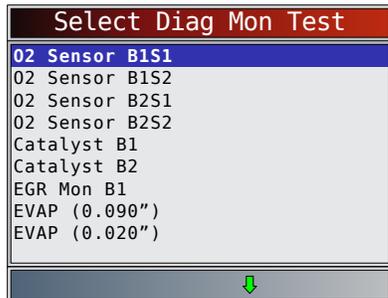
On Non-CAN vehicles the scan tool displays:
- Test data (test ID)
- Maximum value (MAX)
- Test measurements (MEAS)
- Minimum value (MIN)
- Status (STS)
- Measurements and Specification values are hexadecimal numbers (i.e., $1A, $FE, $11.)
- Module (MOD)

```
           Test $03
┌──────────────────────────────┐
│ ID                        01 │
│ MOD                      $09 │
│ MAX                     ---- │
│ MEAS                      00 │
│ MIN                       00 │
│ STS                       OK │
│                              │
└──────────────────────────────┘
```
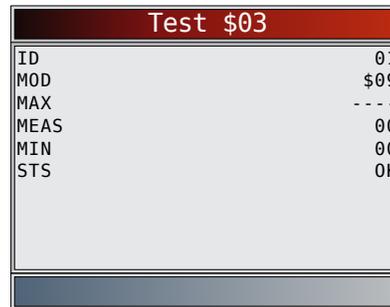
- On CAN vehicles scan tool displays:
    - Test performed. The test performed can be $## if test is not defined. Refer to vehicle service manual for details.
    - Measured values and units of measured (such as volts, amps, and seconds).
    - Status of monitor test data.
    - Module ID where the monitor test data came from.

```
         O2 Sensor B1S1
┌──────────────────────────────┐
│ RICH-LN Thresh               │
│ MOD                      $07 │
│ MAX               0.4497(V)  │
│ MEAS              0.4497(V)  │
│ MIN               0.4497(V)  │
│ STS                       OK │
│                              │
│              ⬇              │
└──────────────────────────────┘
```

3. Return to **Select Test** menu.
    - Press BACK.
4. Return to **Special Tests Menu**.
    - Press BACK.

5.12 On-Board Systems

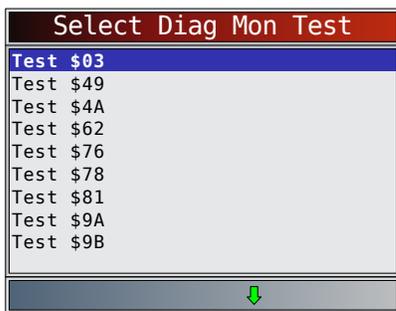The **On-Board Systems** test allows the scan tool to control operation of vehicle components, tests or systems.

- Some manufacturers do not allow tools to control vehicle systems. A vehicle not supporting an on-board system is identified by a message that is displayed when selected.
- Refer to the vehicle service manual for on-board systems instructions.
- The manufacturer is responsible for determining the criteria to automatically stop test. Refer to appropriate vehicle service manual.

From **Special Tests Menu**:
1. Select **On-Board Systems**.
    - Use the ▲ **UP** and ▼ **DOWN** keys until **On-Board Systems** is highlighted.
    - Press ENTER.

```
┌─────────────────────────────┐
│       Special Tests         │
├─────────────────────────────┤
│ I/M Monitors                │
│ Drive Cycle Monitor         │
│ State OBD Check             │
│ MIL Status                  │
│ O2 Monitor Tests            │
│ Diagnostic Monitor Tests    │
│ On-Board Systems            │
│ Vehicle Information         │
│ Charging System Monitor     │
├─────────────────────────────┤
│              ⬇              │
└─────────────────────────────┘
```
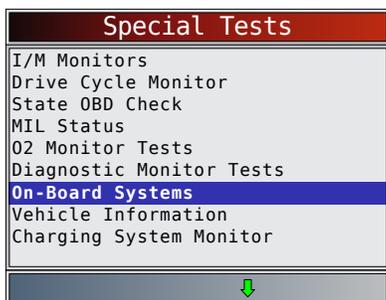
- A list of on-board systems and components available for testing are shown on the display.

2. Select test.
   - Use the ▲ **UP** and ▼ **DOWN** keys until desired test is highlighted.
   - Press ENTER.

```
┌─────────────────────────────┐
│      On-Board Systems       │
├─────────────────────────────┤
│ EVAP System Test            │
│                             │
│                             │
│                             │
│                             │
│                             │
│                             │
└─────────────────────────────┘
```

```
┌─────────────────────────────┐
│      On-Board Systems       │
├─────────────────────────────┤
│             (i)             │
│                             │
│        Command sent         │
│                             │
│    Press ENTER to continue  │
│                             │
└─────────────────────────────┘
```
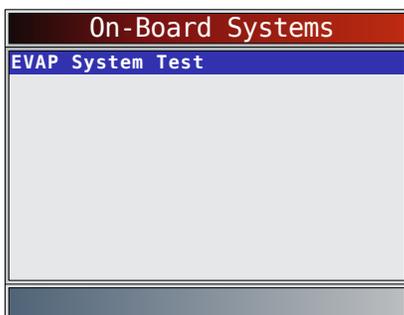
3. Return to **On-Board Systems** menu.
   - Press ENTER.
4. Return to **Special Tests Menu**.
   - Press BACK.

5.13   Vehicle Information

The **Vehicle Information** function allows the scan tool to request the vehicle's VIN number, calibration ID(s) which identifies software version in vehicle control module(s), calibration verification numbers (CVN(s)) and in-use performance tracking.

- **Vehicle Information** function applies to model year 2000 and newer OBDII compliant vehicles.
- The scan tool cannot verify if data is correct for scanned vehicles.
- CVNs are calculated values required by OBDII regulations.

- The CVN calculation may take several minutes.
- CVNs are reported to determine if emission-related calibrations have been changed. Multiple CVNs may be reported for a control module.
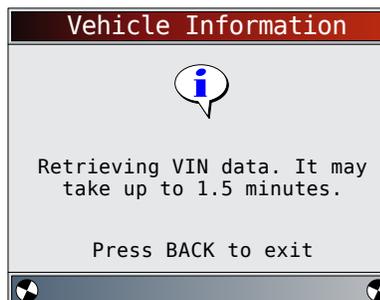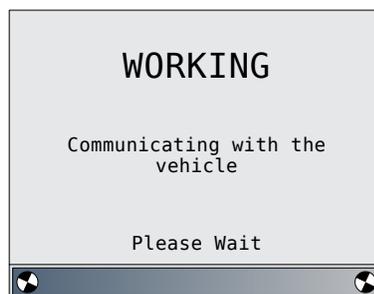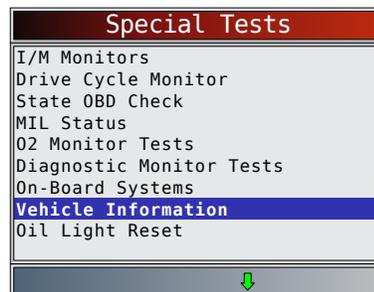- In-use performance tracking, tracks performance of key I/M Monitors.

From **Special Tests Menu**:
1. Select **Vehicle Information**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until **Vehicle Information** is highlighted.
   - Press ENTER.

```
┌─────────────────────────────┐
│       Special Tests         │
├─────────────────────────────┤
│ I/M Monitors                │
│ Drive Cycle Monitor         │
│ State OBD Check             │
│ MIL Status                  │
│ O2 Monitor Tests            │
│ Diagnostic Monitor Tests    │
│ On-Board Systems            │
│ Vehicle Information         │
│ Oil Light Reset             │
├─────────────────────────────┤
│              ⬇              │
└─────────────────────────────┘
```

```
┌─────────────────────────────┐
│     Vehicle Information      │
├─────────────────────────────┤
│             (i)             │
│                             │
│        Verify key ON        │
│         Engine OFF.         │
│                             │
│    Press ENTER to continue  │
│                             │
└─────────────────────────────┘
```

```
┌─────────────────────────────┐
│                             │
│          WORKING            │
│                             │
│  Communicating with the     │
│         vehicle             │
│                             │
│       Please Wait           │
│                             │
└─────────────────────────────┘
```

```
┌─────────────────────────────┐
│     Vehicle Information      │
├─────────────────────────────┤
│             (i)             │
│                             │
│  Retrieving VIN data. It may│
│   take up to 1.5 minutes.   │
│                             │
│     Press BACK to exit      │
│                             │
└─────────────────────────────┘
```

```
┌─────────────────────────────┐
│     Vehicle Information      │
│                             │
│             (i)             │
│                             │
│   Retrieving CVN data. It may│
│    take up to 1.5 minutes.  │
│                             │
│      Press BACK to exit     │
│                             │
└─────────────────────────────┘
```

```
┌─────────────────────────────┐
│     Vehicle Information      │
│                             │
│             (i)             │
│                             │
│  Retrieving CALID data. It may│
│    take up to 1.5 minutes.  │
│                             │
│      Press BACK to exit     │
│                             │
└─────────────────────────────┘
```

```
┌─────────────────────────────┐
│     Vehicle Information      │
│                             │
│             (i)             │
│                             │
│   Retrieving IPT data. It may│
│    take up to 1.5 minutes.  │
│                             │
│      Press BACK to exit     │
│                             │
└─────────────────────────────┘
```

2. Select information to view from the menu.
   - Use the ▲ **UP** and ▼ **DOWN** keys until desired selection is highlighted.
   - Press ENTER.

```
┌─────────────────────────────┐
│     Vehicle Information      │
│ VIN                         │
│ CVN                         │
│ CAL ID                      │
│ IPT                         │
│                             │
└─────────────────────────────┘
```
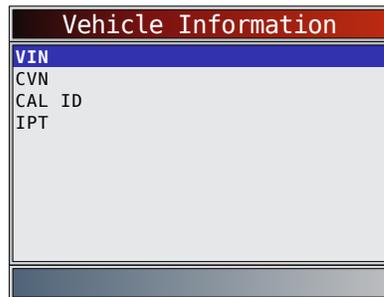
   - If the selected menu item has data for more than one module, a menu listing all modules returning data for that menu item is shown.
3. View information supported by vehicle.
   - Use the ▲ **UP** and ▼ **DOWN** keys (if required).

```
┌─────────────────────────────┐
│        VIN (MOD $09)        │
│ 1HGCM56866A018504           │
│                             │
│                             │
│                             │
│                             │
└─────────────────────────────┘
```

```
┌─────────────────────────────┐
│        CVN (MOD $09)        │
│ 00 5C 02 52                 │
│                             │
│                             │
│                             │
│                             │
└─────────────────────────────┘
```

```
┌─────────────────────────────┐
│      CAL ID (MOD $ 09)      │
│ 37805-RAD-A590              │
│ --------------              │
│                             │
│                             │
│                             │
└─────────────────────────────┘
```

```
┌─────────────────────────────┐
│        IPT (MOD $ 09)       │
│ OBDCOND                    0│
│ IGNCNTR                    0│
│ CATCOMP1                   0│
│ CATCOND1                   0│
│ CATCOMP2                   0│
│ CATCOND2                   0│
│ O2SCOMP1                   0│
│ O2SCOND1                    │
│ Monitor Conditions Encountered│
│             ⬇               │
└─────────────────────────────┘
```

- In the above examples, Module $09 returned data. Scroll down to view information. CVNs are shown as hexadecimal numbers.
- Abbreviations and names for in-use performance tracking data supported by the Tool are shown below. Not all data is supported by all vehicles.

Abbreviated Name	Expanded Name
In-Use Perf Tracking	In-Use Performance Tracking
OBDCOND	OBD Monitoring Conditions Encountered Counts
IGNCNTR	Ignition Counter
CATCOMPX	Catalyst Monitor Completion Counts Bank x
CATCONDX	Catalyst Monitor Conditions Encountered Counts Bank x

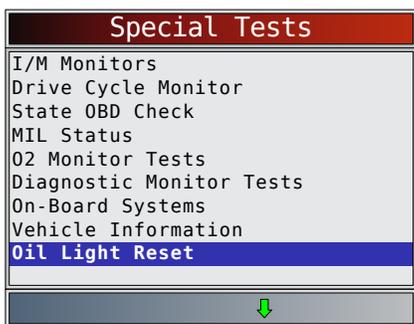| O2SCOMPX	O2 Sensor Monitor Completion Counts Bank x
O2SCONDX	O2 Sensor Conditions Encountered Counts Bank x
EGRCOMP	EGR Monitor Completion Condition Counts
EGRCOND	EGR Monitor Conditions Encountered Counts
AIRCOMP	AIR Monitor Completion Condition Counts (Secondary Air)
AIRCOND	AIR Monitor Conditions Encountered Counts (Secondary Air)
EVAPCOMP	EVAP Monitor Completion Condition Counts
EVAPCOND	EVAP Monitor Conditions Encountered Counts

- If message INVALID displays on screen, the data returned from the vehicle is incorrect, or is not formatted in accordance with OBDII specifications.
4. Return to **Vehicle Information** menu.
   - Press BACK.
5. Return to **Special Tests Menu**.
   - Press BACK.

5.14 Oil Light Reset

The Oil Light Reset function allows the Scan Tool to reset oil life to 100% and turn off the change oil light. This function will only appear on the Special Tests menu when supported by the currently selected vehicle.
From **Special Tests Menu**:
1. Select **Oil Light Reset**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until **Oil Light Reset** is highlighted.
   - Press ENTER.

```
        Special Tests
I/M Monitors
Drive Cycle Monitor
State OBD Check
MIL Status
O2 Monitor Tests
Diagnostic Monitor Tests
On-Board Systems
Vehicle Information
Oil Light Reset
```

2. Follow the instructions displayed. They will vary depending on the vehicle.
   - Press ENTER.

```
        Oil Light Reset
Cycle key, Turn engine off, Key on

Press BACK to exit

      Press ENTER to continue
```

3. Reset oil light.
   - Press ENTER.

```
        Oil Light Reset
            i
    Press ENTER to reset
        BACK to exit

    Press ENTER to continue
```

4. After the command is sent, the oil light should be off.
   - Press ENTER to return to the **Special Tests Menu**.

```
        Oil Light Reset
            i

        Command sent

    Press ENTER to continue
```

5.15 Battery Reset

The Battery Reset function allows the Scan Tool to tell the vehicle that the battery has been replaced. This function will only appear on the Special Tests menu when supported by the currently selected vehicle. Resetting the battery system when a new battery is installed allows the vehicle to customize charging to the age and condition of the battery.
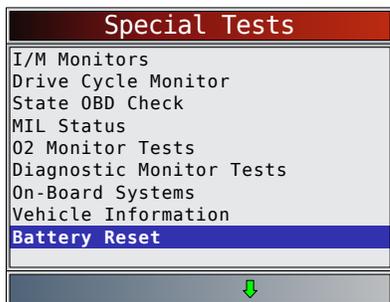
Battery Information

The vehicle may contain either a lead-acid battery or an AGM (absorbed glass mat) battery. Leadacid batteries contain liquid sulphuric acid and can spill when overturned. AGM batteries also contain sulphuric acid, but the acid is contained in glass mats between the terminal plates.
If the original battery is replaced with a different type of battery (eg. a lead-acid battery is replaced with an AGM

battery) or a battery with a different capacity (mAh), the vehicle may require reprogramming to the new battery type in addition to performing the battery reset. Reprogramming is not a function of the tool. Consult the vehicle manual for additional vehicle-specific information.

From the **Special Tests Menu**:

1. Select **Battery Reset**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until **Battery Reset** is highlighted.
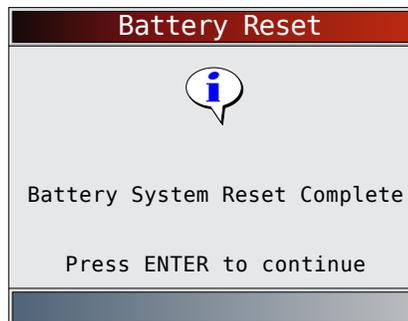   - Press **ENTER**.

```
┌─────────────────────────────┐
│        Special Tests        │
├─────────────────────────────┤
│ I/M Monitors                │
│ Drive Cycle Monitor         │
│ State OBD Check             │
│ MIL Status                  │
│ O2 Monitor Tests            │
│ Diagnostic Monitor Tests    │
│ On-Board Systems            │
│ Vehicle Information         │
│ Battery Reset               │
├─────────────────────────────┤
│              ⬇              │
└─────────────────────────────┘
```

2. Follow the instructions displayed. They will vary depending on the vehicle.
   - Press **ENTER**.

```
┌─────────────────────────────┐
│        Battery Reset        │
├─────────────────────────────┤
│                             │
│  Required Whenever:         │
│                             │
│  Battery has been replaced  │
│  Otherwise instructed by shop│
│ manual                      │
│                             │
├─────────────────────────────┤
│  Press ENTER to continue    │
└─────────────────────────────┘
```

3. Perform **Battery Reset**.
   - The messages displayed during battery reset will vary depending on the vehicle.

```
┌─────────────────────────────┐
│        Battery Reset        │
├─────────────────────────────┤
│                             │
│     (May Take 30 Secs)      │
│                             │
│      Time remaining         │
│          0:28               │
│                             │
│       Please Wait           │
├─────────────────────────────┤
└─────────────────────────────┘
```

4. Battery Reset Complete.
   - Press **ENTER** to return to the **Special Tests Menu**.

```
┌─────────────────────────────┐
│        Battery Reset        │
├─────────────────────────────┤
│             (i)             │
│                             │
│                             │
│ Battery System Reset Complete│
│                             │
│   Press ENTER to continue   │
├─────────────────────────────┤
└─────────────────────────────┘
```
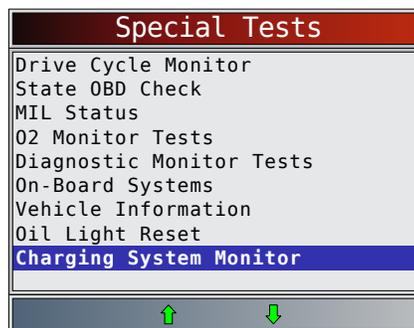
5.16 Charging System Monitor

The **Charging System Monitor** function allows the Scan Tool to provide voltage measurements at the DLC to give an indication of battery, starter, and alternator performance.

From the **Special Tests Menu**:

1. Select **Charging System Monitor.**
   - Use the ▲ **UP** and ▼ **DOWN** keys until **Charging System Monitor** is highlighted.
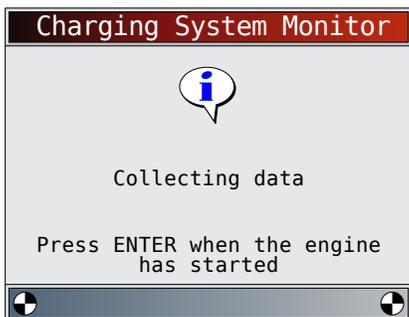   - Press **ENTER**.

```
┌─────────────────────────────┐
│        Special Tests        │
├─────────────────────────────┤
│ Drive Cycle Monitor         │
│ State OBD Check             │
│ MIL Status                  │
│ O2 Monitor Tests            │
│ Diagnostic Monitor Tests    │
│ On-Board Systems            │
│ Vehicle Information         │
│ Oil Light Reset             │
│ Charging System Monitor     │
├─────────────────────────────┤
│        ⬆        ⬇           │
└─────────────────────────────┘
```

2. Turn the ignition key on but do not start the engine.
   - Press **ENTER**.

```
┌─────────────────────────────┐
│   Charging System Monitor   │
├─────────────────────────────┤
│             (i)             │
│                             │
│      Turn the key on.       │
│                             │
│   Do NOT start the engine.  │
│                             │
│   Press ENTER to continue   │
├─────────────────────────────┤
└─────────────────────────────┘
```
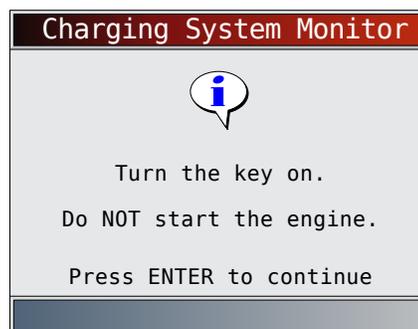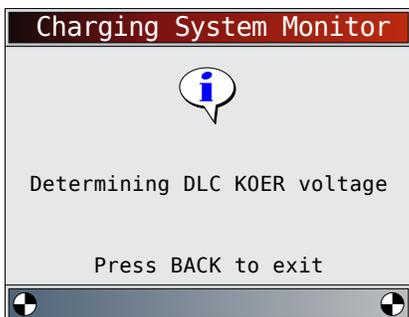
3. The DLC voltage is measured at key on engine off.
   - The screen below shows a KOEO voltage of 12.2V.
   - Start the engine or press **BACK** to return to the Diagnostic Menu. The Scan Tool will monitor the DLC voltage and progress to step 4 if starter cranking is detected.
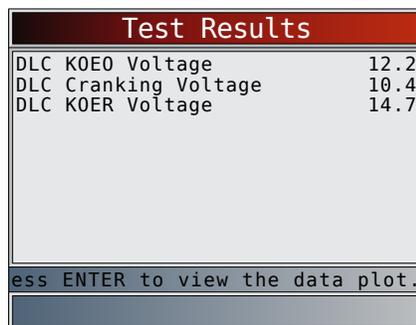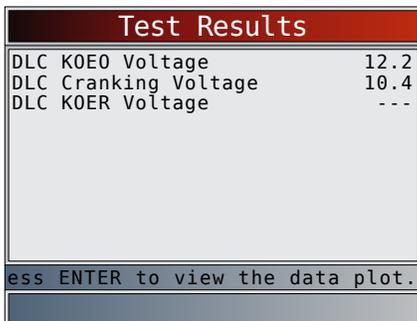
```
┌──────────────────────────────────┐
│      Charging System Monitor     │
│                                  │
│              (i)                 │
│                                  │
│       DLC KOEO Voltage:          │
│             12.2V                │
│                                  │
│      Please start the engine     │
│                                  │
│       Press BACK to exit         │
│ ◉ ▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬ ◉     │
└──────────────────────────────────┘
```
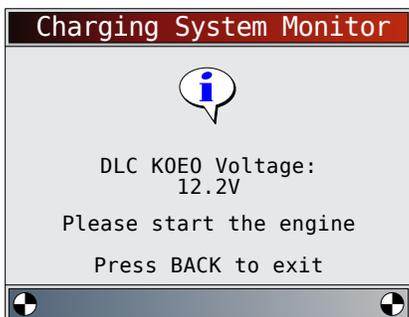
4. When the cranking condition is detected, the scan tool will begin collecting DLC voltage readings.
   - If the engine starts, press ◢ENTER◣.

```
┌──────────────────────────────────┐
│      Charging System Monitor     │
│                                  │
│              (i)                 │
│                                  │
│                                  │
│          Collecting data         │
│                                  │
│    Press ENTER when the engine   │
│            has started           │
│ ◉ ▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬ ◉     │
└──────────────────────────────────┘
```

5. If an engine started condition is detected, the scan tool will collect key on engine running DLC voltages.

```
┌──────────────────────────────────┐
│      Charging System Monitor     │
│                                  │
│              (i)                 │
│                                  │
│                                  │
│   Determining DLC KOER voltage   │
│                                  │
│                                  │
│       Press BACK to exit         │
│ ◉ ▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬ ◉     │
└──────────────────────────────────┘
```

6. The test results are then displayed.

```
┌──────────────────────────────────┐
│          Test Results            │
│ DLC KOEO Voltage          12.2   │
│ DLC Cranking Voltage      10.4   │
│ DLC KOER Voltage          ---    │
│                                  │
│                                  │
│                                  │
│ ess ENTER to view the data plot. │
│                                  │
└──────────────────────────────────┘
```

```
┌──────────────────────────────────┐
│          Test Results            │
│ DLC KOEO Voltage          12.2   │
│ DLC Cranking Voltage      10.4   │
│ DLC KOER Voltage          14.7   │
│                                  │
│                                  │
│                                  │
│ ess ENTER to view the data plot. │
│                                  │
└──────────────────────────────────┘
```

On the first screen, the Scan Tool didn't detect that the engine had started, so there isn't a KOER voltage reading.

The second screen did detect that the engine had started so there is a KOER reading.

The screen on the left shows that the KOEO voltage before an engine start was attempted was 12.2V. Once the starter began cranking the engine, a cranking voltage of 10.4V was measured. After the engine started, a KOER voltage reading of 14.7V was measured.

- If the KOEO voltage is very low, this could be an indication of a bad battery, or one that needs to be charged.
- If the cranking voltage is a lot lower than the KOEO voltage, than this is an indication of a worn starter.
- If the KOER voltage is not higher than the KOEO voltage, than this indicates a bad or weak alternator.

After reviewing the test results, Press ◢ENTER◣ to view the data plot.

7. View the data plot.
   - The triangle below the graph indicates the position of the frame in the graph.
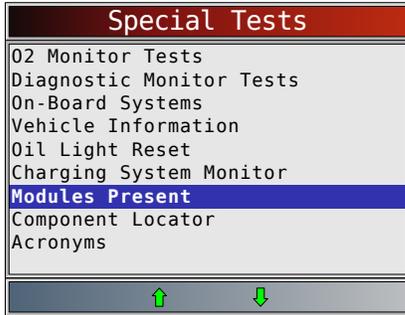   - Use the ◀ **LEFT** and ▶ **RIGHT** arrow keys to scroll back and forth through graph.

```
┌──────────────────────────────────┐
│ DLC Pin 16 Voltage        10.6   │
│     ┌──────────────────────────┐ │
│ 14.7┤                          │ │
│     │                          │ │
│     │                          │ │
│     │                          │ │
│     │                          │ │
│ 10.4┤  ▲                       │ │
│     └──────────────────────────┘ │
│ Frame: 0              Time: 0.00 │
└──────────────────────────────────┘
```
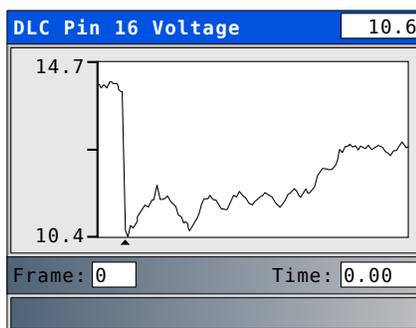
8. Press ◢ENTER◣ to return to the Special Tests Menu.

5.17 Modules Present

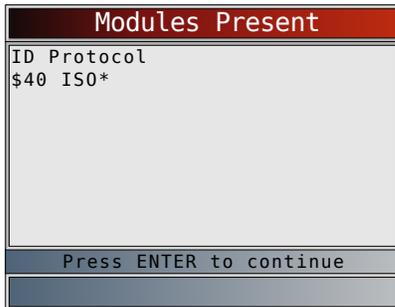The Scan Tool identifies the module IDs and communication type for all Global OBD II modules in the vehicle.

From the **Special Tests Menu**:

1. Select **Modules Present**.
   - Use the ▲ **UP** and ▼ **DOWN** keys until **Modules Present** is highlighted.
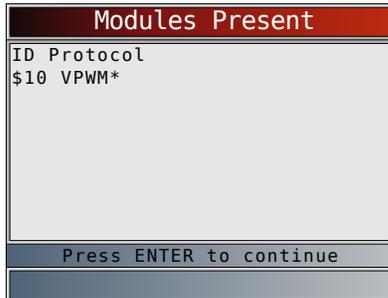   - Press ◢ENTER◣.

```
┌─────────────────────────────────┐
│        Special Tests            │
├─────────────────────────────────┤
│ O2 Monitor Tests                │
│ Diagnostic Monitor Tests        │
│ On-Board Systems                │
│ Vehicle Information             │
│ Oil Light Reset                 │
│ Charging System Monitor         │
│ Modules Present                 │
│ Component Locator               │
│ Acronyms                        │
│                                 │
├─────────────────────────────────┤
│         ⇧         ⇩             │
└─────────────────────────────────┘
```

The types of protocols (communication types) supported by the scan tool are:

- ISO 9141-2 protocol is shown as ISO.

```
┌─────────────────────────────────┐
│        Modules Present          │
├─────────────────────────────────┤
│ ID Protocol                     │
│ $40 ISO*                        │
│                                 │
│                                 │
│                                 │
│                                 │
├─────────────────────────────────┤
│     Press ENTER to continue     │
└─────────────────────────────────┘
```

- SAE J1850 protocol is shown as VPWM or PWM.

```
┌─────────────────────────────────┐
│        Modules Present          │
├─────────────────────────────────┤
│ ID Protocol                     │
│ $10 VPWM*                       │
│                                 │
│                                 │
│                                 │
├─────────────────────────────────┤
│     Press ENTER to continue     │
└─────────────────────────────────┘
```

OR

```
┌─────────────────────────────────┐
│        Modules Present          │
├─────────────────────────────────┤
│ ID Protocol                     │
│ $10 PWM*                        │
│                                 │
│                                 │
│                                 │
├─────────────────────────────────┤
│     Press ENTER to continue     │
└─────────────────────────────────┘
```
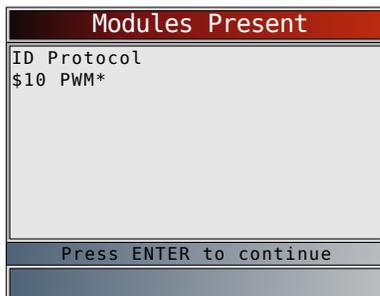
- ISO 15765-4 protocol is shown as CAN.

```
┌─────────────────────────────────┐
│        Modules Present          │
├─────────────────────────────────┤
│ ID Protocol                     │
│ $01 CAN*7e9                     │
│ $00 CAN*7e8                     │
│                                 │
│                                 │
├─────────────────────────────────┤
│     Press ENTER to continue     │
└─────────────────────────────────┘
```
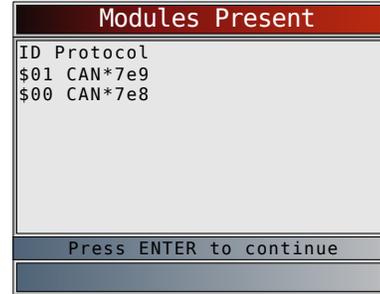
Since CAN vehicles use module IDs larger than 2 digits, the Scan Tool assigns a 2 digit module ID to be used in place of the actual CAN module ID. The module ID assigned for the CAN module ID is used in all functions of the Scan Tool.

- ISO 14230-4 protocol is shown as K2K (Keyword 2000).

```
┌─────────────────────────────────┐
│        Modules Present          │
├─────────────────────────────────┤
│ ID Protocol                     │
│ $10 K2K*                        │
│                                 │
│                                 │
│                                 │
├─────────────────────────────────┤
│     Press ENTER to continue     │
└─────────────────────────────────┘
```
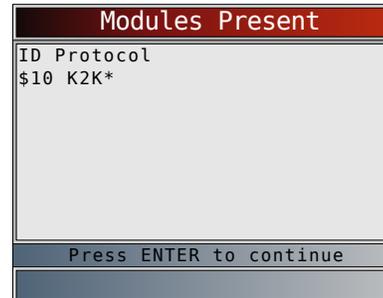
In the above examples, the * indicates the protocol used to communicate to the vehicle's control module.

6   Troubleshooting

6.1   Error Messages

Check the following if an error message displays:
- Verify ignition key is in the ON and not in the ACCESSORIES position.
- Make sure the DLC Cable is attached to vehicle's data link connector (DLC) and scan tool.
- Look at DLC and check for cracked or recessed pins, or for any substance that could prevent a good electrical connection.
- Test for continuity between the DLC wiring and the computer. In an extreme case, there may be a broken wire.
- Check for bent or broken pins.
- With the engine off, check for blown fuses in the vehicle fuse box.
- Make sure the vehicle's control module has a good ground. If the computer case is grounded, then clean the connection and apply a conductive (dielectric) grease to the mating surfaces.
- With the key on engine off (KOEO), verify vehicle battery voltage is at least 8.0V.

- Verify the control module is not defective. Refer to the service manual to diagnose the control module.

6.2   Scan Tool Does Not Power Up

⚠️ **WARNING**
Review Safety Messages on page 5 before troubleshooting.

If scan tool will not power up, communicate with vehicle control module, pass scan tool self-tests, or functions incorrectly in any other way, do the following:

- Check and replace the batteries (if needed).
- Clean the DLC pins.
- Disconnect and reconnect DLC making sure it is connected correctly.
- Check vehicle battery to make sure at least 8.0 volts is present.
- Contact customer service.
- With the engine off, check for blown fuses in the vehicle fuse box.

6.3   Vehicle Communication Fault

The vehicle's control module(s) enters into an unrecoverable state.

1. Turn vehicle key to off position.
   - Wait 10 seconds.
   - Press `ENTER`.

```
┌─────────────────────────────┐
│        Vehicle Required      │
│                              │
│              (i)             │
│                              │
│      Please verify the tool is│
│   connected to the vehicle with│
│    the ignition key turned on.│
│                              │
│      Press ENTER to continue │
│                              │
└─────────────────────────────┘
```

6.4   Operating Error or Erroneous Data

An Operating Error or Erroneous Data occurs if vehicle's computer(s) stop(s) communicating with the scan tool.

1. Make selection.
   - Use the ◀ **LEFT** and ▶ **RIGHT** keys.
   - Press `ENTER`.

```
┌─────────────────────────────┐
│        LINK ERROR            │
│                              │
│      Check connection! Try   │
│            again?            │
│                              │
│      [ Yes ]      [ No ]     │
│                              │
└─────────────────────────────┘
```

6.5   Battery Replacement

The Scan Tool requires 4-AAA alkaline batteries to operate without vehicle power.

- When the batteries need to be replaced, the low-battery icon (🔋) is displayed.
- Rechargeable batteries do not last as long as alkaline types and are not recommended.
- Non-rechargeable Lithium (Li) battery can be used. Though Lithium types last longer than the alkaline types, they are more expensive.
1. Place display face-down on a non-abrasive surface.
2. Remove battery cover by turning phillips screw counterclockwise. Slide battery cover off.
3. Remove batteries and properly discard.
4. Install four new AAA Alkaline batteries.
5. Reinstall battery cover by sliding battery cover on. Install phillips screw turning it clockwise. Do not overtighten screw.

6.6   Tool Self-Tests

Tool Self-Tests check the display, keys, and internal memory.

- Refer to "4   Using the Scan Tool" on page 10 for the operation procedures for scan tool self-tests.

6.7   Technical Support

Toll-Free Number: 1-800-228-7667.

7   Appendix A— PID Definitions

Although there are in excess of 300 PIDs, the tool only displays the PIDs the vehicle supports.

PID	PID Description
ABS FRP	Absolute Fuel Rail Pressure
ABS LOAD	Absolute Load Value
ABS TPS B, C	Throttle Position B, C
ABSLT TPS	Absolute Throttle Position
ACC POS D	Accelerator Pedal D, E, F
ACC POS REL	Relative Accelerator Pedal Position
AECD1_TIME1, TIME 2	Total Run Time with EI-AECD #1 Timer 1 Active, #2 Timer Active

PID	PID Description
AECD10_TIME1, TIME 2	Total Run Time with El-AECD #10 Timer 1 Active, #2 Timer Active
AECD11_TIME1, TIME 2	Total Run Time with El-AECD #11 Timer 1 active, #2 Timer Active
AECD12_TIME1, TIME 2	Total Run Time with El-AECD #12 Timer 1 active, #2 Timer Active
AECD13_TIME1, TIME 2	Total Run Time with El-AECD #13 Timer 1 active, #2 Timer Active
AECD14_TIME1, TIME 2	Total Run Time with El-AECD #14 Timer 1 active, #2 Timer Active
AECD15_TIME1, TIME 2	Total Run Time with El-AECD #15 Timer 1 active, #2 Timer Active
AECD16_TIME1, TIME 2	Total Run Time with El-AECD #16 Timer 1 active, #2 Timer Active
AECD17_TIME1, TIME 2	Total Run Time with El-AECD #17 Timer 1 active, #2 Timer Active
AECD18_TIME1, TIME 2	Total Run Time with El-AECD #18 Timer 1 active, #2 Timer Active
AECD19_TIME1, TIME 2	Total Run Time with El-AECD #19 Timer 1 active, #2 Timer Active
AECD2_TIME1, TIME 2	Total Run Time with El-AECD #2 Timer 1 Active, #2 Timer Active
AECD20_TIME1, TIME 2	Total Run Time with El-AECD #20 Timer 1 active, #2 Timer Active
AECD3_TIME1, TIME 2	Total Run Time with El-AECD #3 Timer 1 Active, #2 Timer Active
AECD4_TIME1, TIME 2	Total Run Time with El-AECD #4 Timer 1 Active, #2 Timer Active
AECD5_TIME1, TIME 2	Total Run Time with El-AECD #5 Timer 1 Active, #2 Timer Active
AECD6_TIME1, TIME 2	Total Run Time with El-AECD #6 Timer 1 Active, #2 Timer Active
AECD7_TIME1, TIME 2	Total Run Time with El-AECD #7 Timer 1 Active, #2 Timer Active
AECD8_TIME1, TIME 2	Total Run Time with El-AECD #8 Timer 1 Active, #2 Timer Active
AECD9_TIME1, TIME 2	Total Run Time with El-AECD #9 Timer 1 Active, #2 Timer Active
ALCOHOL	Alcohol Fuel Percent
BARO PRS	Barometric Pressure
BAT_PWR	Hybrid Battery Pack Remaining Life
BP_A_ACT, B_ACT	Boost Pressure Sensor A, Sensor B
BP_A_CMD, B_CMD	Commanded Boost Pressure A, Pressure B
BP_A_STAT, B_STAT	Boost Pressure A Control Status, B Control Status
CACT 11, 12	Charge Air Cooler Temperature Bank 1 Sensor 1 supported, Sensor 2 supported
CACT 21,22	Charge Air Cooler Temperature Bank 2 Sensor 1 supported, Sensor 2 supported
CALC LOAD	Calculated Engine Load
CAT TEMP11, TEMP12	Cataltic Converter Temp Bank1, Temp Bank 3
CAT TEMP21, TEMP22	Cataltic Converter Temp Bank2, Temp Bank 4
CLR DIST	Distance since erase
CLR TIME	Minutes Run since Erase

PID	PID Description
CLR TRPS	Warmups Since Erase
CMD EQ RAT	Commanded Equivalence Ratio
COOLANT	Engine Coolant Temp
DPF_REG_AVGD	Average Distance Between DPF Regen
DPF_REG_AVGT	Average Time Between DPF Regen
DPF_REG_STAT	Diesel Particulate Filter (DPF) Regen Status
DPF_REG_TYP	Diesel Particulate Filter (DPF) Regen Type
DPF_REGEN_PCT	Normalized Trigger for DPF Regen
DPF1_DP, DPF2_DP	Diesel Particulate Filter (DPF) Bank 1 Delta Pressure Bank 2 Delta Pressure
DPF1_INP, DPF2_INP	Diesel Particulate Filter (DPF) Bank 1 Inlet Pressure, Bank 2 Inlet Pressure
DPF1_INT, DPF2_INT	DPF Bank 1 Inlet Temperature Sensor, Bank 2 Inlet Temperature Sensor
DPF1_OUTP, DPF2_OUTP	Diesel Particulate Filter (DPF) Bank 1 Outlet Pressure, Bank 2 Outlet Pressure
DPF1_OUTT, DPF2_OUTT	DPF Bank 1 Outlet Temperature Sensor, Bank 2 Outlet Temperature Sensor
ECT 1, 2	Engine Coolant Temperature 1, Temperature 2
EGR CMD	Comanded EGR
EGR ERR	Exhaust Gas Recirculation Error
EGR_A_ACT, B_ACT	Actual EGR A Duty Cycle/Position, B Duty Cycle/Position
EGR_A_CMD, B_CMD	Commanded EGR A Duty Cycle/Position, B Duty Cycle/ Position
EGR_A_ERR, B_ERR	EGR A Error, B Error
EGRT 11, 21	Exhaust Gas Recirculation Temperature Bank 1 Sensor 1, Bank 2 Sensor 1
EGRT 12, 22	Exhaust Gas Recirculation Temperature Bank 1 Sensor 2, Bank 2 Sensor 2
EGT 11, 21	Exhaust Gas Temperature (EGT) Bank 1 Sensor 1, Bank 2 Sensor 1
EGT 12, 22	Exhaust Gas Temperature (EGT) Bank 1 Sensor 2, Bank 2 Sensor 2
EGT 13, 23	Exhaust Gas Temperature (EGT) Bank 1 Sensor 3, Bank 2 Sensor 3
EGT 14, 24	Exhaust Gas Temperature (EGT) Bank 1 Sensor 4, Bank 2 Sensor 4
EMIS_SUP	Emission requirements to which vehicle is designed
ENG RUN	Time Since Engine Start
ENG SPEED	Engine RPM
EOT	Engine Oil Temperature
EP_1, 2	Exhaust Pressure Sensor Bank 1, Bank 2
EQ RATIO	Equivalence Ratio
EVAP PURGE	Commanded EVAP Purge
EVAP VP	EVAP Vapor Pressure
EVAP VPA	Absolute EVAP Vapor Pressure
FRP_A, B	Fuel Rail Pressure A, B
FRP_A_CMD, B_CMD	Commanded Fuel Rail Pressure A, B

PID	PID Description
FRT_A, B	Fuel Rail Temperature A, B
FUEL LEVEL	Fuel Level Input
FUEL PRES	Fuel Rail Pressure
FUEL SYS 1, 2	Fuel System 1 Loop Status, System 2 Loop Status
FUEL TYPE	Fuel Type
FUEL_RATE	Engine Fuel Rate
FUEL_TIMING	Fueling Injection Timing
GPL_STAT	Glow Plug Lamp Status
IAF_A_CMD, B_CMD	Commanded Intake Air Flow A Control, B Control
IAF_A_REL, B_REL	Relative Intake Air Flow A Position, B Position
IAT	Intake Air Temp
IAT 11, 21	Intake Air Temperature Sensor Bank 1 Sensor 1, Bank 2 Sensor 1
IAT 12, 22	Intake Air Temperature Sensor Bank 1 Sensor 2, Bank 2 Sensor 2
IAT 13, 23	Intake Air Temperature Sensor Bank 1 Sensor 3, Bank 2 Sensor 3
ICP_A, B	Injection Control Pressure A, B
ICP_A_CMD, B_CMD	Commanded Injection Control Pressure A, B
IDLE_TIME	Total Idle Run Time
IGN ADV	Timing Advance
LAMBDA11, 21	02 Sensor Lambda Bank 1 Sensor 1, Bank 2 Sensor 1
LAMBDA12, 22	02 Sensor Lambda Bank 1 Sensor 2, Bank 2 Sensor 2
LT FTRM1	Long Term Fuel Trim 1 or 3
LT FTRM2	Long Term Fuel Trim 2 or 4
LT SEC FT1, 2, 3, 4	Long Term Secondary O2 Sensor Fuel Trim 1, 2, 3, 4
MAF, A, B	Mass Air Flow, A, B
MAP, A, B	Manifold Absolute Pressure, A, B
MIL DIST	MIL_DIST
MIL STATUS	Malfunction Indicator Lamp
MIL TIME	Minutes Run by MIL activated
MST	Manifold Surface Temperature
N/D_STAT	Auto Trans Neutral Drive Status
N/G_STAT	Manual Trans Neutral Gear Status
NNTE_Stat	NOx NTE control area status
NOX 11, 21	NOx Sensor Concentration Bank 1 Sensor 1, Bank 2 Sensor 1
NOX 12,22	NOx Sensor Concentration Bank 1 Sensor 2, Bank 2 Sensor 2
NOX LEVEL HI, HI1, HI2, HI3, HI4	SCR inducement system actual state 10K history HI1 (0-10000 km), 10K history HI2 (10000-20000 km), 10K history HI3 20000-30000 km), 10K history HI4 (30000-40000 km): NOx emission too high
NOX_ADS_DE-SUL	NOx Adsorber Desulfurization Status
NOX_ADS_RE-GEN	NOx Adsorber Regen Status

PID	PID Description
NWI_TIME	Total Run Time by the Engien whicle NOx warning mode is activated
O2S	O2 Voltage or Current indicates Bank / Sensor
O2S11_PCT, O2S21_PCT	02 Sensor Concentration Bank 1 Sensor 1, Bank 2 Sensor 1
O2S12_PCT, O2S22_PCT	02 Sensor Concentration Bank 1 Sensor 2, Bank 2 Sensor 2
OBD2 STAT	OBD Status
OUT TEMP	Ambient Air Temp
PM 11, PM 21	PM Sensor Mass Concentration Bank 1 Sensor 1, Bank 2 Sensor 1
PNTE_Stat	PM NTE control area status
PTO STATUS	PTO Status
PTO_STAT	Power Take Off (PTO) Status
PTO_TIME	Total Run Time With PTO Active
REAG_DEMD	Average Demanded Reagent Consumption
REAG_LVL	Reagent Tank Level
REAG_RATE	Average Reagent Consumption
REL FRP	Relative Fuel Rail Pressure
REL TPS	Relative Throttle Position
RUN_TIME	Total Engine Run Time
SCR REAG DEV, DEV1, DEV2, DEV3, DEV4	SCR inducement system actual state 10K history DEV1 (0 - 10000 km), 10K history DEV2 (10000 - 20000 km), 10K history DEV3 (20000 - 30000 km), 10K history DEV4 (30000 - 40000 km): deviation of reagent consumption
SCR REAG LOW, LOW1, LOW2, LOW3, LOW4	SCR inducement system actual state 10K history LOW1 (0 - 10000 km), 10K history LOW2 (10000 - 20000 km), 10K history LOW3 (20000 - 30000 km), 10K history LOW4 (30000 - 40000 km): reagent level too low
SCR REAG WRONG, WRONG1, WRONG2, WRONG3, WRONG4	SCR inducement system actual state 10K history WRONG1 (0 - 10000 km), 10K history WRONG2 (10000 - 20000 km), 10K history WRONG3 (20000 - 30000 km), 10K history WRONG4 (30000 - 40000 km): incorrect reagent
SCR SYS ACTIVE	SCR inducement system actual state: inducement system active
SCR_DIST_1D	Distance travelled in current 10K block (0 - 10000 km)
SCR_DIST_1N, 2N, 3N, 4N	Distance travelled while inducement system active in current 10K block 1N (0 - 10000 km), 20K block 2N (10 - 20000 km), 30K block 3N (20 - 30000 km), 40K block 4N (30 - 40000 km)
SECOND AIR	Secondary Air Status
ST FTRM	Fuel Trim Bank / Sensor
ST FTRM1, 3	Short Term Fuel Trim1 or 3
ST FTRM2, 4	Short Term Fuel Trim2 or 4
ST SEC FT1, 2, 3, 4	Short Term Secondary O2 Sensor Fuel Trim 1, 2, 3, 4
TAC_A_CMD, B_CMD	Commanded Throttle Actuator A Control, B Control

PID	PID Description
TAC_A_REL, B_REL	Relative Throttle A Position, B Position
TCA_CINP, TCB_CINP	Turbocharger Compressor Inlet Pressure Sensor A, Pressure Sensor B
TCA_CINT, TCB_CINT	Turbocharger A Compressor Inlet Temperature, Turbocharger B
TCA_COUTT, TCB_COUTT	Turbocharger A Compressor Outlet Temperature, Turbocharger B
TCA_RPM, TCB_RPM	Turbocharger A RPM, B RPM
TCA_TOUTT, TCB_TOUTT	Turbocharger A Turbine Outlet Temperature, Turbocharger B
TCA_TINT, TCB_TINT	Turbocharger A Turbine Inlet Temperature, Turbocharger B
THROT CMD	Commanded Throttle Actuator Control
TP G	Absolute Throttle Position G
TQ_ACT	Actual Engine - Percent Torque
TQ_DD	Driver's Demand Engine - Percent Torque
TQ_MAX1, MAX2, MAX3, MAX4, MAX5	Engine percent torque at idle point 1, 2, 3, 4, 5
TQ_REF	Engine Reference Torque
TROUB CODE	Code causing the Freeze Frame
VEH SPEED	Vehicle Speed
VGT_A_ACT	Variable geometry turbo A position
VGT_A_ACT, B_ACT	Variable Geometry Turbo A Position, Turbo B
VGT_A_CMD	Commanded variable geometry turbo A position
VGT_A_CMD, B_CMD	Commanded Variable Geometry Turbo A Position, Turbo B
VGT_A_STAT	Variable geometry turbo A control status
VGT_A_STAT, B_STAT	Variable Geometry Turbo A Control Status, Turbo B
VGT_B_ACT	Variable geometry turbo B position
VGT_B_CMD	Commanded variable geometry turbo B position
VGT_B_STAT	Variable geometry turbo B control status
VPWR	Control Module Voltage
WG_A_ACT	Wastegate A position
WG_A_ACT, B_ACT	Wastegate A Position, B Position
WG_A_CMD	Commanded wastegate A control
WG_A_CMD, B_CMD	Commanded Wastegate A Control, B Control
WG_B_ACT	Wastegate B position
WG_B_CMD	Commanded wastegate B control

8   Appendix B—Glossary

A/C:
Air conditioner

A/D:
Analog to digital

A/F:
Air/Fuel ratio. The proportion of air and fuel delivered to the cylinder for combustion. For example, an A/F ratio of 14:1 denotes 14 times as much air as fuel in the mixture. Ideally the A/F ratio is 14.7:1.

ABS:
Anti-lock brake system

A/C clutch relay:
The PCM uses this relay to energize the A/C clutch, turning the A/C compressor on or off.

A/C pressure sensor:
Measures air conditioning refrigerant pressure and sends a voltage signal to the PCM.

A/C pressure switch:
A mechanical switch connected to the A/C refrigerant line. The switch is activated (sending a signal to the PCM) when the A/C refrigerant pressure becomes too low or high.

Actuator:
Actuators such as relays, solenoids, and motors allow the PCM to control the operation of vehicle systems.

Air Injection Reaction (AIR) System:
An emission control system operated by the PCM. During cold starts, an air pump injects outside air into the exhaust manifold to help burn hot exhaust gases. This reduces pollution and speeds warm-up of oxygen sensors and catalytic converters. After the engine is warm, the air will either be dumped back to the atmosphere (or into the air cleaner assembly) or sent to the catalytic converter.

APP:
Acceleration pedal position (sensor)

ASR:
Acceleration slip regulation

Bank x:
The standard way of referring to the bank of cylinders containing cylinder #x. In-line engines have only one bank of cylinders. Most commonly used to identify the location of oxygen sensors. See O2S, Sensor x, Sensor x.

BARO:
Barometric pressure sensor. See MAP sensor.

BBV:
Brake boost vacuum (sensor)

BCM:
Body control module

Boost control solenoid:
A solenoid that is energized by the PCM, in order to control turbo/supercharger boost pressure.

Brake switch signal:
An input signal to the PCM indicating that the brake pedal is being pressed. This signal is typically used to

disengage cruise control systems and torque converter clutch (TCC) solenoids. See also TCC.

CAM:
Camshaft position sensor. Sends a frequency signal to the PCM to synchronize fuel injector and spark plug firing.

Catalytic converter:
Designed to reduce exhaust emissions.

CAN:
Controller area network

CARB:
California air resources board. Governing body for emissions control in California.

CKP REF:
Crankshaft position reference.

CKP:
Crankshaft position. See CPS.

CKT:
Circuit

Closed loop (CL):
A feedback system that uses the O2 Sensor(s) to monitor the results of combustion. Based on the signal(s) from the O2 sensor(s), the PCM modifies the air/fuel mixture to maintain optimum performance with lowest emissions. In closed loop mode, the PCM can fine tune control of a system to achieve an exact result.

CMP:
Camshaft position sensor

CO:
Carbon monoxide; odorless gas produced by incomplete combustion.

Code scanner:
A device that interfaces with and communicates information via a data link.

Continuous memory codes:
See pending codes.

CPS:
Crankshaft position sensor. Sends a frequency signal to the PCM. It is used to reference fuel injector operation and synchronize spark plug firing on distributorless ignition systems (DIS).

CTS:
Coolant temperature sensor. A resistance sensor that sends a voltage signal to the PCM indicating the temperature of the coolant. This signal tells the PCM whether the engine is cold or warm.

CVRTD:
Continuous variable real time damping

D/R:
Drive/reverse

Data Link Connector (DLC):
Connector providing access and/or control of the vehicle information, operating conditions, and diagnostic information. Vehicles with OBD II use a 16-pin connector located in the passenger compartment.

Data stream:

The actual data communications sent from the vehicle's PCM to the data connector.

DEPS:
Digital engine position sensor.

Detonation:
See knock.

DI/DIS:
Direct Ignition/Distributorless Ignition System. A system that produces the ignition spark without the use of a distributor.

DPFE:
Differential pressure feedback-exhaust gas recirculation sensor

DTC:
Diagnostic trouble code. An alphanumeric identifier for a fault condition identified by the on board diagnostic system.

Duty Cycle:
A term applied to signals that switch between on and off. Duty cycle is the percentage of time the signal is on. For example, if the signal is on only one fourth of the time, then the duty cycle is 25%. The PCM uses duty cycle type signals to maintain precise control of an actuator.

EBCM:
Electronic brake control module

EBTCM:
Electronic brake/traction control module

ECM:
Engine control module or electronic control module

ECT:
Engine coolant temperature sensor. See CTS.

EEPROM:
Electrically erasable programmable read only memory

EFE:
Early fuel evaporation

EFI:
Electronic fuel injection. Any system where a computer controls fuel delivery to the engine by using fuel injectors.

EGR:
Exhaust gas recirculation. The PCM uses the EGR system to recirculate exhaust gases back into the intake manifold to reduce emissions. EGR is used only during warm engine cruise conditions.

EOP:
Engine oil pressure (switch)

EOT:
Engine oil temperature (sensor)

EPA:
Environmental protection agency

ESC:
Electronic spark control. An ignition system function that warns the PCM when knock is detected. The PCM then retards spark timing to eliminate the knocking condition.

EST:

Electronic spark timing. An ignition system that allows the PCM to control spark advance timing. The PCM determines optimum spark timing from sensor information — engine speed, throttle position, coolant temperature, engine load, vehicle speed, Park/Neutral switch position, and knock sensor condition.

EVAP:
Evaporative emissions system

FC:
Fan control

Freeze frame:
A block of memory containing DTCs of the vehicle operating conditions for a specific time.

FTP:
Federal test procedure. Strict test of vehicle's emissions.

Ground (GND):
An electrical conductor used as a common return for an electric circuit(s) and with a relative zero potential (voltage).

Hall effect sensor:
Any of a type of sensor utilizing a permanent magnet and a transistorized Hall Effect switch. Hall Effect type sensors may be used to measure speed and position of the crankshaft or camshaft — for spark timing and fuel injector control.

HO2S:
Heated oxygen sensor. See O2S.

HVAC:
Heating, ventilation, & air conditioning (system)

I/M:
Inspection and maintenance. An emission control program.

IAC:
Idle air control. A device mounted on the throttle body which adjusts the amount of air bypassing a closed throttle so that the PCM can control idle speed.

IAT:
Intake air temperature (sensor)

ICM:
Ignition control module.

IMRC:
Intake manifold runner control

IPC:
Instrument panel cluster

ISC:
Idle speed control. A small electric motor mounted on the throttle body and controlled by the PCM. The PCM can control idle speed by commanding the ISC to adjust its position.

ISO:
International Organization of Standardization also know as International Standards Organization.

KAM:
Keep alive memory

Knock sensor (KS):
Used to detect engine detonation or knock. The sensor contains a piezoelectric element and is threaded into the engine block. Special construction makes the element sensitive only to engine vibrations associated with detonation.

Knock:
Uncontrolled ignition of the air/fuel mixture in the cylinder. Also referred to as detonation or ping. Knock indicates extreme cylinder pressures or "hotspots" that are causing the air/fuel mixture to detonate prematurely.

KOEO:
Key ON engine OFF. Turn the ignition key to on, but don't start the engine.

KOER:
Key ON engine running. Start the vehicle.

LCD:
Liquid crystal display

LTFT:
Long term fuel trim

M/T:
Manual transmission or manual transaxle.

MAF:
Mass air flow (sensor). Measures the amount and density of air entering the engine and sends a frequency or voltage signal to the PCM. The PCM uses this signal in its fuel delivery calculations.

MAP:
Manifold absolute pressure (sensor). Measures intake manifold vacuum or pressure and sends a frequency or voltage signal (depending on sensor type) to the PCM. This gives the PCM information on engine load for control of fuel delivery, spark advance, and EGR flow.

MAT:
Manifold air temperature (sensor). A resistance sensor in the intake manifold that sends a voltage signal to the PCM indicating the temperature of the incoming air. The PCM uses this signal for fuel delivery calculations.

MIL:
Malfunction indicator lamp. The MIL is most commonly known as the check engine or service engine soon light. A required on-board indicator to alert the driver of an emission-related malfunction.

Misfire:
Caused by the air fuel ratio being incorrect.

Monitor:
A test performed by the on-board computer to verify proper operation of emission-related systems or components.

MPFI or MFI:
Multi-port fuel injection. MPFI is a fuel injection system using one (or more) injector(s) for each cylinder. The injectors are mounted in the intake manifold, and fired in groups rather than individually.

NOx:
Oxides of nitrogen. The system EGR and Camshafts injects exhaust gases into the intake manifold to reduce these gases at the tailpipe.

O2S:

Oxygen sensor. Generates a voltage of 0.6 to 1.1 volts when the exhaust gas is rich (low oxygen content). The voltage changes to 0.4 volts or less when the exhaust gas is lean (high oxygen content). This sensor only operates after it reaches a temperature of approximately 349ºC (660ºF). O2 sensors are usually found both upstream and downstream of the catalytic converter. The PCM uses these sensors to fine tune the air-fuel ratio and to monitor the efficiency of the catalytic converter. See Bank 1, Bank 2, Sensor 1, Sensor 2.

OBDII:

On-board diagnostics, second generation. OBD II is a U.S. Government-mandated standard requiring all cars and light trucks to have a common data connector, connector location, communication protocol, DTCs and code definitions. OBD II first appeared on vehicles in late 1994, and is required to be present on all cars sold in the US after January 1, 1996.

ODM:

Output device monitor

Open loop (OL):

A control system mode that does not monitor the output to verify if the desired results were achieved. A fuel delivery system usually operates in open loop mode during cold engine warm-up because the oxygen sensors are not yet ready to send a signal. Without the oxygen sensor signal, the computer cannot check the actual results of combustion.

PCM:

Powertrain control module. The brains of the engine and transmission control systems housed in a metal box with a number of sensors and actuators connected via a wiring harness. Its job is to control fuel delivery, idle speed, spark advance timing, and emission systems. The PCM receives information from sensors, then energizes various actuators to control the engine. The PCM is also known as the ECM (engine control module).

Pending codes:

Also referred to as continuous memory codes and maturing diagnostic trouble codes. Pending codes may be set by emission related powertrain components and systems. If the fault does not occur after a certain number of drive cycles, the code is erased from memory.

PID:

Parameter identification. Identifies an address in memory which contains vehicle operating information.

PNP:

Park/neutral position. A switch that tells the PCM when the gear shift lever is in the park or neutral position. When in park or neutral, the PCM operates the engine in an idle mode.

PROM:

Programmable read-only memory. The PROM contains programming information the PCM needs to operate a specific vehicle model/engine combination.

PSPS:

Power steering pressure switch

Purge solenoid:

Controls the flow of fuel vapors from the carbon canister to the intake manifold. The canister collects vapors evaporating from the fuel tank, preventing them from escaping to the atmosphere and causing pollution. During warm engine cruise conditions, the PCM energizes the Purge Solenoid so the trapped vapors are drawn into the engine and burned.

PWM:

Pulse width modulated

PZM:

Platform zone module

QDM:

Quad driver module

RAM:

Random access memory

Relay:

An electromechanical device in which connections in one circuit are switched.

Reluctance sensor:

A type of sensor typically used to measure crankshaft or camshaft speed and/or position, driveshaft speed, and wheel speed.

ROM:

Read-only memory. Permanent programming information stored inside the PCM, containing the information the PCM needs to operate a specific vehicle model/engine combination.

RPM:

Revolutions per minute

SAE:

Society of Automotive Engineers

Scan tool:

A device that interfaces with and communicates information on a data link.

SDM:

Sensing and diagnostic module

Sensor x:

A standard term used to identify the location of oxygen sensors. Sensor 1 is located upstream of the catalytic converter. See O2S, Bank 1, Bank 2.

Sensor:

Any device that reports information to the PCM. The job of the sensor is to convert a parameter such as engine temperature into an electrical signal that the PCM can understand.

SFI or SEFI:

Sequential fuel injection or sequential electronic fuel Injection. A fuel injection system that uses one or more injectors for each cylinder. The injectors are mounted in the intake manifold and are fired individually.

Solenoid:

A device consisting of an electrical coil which when energized, produces a magnetic field in a plunger, which is pulled to a central position. A solenoid may be used as an actuator in a valve or switch.

STFT:

Short term fuel trim
STS:
Service throttle soon
TAC:
Throttle actuator control
TBI:
Throttle body injection. A fuel injection system having one or more injectors mounted in a centrally located throttle body, as opposed to positioning the injectors close to an intake valve port. TBI is also called Central Fuel Injection (CFI) in some vehicles.
TCC:
Torque converter clutch
TCM:
Transmission control module
TCS:
Traction control system for PCM and brakes
TDC:
Top dead center. When a piston is at its uppermost position in the cylinder.
TFP:
Transmission fluid pressure
TFT:
Transmission fluid temperature (sensor)
Throttle body:
A device which performs the same function as a carburetor in a fuel injection system. On a throttle body injection (TBI) system, the throttle body is both the air door and the location of the fuel injectors. On port fuel injection systems (PFI, MPFI, SFI, etc.), the throttle body is simply an air door. Fuel is not added until the injectors at each intake port are activated. In each case, the throttle body is attached to the accelerator pedal.
TPS:
Throttle position sensor. Potentiometer-type sensor connected to the throttle shaft. Its voltage signal output increases as the throttle is opened. The PCM uses this signal to control many systems such as idle speed, spark advance, fuel delivery, etc.
Traction assist:
Assist in traction with brakes only.
Trip:
Vehicle operation for a period of time so the systems can be monitored.
TTS:
Transmission temperature sensor. A resistance sensor mounted in the transmission housing in contact with the transmission fluid. It sends a voltage signal to the PCM indicating the temperature of the transmission.

VECI:
Vehicle emission control information. A decal located in the engine compartment containing information about the emission control systems found on the vehicle. The VECI is the authoritative source for determining whether a vehicle is OBDII compliant.
VIN:
Vehicle identification number. This is the factory-assigned vehicle serial number. This number is stamped on a number of locations throughout the vehicle, but the most prominent location is on top of the dashboard on the driver's side, visible from outside the car. The VIN includes information about the car, including where it was built, body and engine codes, options, and a sequential build number.
VSS:
Vehicle speed sensor. Sends a frequency signal to the PCM. The frequency increases as the vehicle moves faster to give the PCM vehicle speed information used to determine shift points, engine load, and cruise control functions.
VTD:
Vehicle theft deterrent
Warm-up cycle:
Warm-up cycle is when the engine coolant temperature rises at least 40 degrees above that at engine start up.
WOT:
Wide-open throttle. The vehicle operating condition brought about when the throttle is completely (or nearly) open. The PCM typically delivers extra fuel to the engine and de-energizes the A/C compressor at this time for acceleration purposes. The PCM uses a switch or the TPS to identify the WOT condition.

9   Limited Warranty

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