



## HDS 200/HDS 250 HD Scan Tool for Class 4-8 Diesel, Light and Medium Vehicles



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: 1-855-267-2483

E-mail: [techsupport.diagnostics@us.bosch.com](mailto:techsupport.diagnostics@us.bosch.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.

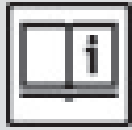
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## 1 Safety Precautions

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.



**PRNDL2**

**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 Heavy Duty Diesel and 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

- Download the Scanning Suite PC application here:
  - <https://www.boschdiagnostics.com/pro/products/Bosch-HDS-200>
  - <https://www.boschdiagnostics.com/pro/products/Bosch-HDS-250>
- Scanning Suite is NOT required to operate the Scan Tool.
- Install the downloaded Scanning Suite application prior to connecting the Scan Tool to the PC.
- Some of the items included in Scanning Suite are:
  - Tool update software
  - Print Capture
- 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.
- Use Scanning Suite to determine if any updates are available for your tool by clicking Check for Update button.
- You can also configure the Scanning Suite Frequency (SS Frequency) to automatically check every xx minutes. The default frequency is 30 minutes.
- Find instructions on how to install Scanning Suite and Tool updates here:
  - <https://www.boschdiagnostics.com/pro/products/Bosch-HDS-200>
  - <https://www.boschdiagnostics.com/pro/products/Bosch-HDS-250>

### 3.3 Introduction to On-Board Diagnostics

#### SAE J1587/J1708

SAE J1587 is a diagnostic protocol standard developed by the Society of Automotive Engineers (SAE) for heavy-duty and most medium-duty vehicles built after 1985. Up to 1995, individual OEMs used their own connectors. From 1996 to 2001, the 6-pin Deutsch was standard. Beginning in 2001, most OEMs converted to the 9-pin Deutsch. Some OEMs still use the 6-pin Deutsch. SAE J1708 is an SAE physical specification developed for heavy duty vehicles (trucks and busses). The protocol promoted a standard for serial communication between modules with microcontrollers. J1708 describes the physical and data link layer. Almost always used in conjunction with the application layer protocol SAE J1587.

#### SAE J1939

In the early 90's, the SAE Truck and Bus Control and Communications Sub-committee started the development of a CAN-based application profile for in-vehicle communication in trucks. In 1998, the SAE published the J1939 set of specifications. A J1939 network connects electronic control units (ECU) within a truck and trailer system. The J1939 specification - with its engine, transmission, and brake message definitions - is dedicated to diesel engine applications.

SAE J1939 has been adopted widely by diesel engine manufacturers. One driving force behind this is the increasing adoption of the engine Electronic Control Unit (ECU), which provides one method of controlling exhaust gas emissions within US and European standards. Consequently, SAE J1939 can now be found in a range of diesel-powered applications: vehicles (on- and off-road), marine propulsion, power generation, and industrial pumping.

#### OBD II

On-Board Diagnostics version II (OBD II) 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 OBD II compliant.

Technicians can now use the same tool to test any OBD II compliant vehicle without special adapters. SAE established guidelines that provide:

- A universal OBD II data link connector, called the DLC, with dedicated pin assignments.
- Diagnostics with vehicle modules involved in emissions controls such as ECM/PCM & transmission.
- 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 OBD II systems. Unfortunately, vehicle manufacturers have different interpretations of this standard communications protocol. As a result, the generic OBD II 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 manufacturer's fleet) were supposed to comply with OBD II standards. For 1995, OBD II systems were to appear on about 40% of the new vehicles sold in the United States. Some of the 1994-1995 OBD II 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 OBD II compliant.

### 3.5 Data Link Connector (DLC)

The data link connector (DLC) allows the scan tool to communicate with the vehicle's computer(s). Use the proper DLC adapter cable to connect the scan tool to the vehicle. Also, the vehicle's DLC may be found in several different places and have many different configurations.



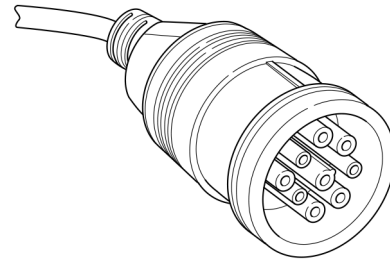
#### IMPORTANT

Power to the tool generally comes from the vehicle. If the tool does not power-up, use the included cigarette lighter cable (7-0135) to power-up the tool.

#### J1939 Type 2

The J1939 Type 2 is a round 9-pin green DLC adapter cable (HDS 200: 1699200242) (HDS 250: 1699200245). This cable will work on trucks with older J1939 Type 1 and new J1939 Type 2 DLCs.

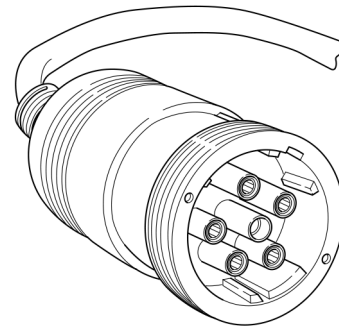
The vehicle DLC is generally mounted inside the cab. For on road heavy trucks, the connector should be mounted on the driver side. For busses, the vehicle DLC should be mounted within reach of the operator's seat. Attach the 9-pin green adapter cable to the extender cable (7-0137) (both supplied with the scan tool) to connect the tool.



#### J1708/J1587

The J1708/J1587 connector is a round 6-pin gray DLC adapter cable (HDS 200: 1699200241) (HDS 250: 1699200244).

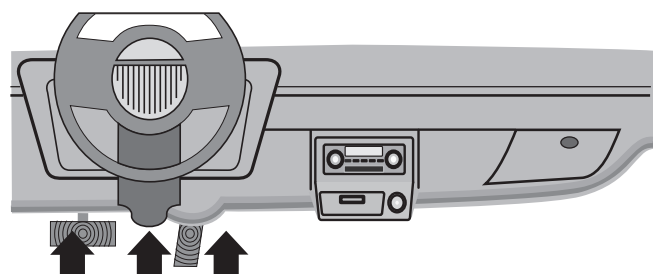
Attach the 6-pin grey adapter cable to the extender cable (7-0137) (both supplied with the scan tool) to connect the tool.



#### OBD II (J1962)

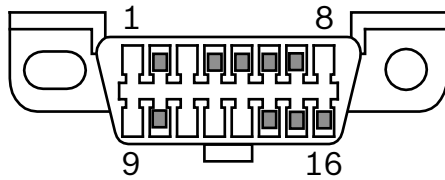
Beginning in 1996, vehicles sold in the United States use the J1962 (OBD II) DLC, a term taken from a physical and electrical specification number assigned by the SAE (J1962). The DLC should be located under the dashboard on the driver's side of the vehicle. If the DLC is not located under the dashboard 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 OBD II connectors, go to <http://www.obdclearinghouse.com>.

Because the OBD II J1962 connector has power and ground, you only need a single cable connection to the tool for both power and vehicle communications. Attach the OBD II adapter cable (HDS 200: 1699200243) (HDS 250: 1699200246) to the extender cable (7-0137) (both supplied with the scan tool), to connect the tool. Certain pins in the connector are reserved.





### OBD II Data Link Connector (DLC) Pins



### 3.6 J1939 Diagnostic Trouble Codes

J1939 DTCs are made up of a Suspect Parameter Number (SPN) and the Failure Mode Identifier (FMI). The SPN identifies the failed component or system. The FMI identifies the type of failure.

J1939 defines a standard set of DTCs. SAE reserves SPNs 0 to 516095. SPNs 516096 to 524287 are reserved for the manufacturer.

### 3.7 J1587 Diagnostic Trouble Codes

J1587 DTCs are made up of either a Parameter Identification number (PID) or a Subsystem Identification number (SID). It is also made up of a Failure Mode Identifier (FMI). The SID or PID identifies the failed component or system. The FMI identifies the type of failure.

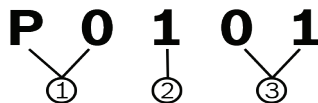
### 3.8 OBD II Diagnostic Trouble Codes (DTCs)

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 OBD II codes.
- OBD II 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.



- Bx = Body  
Cx = Chassis  
Px = Powertrain  
Ux = Network communication  
x = 0, 1, 2, or 3
- Vehicle specific system
- 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. USB port - provides USB connection for the computer.
2. **F1** and **F2** keys are used to perform the specified action on the display directly above the key. If nothing appears on the display directly above the F1 and F2 keys, then the keys are inactive.
3. **LEFT** and **RIGHT** arrow keys - selects YES or NO and selects data parameters for custom data list.
4. **ENTER** key - selects displayed items.
5. **ON/OFF** key - turns power ON or OFF.
6. **BACK** key - goes to the previous screen or level.
7. **UP** and **DOWN** arrow keys - moves selection up or down.
8. LCD display (color, backlit, QVGA resolution)
9. DLC cable (not shown) - provides connection for vehicle interface.
10. Serial Number Plate (not shown) - Located inside battery compartment, provides serial number of scan tool.
11. Battery Compartment (on back; not shown) - provides power to the scan tool when reprogramming from a personal computer or off-vehicle reviewing of codes and printing.
12. 12V Power Jack (not shown) - provides power to scan tool when scan tool is connected to certain Heavy Duty vehicles.

### 4.2 Specifications

|   |  |
|---|--|
| <b>Display</b>                          | Color, backlit, QVGA resolution                                |
| <b>Operating Temperature</b>            | 0 to 50°C (32 to 122°F)  |
| <b>Storage Temperature</b>              | -20 to 70°C (-4 to 158°F)                                      |
| <b>Internal Power</b>                   | 4-AAA Batteries  |
| <b>Barrel Jack External Power</b>       | 7 to 16 Volts  |
| <b>DLC Adapter Cable External Power</b> | <b>HDS 200:</b> 7 to 16 Volts<br><b>HDS 250:</b> 7 to 36 Volts |

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

#### Dimensions

| Height   | Width       | Depth        |
|----------|-------------|--------------|
| 7 inches | 3.75 inches | 1.125 inches |
| 178 mm   | 95 mm       | 29 mm        |

#### Accessories

| Part                    | Description  | Part No.  |
|-------------------------|--|---|
| Extender Cable          | Cable used to connect vehicle specific adapter cables to scan tool       | 7-0137  |
| OB2 II Cable            | Communicates between vehicle and tool                                    | 1699200243 (HDS 200)<br>1699200246 (HDS 250)                                |
| Cigarette Lighter Cable | Cable used to power scan tool from cigarette lighter.                    | 7-0135  |
| 9-pin Deutsch Cable     | Refer to page 8  | 1699200242 (HDS 200)<br>1699200245 (HDS 250)                                |
| 6-Pin Deutsch Cable     | Refer to page 8  | 1699200241 (HDS 200)<br>1699501129 (HDS 250)<br><i>*formerly 1699200244</i> |
| USB Cable               | Cable used to update scan tool firmware and print data to Scanning Suite | 0038-000-3430   |

\* Some units were originally shipped with a 6-Pin Deutsch Cable (Part No. 1699200244). When replacing this cable, the 6-Pin Deutsch Cable (Part No. 1699501129) should be purchased.






#### Optional Accessories

| Part                         | Description   | Part No. |
|------------------------------|---|----------|
| Battery Clip Y Adapter Cable | Adapter that allows the Cigarette Lighter Cable to connect directly to vehicle battery cables | 7-0136   |

Replacement parts are available from the manufacturer by contacting customer service at 1-855-267-2483 (8:00-6:00 EST Monday-Friday).

### 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 additional information is available by scrolling down.
-  Indicates additional information is available by scrolling up.
-  Indicates the internal batteries need replaced or are not installed.
-  Indicates selected items in a data list or that data is available for items on the Review Data and Print Data Menu.
-  Indicates graphical viewing of data items is available in View Data and when playing back previously recorded data.

#### 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.





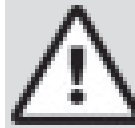
#### CAUTION

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

### 4.4 Power

#### Internal Battery Power

- Battery power is not required to use tool.
- Press and hold  **ON/OFF** key 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 instruction 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. If you use the cigarette lighter adapter cable, be aware that some vehicle cigarette lighters are not powered when the ignition is in the OFF position. Therefore, you may wish to use the optional battery clip adapters (7-0136).

#### USB Power




When the tool is connected to a PC via a USB cable, the tool will automatically power up. Refer to "7.2 Scan Tool Does Not Power Up" on page 41 if there are problems.

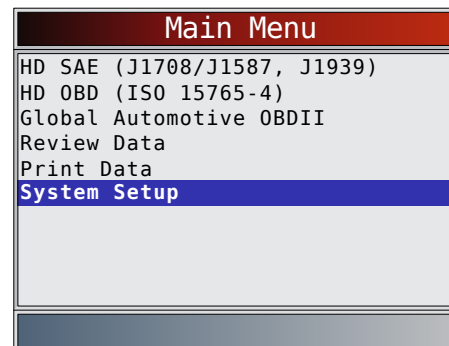
### 4.5 System Setup

**System Setup** allows:

- Measurement units to be changed.
- Auto-Power off time to be changed.
- Printer 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/SPN names to be turned ON or OFF.
- Change the number of Pre-Trigger frames when recording data.

From the **Main Menu**, **Heavy Duty Standard** menu, **HD OBD**, or **Global Automotive OBDII** menu:

1. Select **System Setup**.
  - Use the  **UP** and  **DOWN** keys until **System Setup** is highlighted.
  - Press .

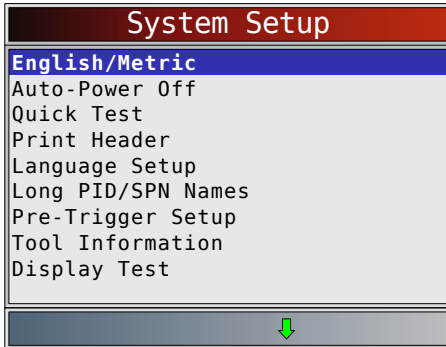


#### Changing Measurement Units

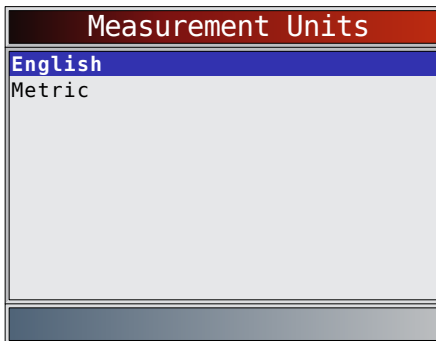
English is the default measurement unit. Measurement units can be changed in **View and Record Data**.

From **System Setup** menu:

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



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



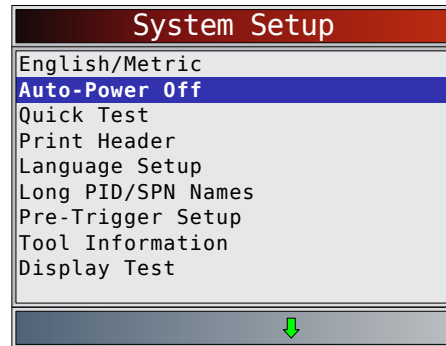
3. Save measurement setting.
  - Press **ENTER**.

### Changing Auto-Power Off

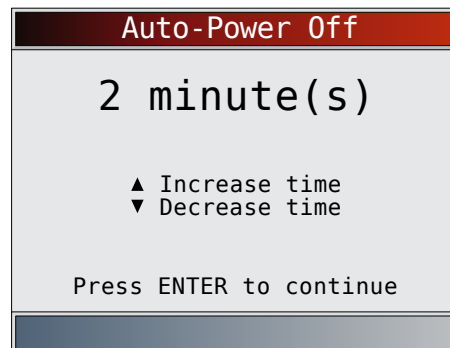
The Auto-Power Off feature allows the tool to turn off automatically after a selected amount of time when tool is not being used. The Auto-Power Off feature will only turn the tool off when it is operating on battery power.

From **System Setup** menu:

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



2. Increase or Decrease **Auto-Power Off** time.
  - Use the ▲ **UP** key to increase time.
  - Use the ▼ **DOWN** key to decrease time.
  - Press **ENTER**.



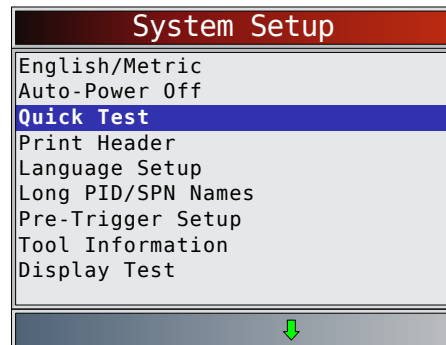
3. Save **Auto-Power Off** time.
  - Press **ENTER**.

### 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 (Global Automotive OBDII and HD OBDII only) and Read Codes.

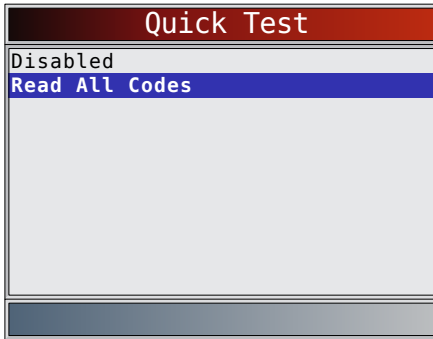
From **System Setup** menu:

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



2. Select desired **Quick Test** choice.
  - Use the ▲ **UP** and ▼ **DOWN** keys until desired choice is highlighted.

- Select **Read All Codes** to view results of all codes. This selection is enabled by default.



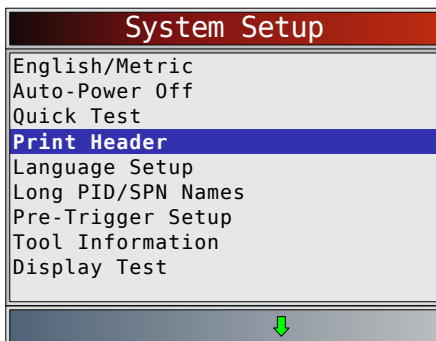
3. Save **Quick Test** setting.
  - Press **ENTER**.

### Print Header

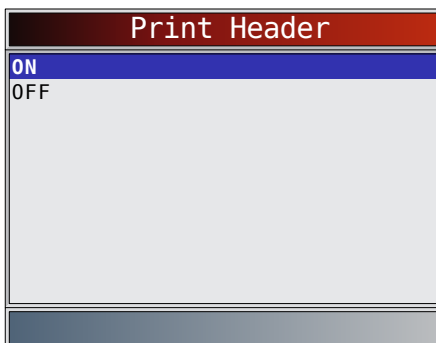
Print Header selection allows the user to turn off the scan tool printing the currently-selected vehicle prior to the retrieved vehicle data when selecting items from the **Print Data** menu.

From **System Setup** menu:

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



2. Select desired **Print Header** choice.
  - Use the **▲ UP** and **▼ DOWN** keys until desired choice is highlighted.



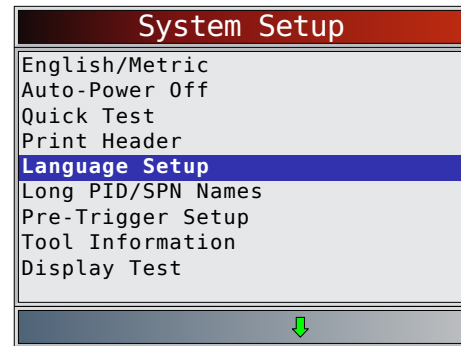
3. Save **Print Header** setting.
  - Press **ENTER**.

### Language Setup

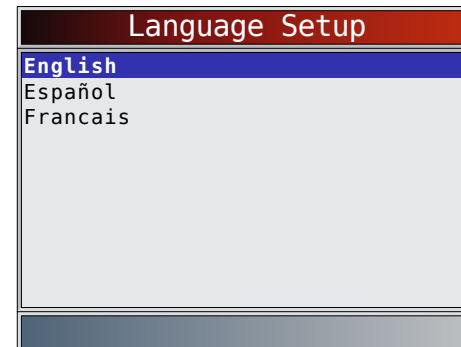
Language Setup selection allows the user to change the language used by the tool. English is the default language.

From **System Setup** menu:

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



2. Select desired **Language Setup** choice.
  - Use the **▲ UP** and **▼ DOWN** keys until the desired language is highlighted.



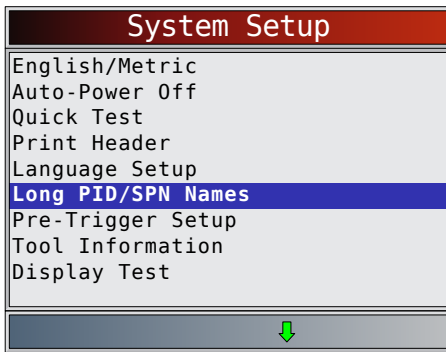
3. Save **Language Setup** setting.
  - Press **ENTER**.

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

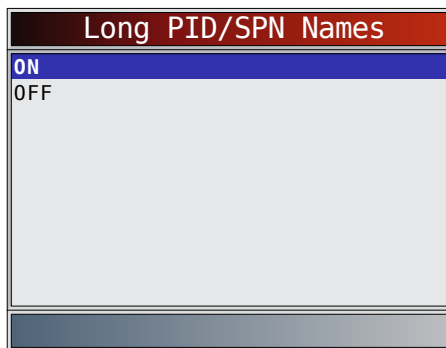
### Long PID/SPN Names

**Long PID/SPN 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** menu:

1. Select **Long PID/SPN Names**.
  - Use the **▲ UP** and **▼ DOWN** keys until **Long PID/SPN Names** is highlighted.
  - Press **ENTER**.



2. Select **ON** or **OFF**.
  - Use the ▲ **UP** and ▼ **DOWN** keys until the desired option is highlighted.
  - Press **ENTER**.



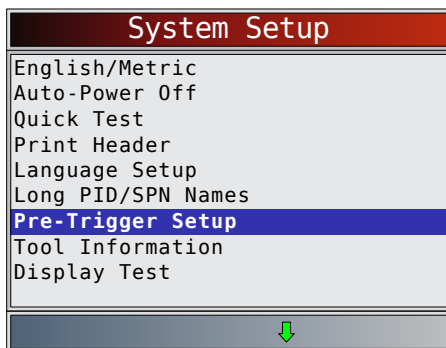
3. Save **Long PID/SPN Names** setting.
  - Press **ENTER**.

### Pre-Trigger Setup

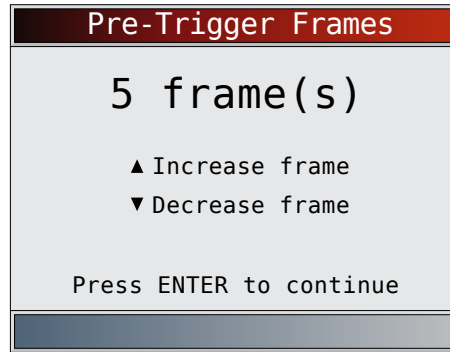
This function is used to configure how many Pre-Trigger frames are stored prior to beginning a recording. Pre-Trigger frames are the negative frames when you are playing back a recording.

From **System Setup** screen:

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



2. Increase or Decrease Pre-Trigger Frames.
  - Use the ▲ **UP** key to increase frames.
  - Use the ▼ **DOWN** key to decrease frames.
  - Press **ENTER**.



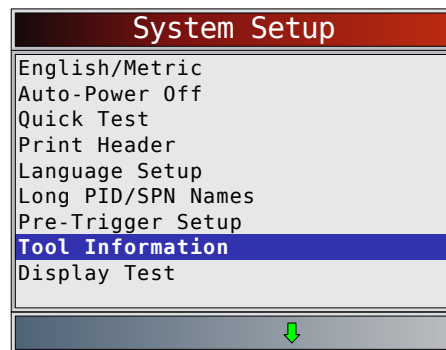
3. Save **Pre-Trigger** frames setting.
  - Press **ENTER**.

### Tool Information

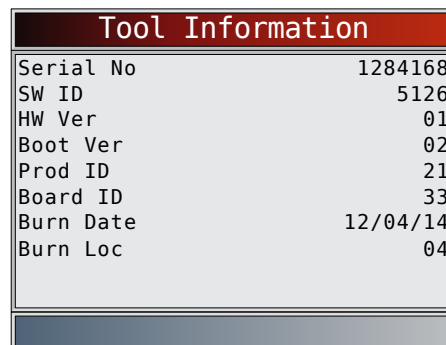
**Tool Information** allows the user to view specific tool information that may be needed when contacting customer service.

From **System Setup** menu:

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



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:)



3. Record **Tool Information**.



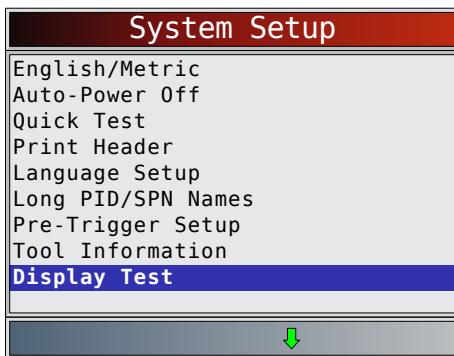
- Space is provided inside the front cover of this manual to write down the scan tool information.
4. Return to **System Setup** menu.
- Press **BACK**
- or
- Press **ENTER**.

### 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** menu:

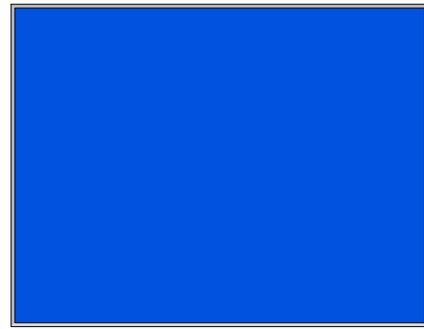
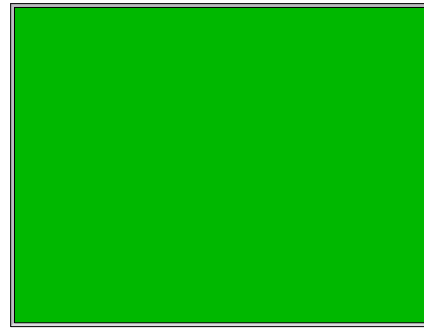
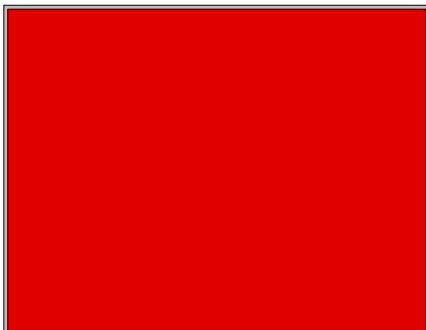
1. Select **Display Test**.
  - Use the **▲ UP** and **▼ DOWN** keys until **Display Test** is highlighted.
  - Press **ENTER**.



2. Start **Display Test**.
  - Press **ENTER**.
3. Look for missing spots.
  - The first screen displayed says, "Check for missing spots in the display."



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



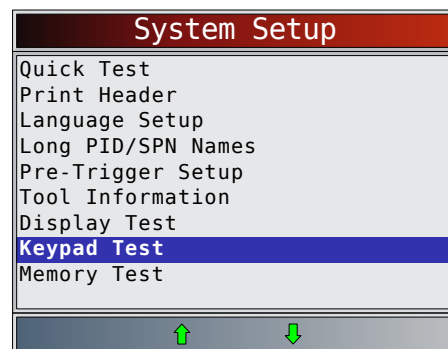
- These four screens will continue in succession until **BACK** is pressed.
4. Press **BACK** to exit the test and return to the **System Setup** menu.

### Keypad Test

The **Keypad Test** is used to verify that the keys are working correctly.

From **System Setup** menu:

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



2. Press a key.
  - Key name or scroll direction should inverse colors on display.
  - **BACK** will return the tool to the **System Setup** screen. If **System Setup** screen does not return, **BACK** is not working correctly.



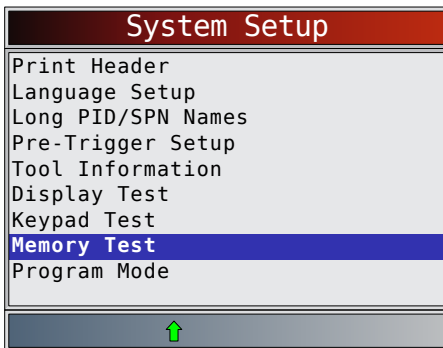
### Memory Test

The **Memory Test** will test RAM and Flash ROM. Run the **Memory Test** if the tool has trouble:

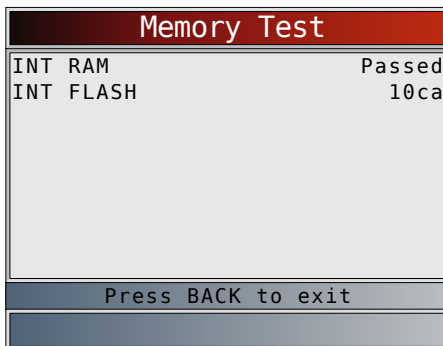
- Playing back recorded data.
- Displaying trouble code definitions.

From **System Setup** menu:

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



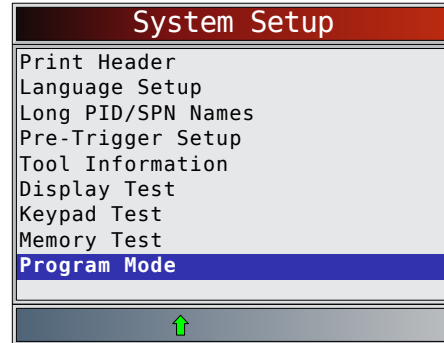
- **Memory Test** may take several minutes to complete.
- **Memory Test** results display:
  - If no problems were detected, then “Pass” is displayed.
  - If RAM fails, an error message is shown.
  - If FLASH fails, a checksum is shown.



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 7.



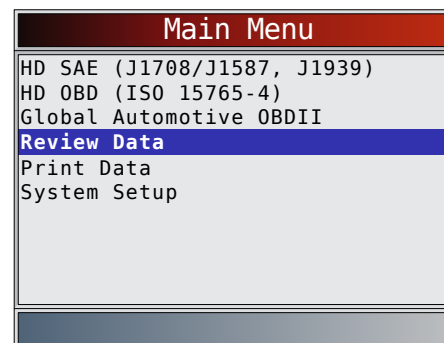
- If the **Program Mode** is entered, **BACK** is not operational. The tool must be powered off to exit **Program Mode** and then restarted to continue.

## 4.6 Vehicle-Specific Features

### Review Data

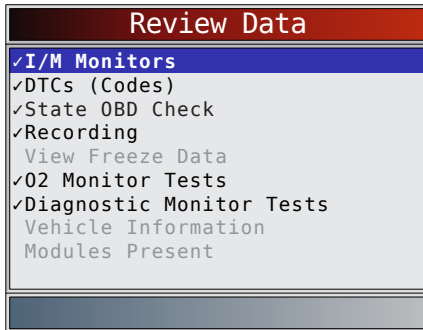
The **Review Data** function allows the user to view the information from the previous vehicle tested. The scan tool can be powered from vehicle, battery power or PC using USB to use the **Review Data** function.

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



2. 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 **Heavy Duty Standard** menu, **HD OBD** menu or **Global Automotive OBDII** menu.
- Only one function, **Recording**, needs detailed instructions.



### Recording

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

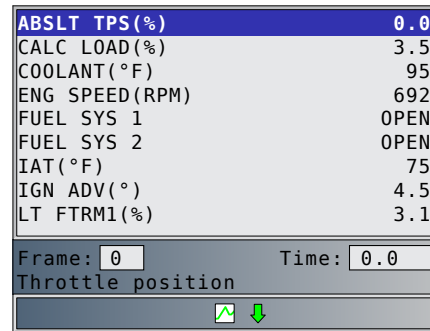
From the **Review Data** menu:


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 the recording you wish to playback.
  - Press **ENTER**.
2. Select **Playback Recording**.
  - Use the **▲ UP** and **▼ DOWN** keys until **Playback Recording** is highlighted.
  - Press **ENTER**.



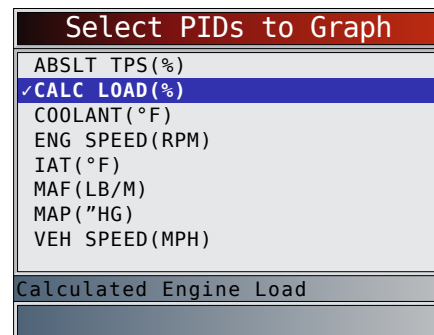
- The recording has frame number and timestamp (in seconds).
  - Negative frames and timestamps indicate data recorded before trigger event.
  - Positive frames and timestamps indicate data recorded after trigger event.
  - Use the **▲ UP** and **▼ DOWN** keys to view recorded PID data within each frame.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

- Refer to “8 Appendix A–Global OBD II PID Definitions” on page 42.
- Refer to “9 Appendix B–Glossary” on page 45 for HD abbreviations.

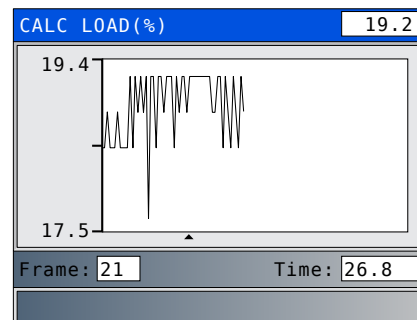


- If graphing is available for selected PID, the “” icon is located on the side of the screen.

- Press **ENTER** to select PIDS to graph.
  - Use the **▲ UP** and **▼ DOWN** keys to highlight the second PID to graph and then press the **▶ RIGHT** key 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** 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.

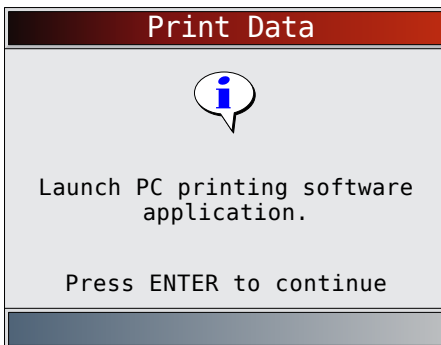
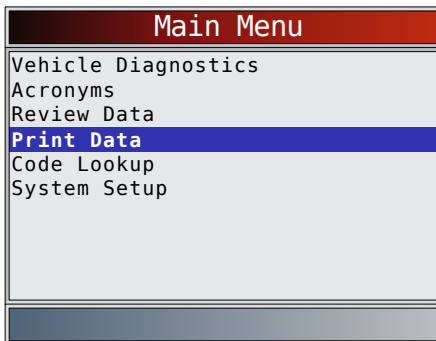
3. Return to **Review Data** menu.

- Press **BACK**.

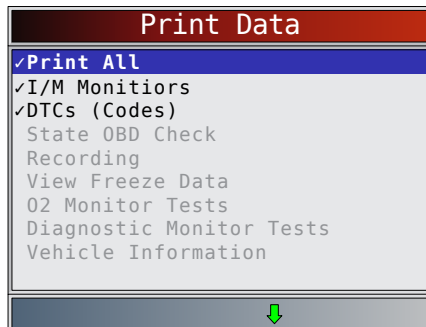
### Print Data

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 Header** function to turn ON/OFF printing vehicle information prior to printing data.
  - Make sure you have precisely 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**.



- On the **Print Data** menu, **Print All** prints all data collected by the scan tool.



- When printing a recording, Start frame and end frame need to be defined.

- This menu contains up to 5 previous vehicles, so select which vehicle you wish to print data.
2. Select **Data To Be Printed**.
    - Use the **▲ UP** and **▼ DOWN** keys.
    - Press **ENTER**.
    - The **Print Data** menu shows a checkmark 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 **BACK**.

### 4.7 Locating Data Link Connector

- The Data Link Connector (DLC) is usually located under the driver's side dash for OBD II Vehicles, Deutsch 6-pin, and Deutsch 9-pin HD Vehicles.
- For more information on OBD II DLC locations, go to <http://www.obdclearinghouse.com>.

NOTE: When using the OBD II, 9-pin, or 6-pin cables, power to the tool generally comes from the vehicle. If the tool does not power-up, use the cigarette cable to power-up the tool.

### 4.8 Connect the Tool

1. Connect extension cable to the tool.
2. Connect the appropriate data link cable to the extension cable. This can either be the J1962 Type B cable, Deutsch 6-pin cable, or the Deutsch 9-pin cable depending on the vehicle. **Only use the cables included in your kit.**
3. Connect data link connector to vehicle.
4. The scan tool should power up. If the tool does not power up, make sure the cable is connected securely.
5. Connect cigarette lighter cable if the scan tool did not power up.
6. Place ignition key in the ON position and have the engine OFF.
7. Select **HD SAE (J1708/J1587, J1939)**, **HD OBD (ISO 15765-4)** or **Global Automotive OBDII** from the **Main Menu**.
8. The required cables screen identifies which DLC cables to use for your selection.
9. If Quick Test is enabled, the Scan Tool runs the Quick Test and displays the results. Press **ENTER** or **BACK**.
10. The Scan Tool shows **Diagnostic Menu**.

IMPORTANT: Make sure you have correctly selected your vehicle. Incorrect vehicle identification can produce unexpected test results.

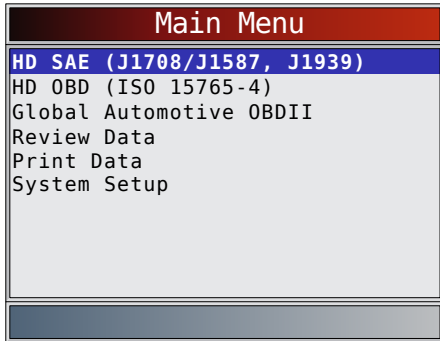
### 4.9 Vehicle Selection

From the **Main Menu** select the vehicle to diagnose. Select **HD SAE (J1708/J1587, J1939)** if the truck vehicle supports either J1708/J1587, J1939. Select **HD OBD (ISO 15765-4)** if the truck supports ISO 15765-4 using the J1962 connector. Select **Global Automotive OBDII** if the vehicle supports OBDII as identified on the Vehicle

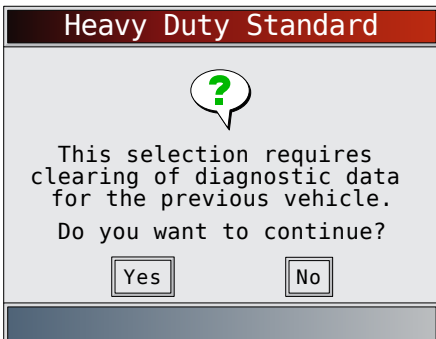
Emissions Control Information decal located under the vehicles hood.

From the **Main Menu**:

1. Select **HD SAE (J1708/J1587, J1939)**, **HD OBD (ISO 15765-4)** or **Global Automotive OBDII**.
  - Use the ▲ **UP** and ▼ **DOWN** keys until **HD SAE (J1708/J1587, J1939)** is highlighted.
  - Press **ENTER**.



2. Use the ◀ **LEFT** and ▶ **RIGHT** keys to select Yes.
  - The scan tool keeps diagnostic data for only the last vehicle. This data is cleared by selecting Yes.
  - Press **ENTER**.



3. Make sure the proper diagnostic cable is connected per screen instructions.
  - Confirm proper scan tool cable part number is connected.
  - Press **F1** **F1** to toggle Demo mode on or off.
  - Press **ENTER**.

#### IMPORTANT

To display demonstration data, press the **F1** **F1** key. A checkmark in the demo button indicates Demo function is on. Press the key again to turn the function off. When in demo mode, the scan tool doesn't communicate with a vehicle but will instead display demonstration data.



4. A **Turn Key Off** screen will display.



- Turn key off for 10 seconds.
- Turn key on.
- Press **ENTER**.
- If vehicle power is not detected, a screen is shown to verify tool connection (non-demo mode).



## 5 Heavy Duty Standard Diagnostics

Heavy Duty Standard Diagnostics is available by selecting **Heavy Duty Standard** from the **Main Menu**. This section applies to all heavy duty SAE J1708/J1587 & J1939 compliant vehicles.

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 scan tool 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, "7.1 Error Messages" on page 41.

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

- A new vehicle is selected.
- Scan tool is flash programmed to update software.

The Heavy Duty Standard Menu has the following selections:

- Read Codes
- Erase Codes
- View Data
- Record Data
- Module Information

- Vehicle Information
- Review Data
- Print Data
- System Setup

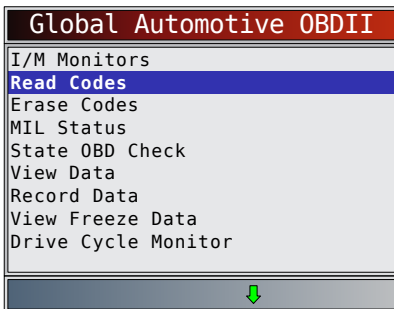
## 5.1 Read Codes

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.

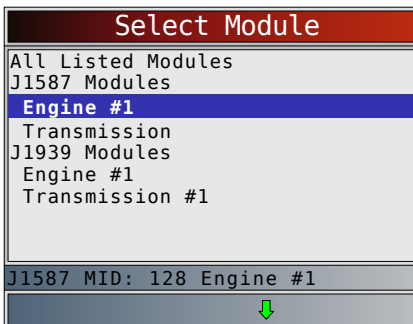
Read Codes can be done with the key on engine off (KOEO) or with the key on engine running (KOER).

From the **Heavy Duty Standard** menu:

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



2. A module menu is displayed.
  - Use the ▲ **UP** and ▼ **DOWN** keys until the designed choice is highlighted.
  - The menu is divided into two sections: a J1587 Module section and a J1939 Module section.
  - The bottom line displays information for the highlighted module: Protocol, module address (Module Identifier=MID and Source Address = SA) and full module description.



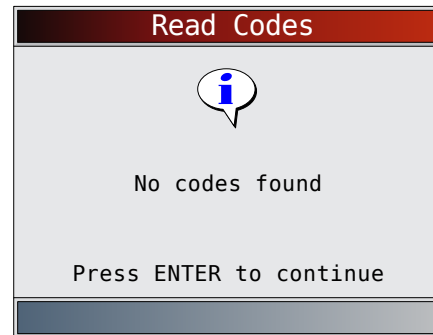
- If All Listed Modules is selected from the Select Module menu, all of the codes will be displayed as if all menu items were selected individually.
  - If DTCs are present, a message displays identifying the DTC definition source.



### IMPORTANT

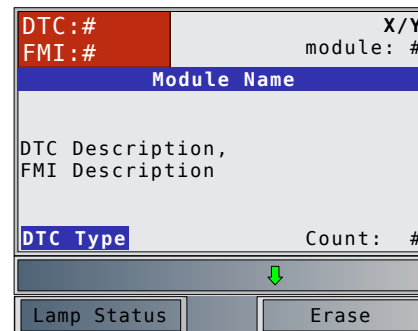
Code definitions are defined by SAE J1587 & J1939. OEM definitions may differ. Please refer to OEM Service Manuals for confirmation.

- If no DTCs are present, a message stating “No codes found” is displayed.



3. View and write down the DTCs.
  - Use the ▲ **UP** and ▼ **DOWN** keys to scroll thru all DTCs.

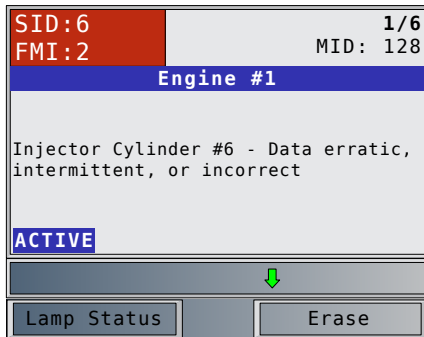
This screen indicates where the Read Codes information is located.



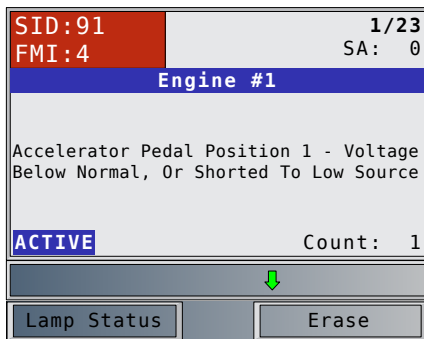
- DTC # - Number of the trouble code found. For J1587 modules, this will either be SID for Subsystem Identification or PID for Parameter Identification. For J1939 modules, this will be SPN for Suspect Parameter Number.
  - FMI # - Number of the Failure Mode Identifier.
  - X/Y - Indication that code x of y is being viewed where x is the code being viewed of the total y.
  - module: # - Address of module reporting DTC. For J1587 modules, this will be MID for Module Identifier. For J1939 modules, this will be SA for Source Address.
  - Module Name - description of the module.
  - DTC Description - This area is reserved for the text description of the DTC #. It is either the description for the SPN, SID or PID depending on the module selected and the trouble code.
  - FMI Description - This is appended to the DTC description and is the description of the Failure Mode Indicator.
  - DTC Type - This area is reserved for providing additional information about the DTC. If Active, the DTC was occurring at the time of scan tool request. If Inactive, the DTC was not occurring at the time of the request.
  - Count # - This field is optional. This is the number of occurrences this DTC has been detected.
- Examples of Read Codes information screens follow.



In this example, the J1587 Engine #1 module, Module Identifier (MID) 128 is reporting a DTC. It was Active at the time DTCs were read.

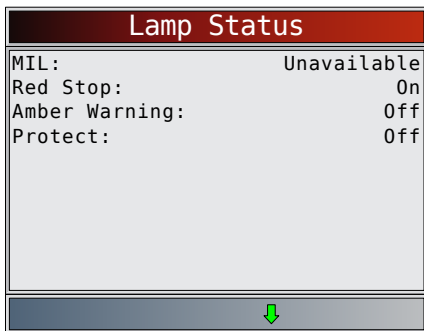


In this example, the J1939 Engine #1 module, Source Address (SA) 0 is reporting a DTC. It was Active at the time DTCs were read. This specific SPN/FMI has only occurred one time.



### Lamp Status

Press the **F1** key while viewing a DTC to show the Lamp status for the module of the given DTC. Details of all possible Lamps is shown.



To return to the last DTC being reviewed, press **BACK**.

### Erase

Press the **F2** key while viewing a DTC to jump to the Erase Codes screen. The distinction between erasing codes by pressing **F2** from **Read Codes** or selecting **Erase Codes** from the **Heavy Duty Standard** menu is that you can erase a specific DTC when starting from Read Codes. The DTC shown when the **F2** key is pressed can be erased. See “5.2 Erase Codes” on page 21.

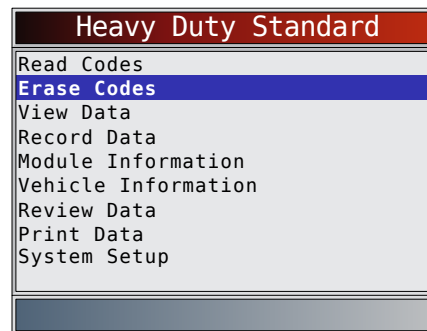
## 5.2 Erase Codes

The Erase Codes function deletes DTCs 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 diagnostic information pertaining to the specified DTC. 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.

From **Heavy Duty Standard** menu:

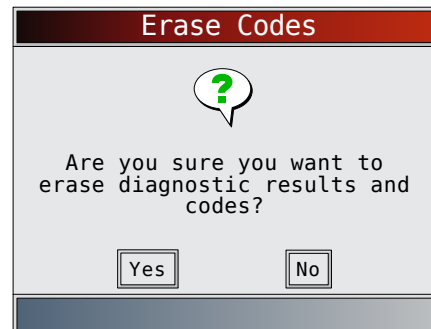
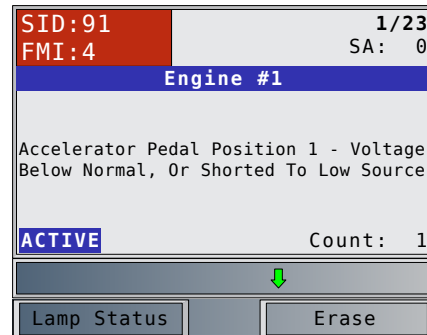
1. a. Select **Erase Codes**.
  - Use the **▲ UP** and **▼ DOWN** keys until **Erase Codes** is highlighted.
  - Press **ENTER**.



OR

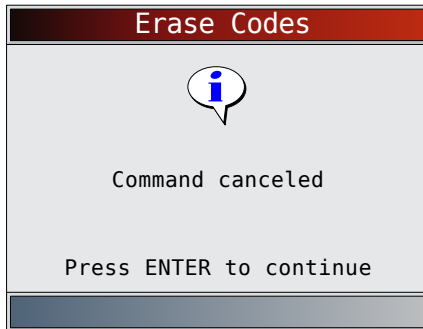
From Read Codes DTC Description screen:

1. b. Press **F2**, **Erase**.

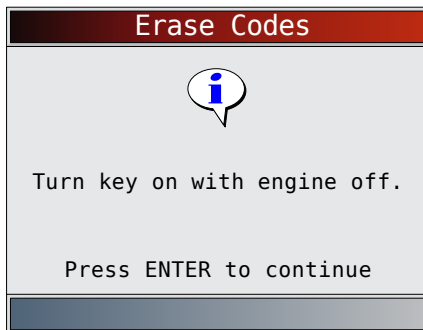


2. Select **YES** to erase diagnostic results and codes.
  - Use the **◀ LEFT** arrow key.
  - Press **ENTER**.
  - If diagnostic results and codes are not to be erased select **NO** and press **ENTER**.

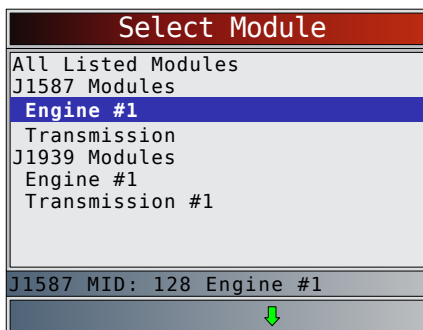
- Selecting **NO** displays a “Command cancelled” message.



3. Turn the key on with the engine off.
  - Press **ENTER**.

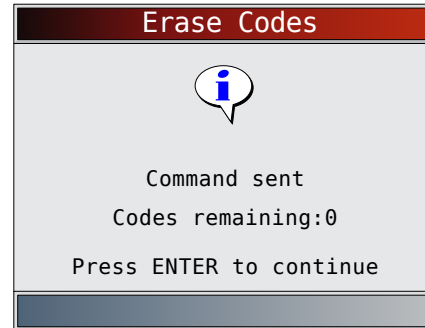


4. A module menu is displayed.
  - Use the **▲ UP** and **▼ DOWN** keys until the designed choice is highlighted.
  - The menu is divided into two sections, a J1587 Module section and a J1939 Module section.
  - The bottom line displays information for the highlighted module: Protocol, module address (Module Identifier=MID and Source Address = SA) and full module description.



5. An erase menu is displayed.
  - Use the **▲ UP** and **▼ DOWN** keys until the desired erase operation is highlighted.
  - Select **Erase Specific Code (#)** to erase only the specific code #. This menu option is only available by pressing **F2** from the Read Codes DTC Description Screen, not when selecting Erase Codes from the **Heavy Duty Standard** menu.
  - Select **Erase All Codes** to erase all Active and Inactive codes for the selected module.

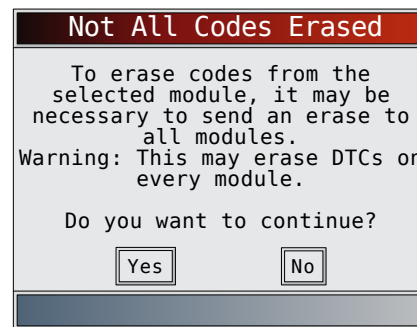
- Select **Erase Inactive Codes** to erase only Inactive codes for the selected module.
  - Select **Erase Active Codes** to erase only Active codes for the selected module.
  - Press **ENTER**.
6. Observe the “Command sent” message is displayed.
    - Press **ENTER**.



7. The Scan Tool may not be able to confirm codes were erased. This is true in the following cases:
  - The selected module didn't respond to a code request after erasing (to confirm codes were erased).
  - At least one code was read from the controller after erasing.
  - The module failed to respond to a request to erase codes.

In each of these cases, codes may not have been erased. It may be possible to erase codes if a Global erase is sent to all modules. However, this may erase codes from every module.

In these cases, the Scan Tool displays:



- Select Yes to attempt to erase codes from every module.
- Select No to skip.

### 5.3 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

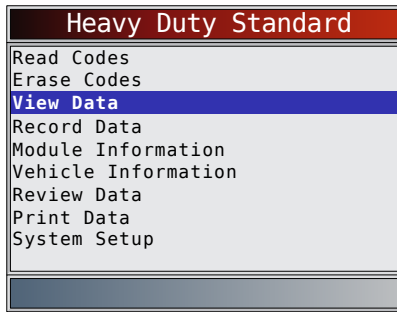
**View Data** can be shown as:

- Entire Data List
- Custom Data List

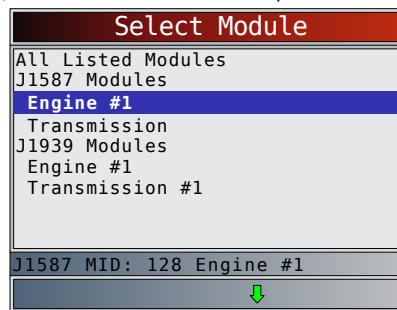
Apart from **Read Codes**, **View Data** is the most useful diagnostic function for isolating the cause of a vehicle operation problem.

From **Heavy Duty Standard** menu:

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



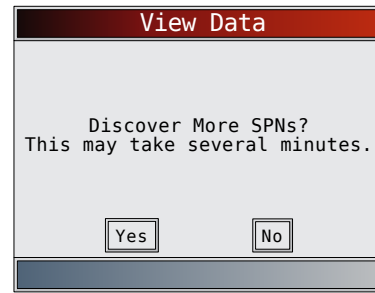
2. A module menu is displayed.
  - Use the ▲ **UP** and ▼ **DOWN** keys until the designed choice is highlighted.
  - Press **ENTER**.
  - The menu is divided into two sections, a J1587 Module section and a J1939 Module section depending on the modules supported (if available).
  - The bottom line displays information for the highlighted module: Protocol, module address (Module Identifier=MID and Source Address = SA) and full module description.



3. The Scan Tool identifies available data items (PIDs or SPNs) to view. There are two identification methods:
  - **The quick method:** The Scan Tool can take approximately 15 seconds to identify available PIDs/SPNs. It may not get every or any available PIDs/SPNs.
  - **The long method:** The Scan Tool could take up to 2 minutes to identify available PIDs/SPNs. This method is more thorough and will identify more PIDs/SPNs to view.

If you are not prompted with the following screen, then the Scan Tool has completed identifying all PIDs/SPNs supported using the long method.

On the Screen below, select “No” to perform the quick method or select “Yes” to perform the long method.



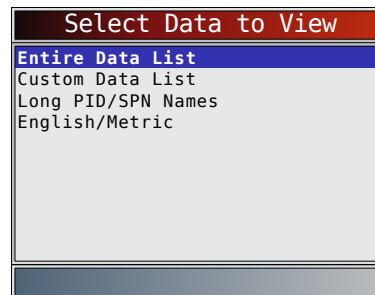
4. Observe while the scan tool validates PID MAP.
  - PID MAP validation is the tool asking the vehicle which PIDs are supported. Refer to “9 Appendix B–Glossary” on page 45 for abbreviations.

### View Entire List

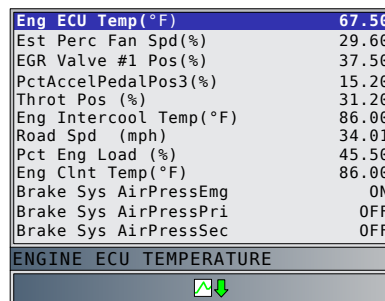
View Entire List shows all supported PID data for the vehicle being tested.

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**.

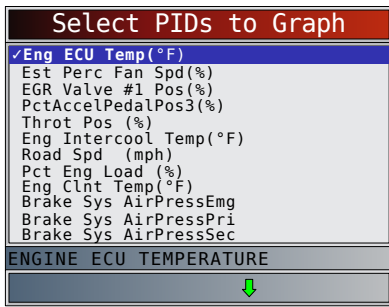



2. View PIDs on scan tool.
  - Use the ▲ **UP** and ▼ **DOWN** keys.
  - Refer to “9 Appendix B–Glossary” on page 45.



If Long PID/SPN Names is turned ON, the expanded text for the PID will scroll on the bottom line of display. Refer to “Long PID/SPN Names” on page 13.

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

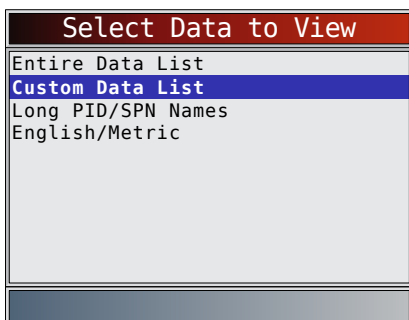


- Use the **RIGHT** arrow key to select/deselect PIDs. The highlighted PID from when **ENTER** was pressed is already selected
  - Use the **LEFT** arrow key to deselect all PIDs.
  - Press **ENTER** to view graph of selected PIDs.
  - When graphing two PIDs, use the **UP** and **DOWN** keys to highlight 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.
- Return to PID screen.
    - Press **BACK**.
  - Return to **Select Data to View** menu.
    - Press **BACK**.
  - Return to **Heavy Duty Standard** menu.
    - Press **BACK**.

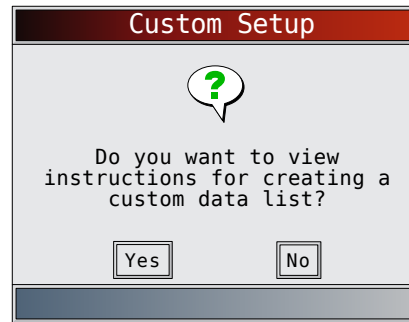
### Custom List Select

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:

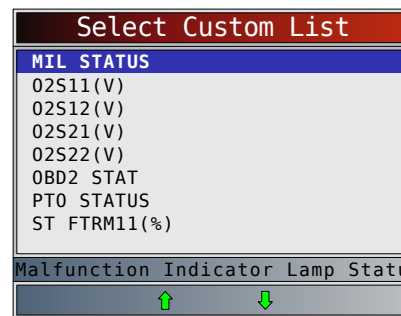
- Select **Custom List Select**.
  - Use the **UP** and **DOWN** keys until **Custom Data List** is highlighted.
  - Press **ENTER**.



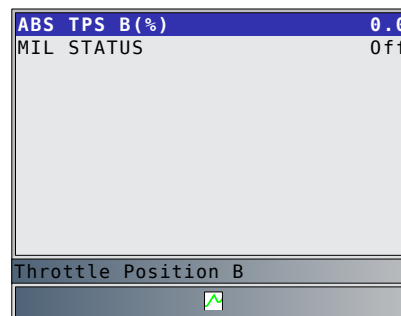
- Select View Instructions or Not.
  - Use the **LEFT** and **RIGHT** keys.
  - Press **ENTER**.




- 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  $\sqrt{\quad}$  symbol.
  - The **LEFT** arrow deselects all marked data parameters.
  - The **ENTER** key starts recording data or displaying selected data parameters.
  - If Long PID/SPN Names is turn ON, the expanded text for the PID will scroll on the bottom line of display. Refer to “Long PID/SPN Names” on page 13.
  - Selected PIDs are kept until you exit View Data and return to the **Heavy Duty Standard** menu.



- View PIDs on scan tool.
  - Use the **UP** and **DOWN** arrow key.
  - Refer to “9 Appendix B–Glossary” on page 45.



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 32 for instructions on how to select PIDs to graph and how to view graph.

- Return to Select Data to View Menu.
  - Press **BACK**.

6. Return to **Heavy Duty Standard** menu.
  - Press **BACK**.

## 5.4 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.

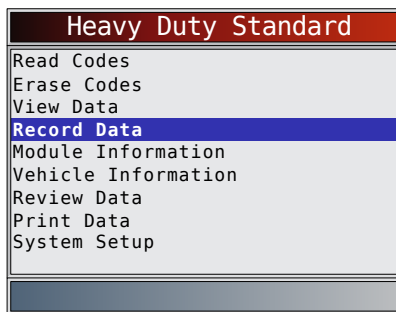


### CAUTION

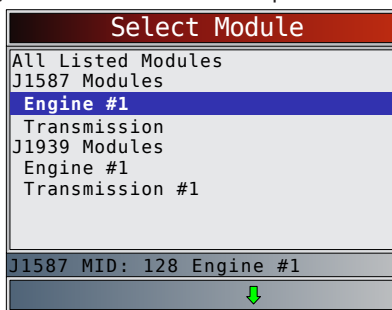
Two people must be in vehicle when driving. One to drive and the other to operate the scan tool.

From **Heavy Duty Standard** menu:

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



2. A module menu is displayed.
  - Use the **▲ UP** and **▼ DOWN** keys until the designed choice is highlighted.
  - Press **ENTER**.
  - The menu is divided into two sections, a J1587 Module section and a J1939 Module section depending on the modules supported (if available).
  - The bottom line displays information for the highlighted module: Protocol, module address (Module Identifier=MID and Source Address = SA) and full module description.



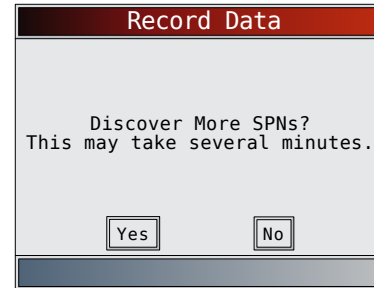
3. The Scan Tool identifies available data items (PIDs or SPNs) to view. There are two identification methods:
  - **The quick method:** The Scan Tool can take approximately 15 seconds to identify available

PIDs/SPNs. It may not get every or any available PIDs/SPNs.

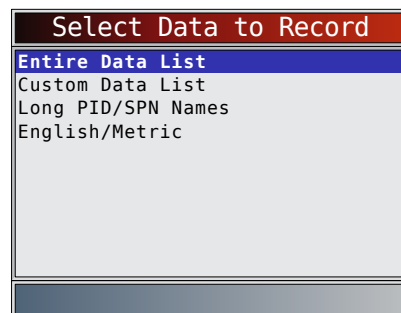
- **The long method:** The Scan Tool could take up to 2 minutes to identify available PIDs/SPNs. This method is more thorough and will identify more PIDs/SPNs to view.

If you are not prompted with the following screen, then the Scan Tool has completed identifying all PIDs/SPNs supported using the long method.

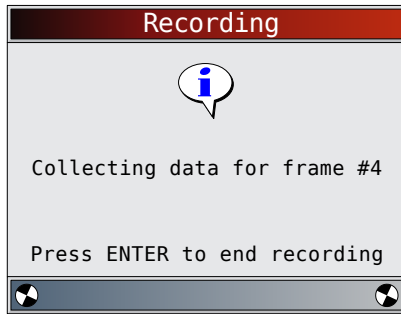
On the Screen below, select “No” to perform the quick method or select “Yes” to perform the long method.



4. 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 overwrite.
  - Scan tool validates PIDs from vehicle.
5. Refer to “5.3 View Data” on page 22 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.



6. 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.



7. After recording, scan tool displays a prompt to Playback Data.
  - Select **NO** to return to **Heavy Duty Standard** menu.
  - Select **YES** to display recorded data.
  - Refer to "Recording" on page 17 for instructions on how to play back data.



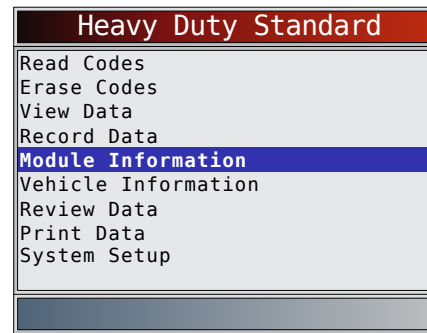
## 5.5 Module Information

The Module Information function allows the scan tool to request information from modules on the vehicle. Information collected includes Make, Module, Serial Number, Power Unit, ECU Part Number, ECU Serial Number, ECU Location, ECU Type, ECU Manufacturer Name, ECU Hardware ID, Software Identifier, CVN ID, Calibration ID, Vehicle Distance, Trip Distance, Total Vehicle Hours, & VIN. A typical module may support some but not all of this information.

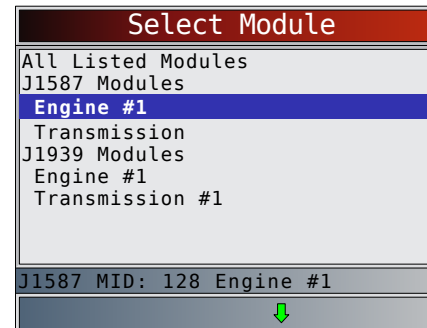
The scan tool cannot verify if data is correct for scanned modules.

From **Heavy Duty Standard** menu:

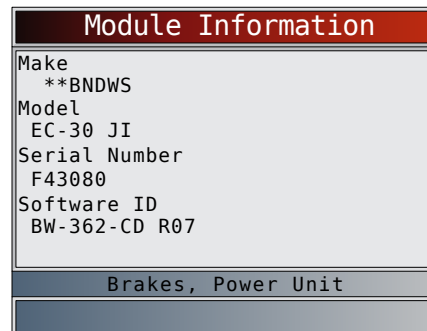
1. Select **Module Information**.
  - Use the ▲ **UP** and ▼ **DOWN** keys until **Module Information** is highlighted.
  - Press **ENTER**.



2. A module menu is displayed.
  - Use the ▲ **UP** and ▼ **DOWN** keys until the designed choice is highlighted.
  - The menu is divided into two sections, a J1587 Module section and a J1939 Module section.
  - The bottom line displays information for the highlighted module: Protocol, module address (Module Identifier=MID and Source Address = SA) and full module description.



3. View information supported by vehicle.
  - Use the ▲ **UP** and ▼ **DOWN** keys (if required). In this example, the Brake, Power Unit module returned data.



In this example, the Engine #1 module returned data. Use the ▲ **UP** and ▼ **DOWN** keys to view all the information.



| Module Information |                                       |
|--------------------|---------------------------------------|
| Make               | INT                                   |
| Model              | 390224241011696M10 CARB ESS<br>EXEMPT |
| Serial Number      | 6.5HM2Y5303951 *                      |
| VIN                | 1HTJTSKL6BH449799                     |
| Engine #1          |                                       |
| ↓                  |                                       |

| Module Information      |                                |
|-------------------------|--------------------------------|
| Serial Number           | 6.5HM2Y5303951 *               |
| VIN                     | 1HTJTSKL6BH449799              |
| Calibration Information | CVN Calibration ID<br>67820293 |
| Software ID             | PRS29XR5                       |
| Engine #1               |                                |
| ↑                       |                                |

- Return to **Module Information** menu.
  - Press **BACK**.
- Return to **Heavy Duty Standard** menu.
  - Press **BACK**.

## 5.6 Vehicle Information

The Vehicle Information function allows the scan tool to request information from the Engine module(s) on the vehicle. Information collected includes Total Vehicle Distance, Total Vehicle Hours, & VIN.

The scan tool cannot verify if data is correct for scanned modules.

From **Heavy Duty Standard** menu:

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

| Heavy Duty Standard        |  |
|----------------------------|--|
| Read Codes                 |  |
| Erase Codes                |  |
| View Data                  |  |
| Record Data                |  |
| Module Information         |  |
| <b>Vehicle Information</b> |  |
| Review Data                |  |
| Print Data                 |  |
| System Setup               |  |

- View information supported by vehicle.

| Vehicle Information |                        |
|---------------------|------------------------|
| VIN                 | 3FRWF6FC4BV629240      |
| Total Distance      | 144983 Miles/233328 km |
| Total Time (h:mm)   | 2414:00                |

- Return to **Heavy Duty Standard** menu.
  - Press **BACK**.

## 6 OBD II Diagnostics

OBDII Diagnostics is available by selecting **HD OBD (ISO 15765-4)** or **Global Automotive OBDII** from the **Main Menu**.

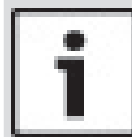
This section applies to all Global OBD II compliant vehicles. The first time the scan tool links to the vehicle, the communication protocol is automatically detected, and is used until the scan tool is turned off or another vehicle is diagnosed.

If an error message displays, make sure the OBD II 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 “7.1 Error Messages” on page 41.

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

- A new vehicle is selected.
- 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, and System Setup** are covered in Section 5 of this manual. These items are not covered in this section.

The **HD OBD** menu and **Global Automotive OBDII** menu are broken down into the following selections:

- I/M Monitors
- Read Codes
- Erase Codes
- MIL Status
- State OBD Check
- View Data
- Record Data
- View Freeze Data
- Drive Cycle Monitor
- O2 Monitor Tests
- Diagnostic Monitor Tests
- On-Board Systems
- Vehicle Information
- Modules Present

- Review Data
- Print Data
- System Setup

### 6.1 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 OBD II 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.

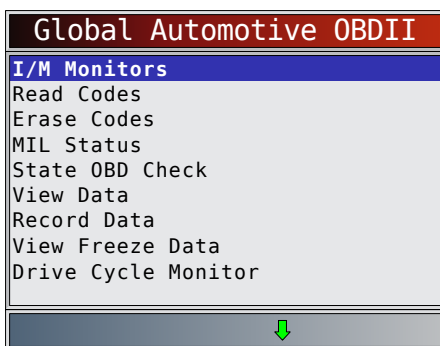
Depending on vehicle, disconnecting or a discharged battery may erase DTCs and clear monitor status. Monitors may be reset by:

- 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 **HD OBD** menu or **Global Automotive OBDII** menu.

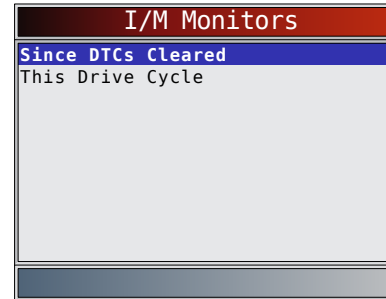
1. Select **I/M Monitors**.
  - Use the ▲ **UP** and ▼ **DOWN** keys until **I/M Monitors** is highlighted.
  - Press **ENTER**.



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.



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 OBD II 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        |

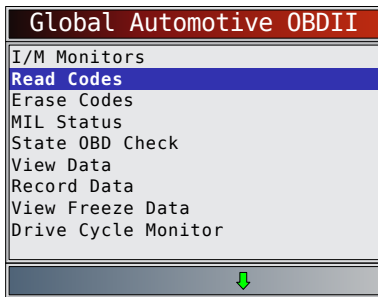
- Return to the **HD OBD** menu or **Global Automotive OBDII** menu.
  - Press **BACK**.

## 6.2 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 the **HD OBD** menu or **Global Automotive OBDII** menu:

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

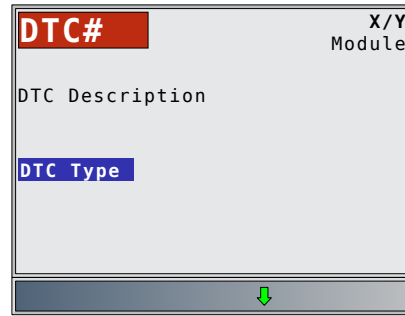


If no DTCs are present, a message stating "No codes found" is displayed.



- 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 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 address of the module (e.g. Mod \$28) is shown in this field. The table below describes modules supported.

| Module   | Description   |
|----------|---|
| MOD \$XX | Module address for the OBD II/EOBD module reporting the DTC |

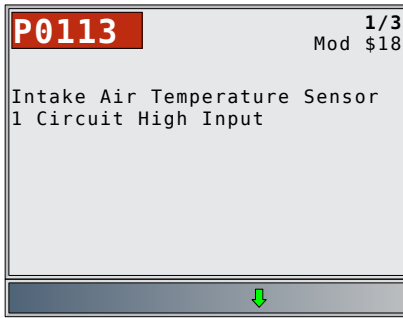
DTC Description - This area is reserved for the text describing the trouble code listed in the DTC number field.

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.

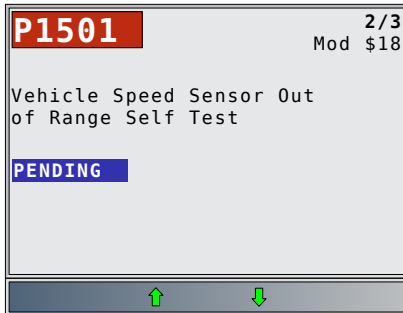
This table describes possible DTC types.

| DTC Type  | Description   |
|-----------|---|
| 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.   |
| 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. |

Examples of Read Codes information screens follow. In this example, module (MOD) \$18 is reporting the DTCs.



Pending indicates a global OBD II/EOBD pending code.



3. Return to **HD OBD** menu or **Global Automotive OBDII** menu.
  - Press **BACK**.

### 6.3 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.

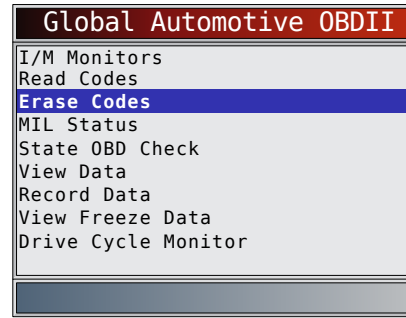
The **Erase Codes** function may also erase View Freeze Data, O2 Monitor Tests, and Diagnostic Monitor Test results depending on vehicle.

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.

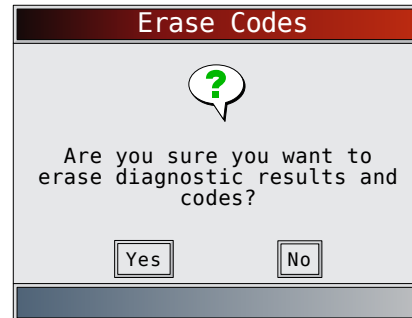
Depending on which monitor sets a code, the vehicle may need to be driven and the monitor ran before concluding that the fault is repaired.

From **HD OBD** menu or **Global Automotive OBDII** menu:

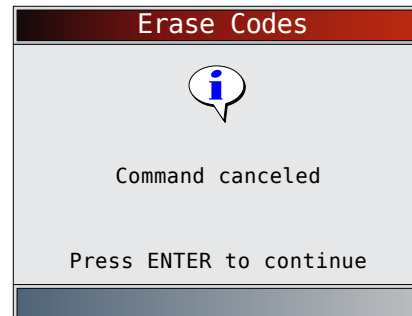
1. Select **Erase Codes**.
  - Use the **▲ UP** and **▼ DOWN** keys until **Erase Codes** is highlighted.
  - Press **ENTER**.



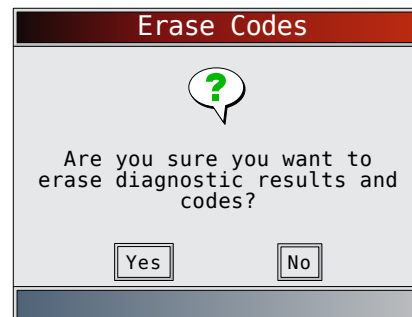
- If diagnostic results and codes are not to be erased select **NO** and press **ENTER**.



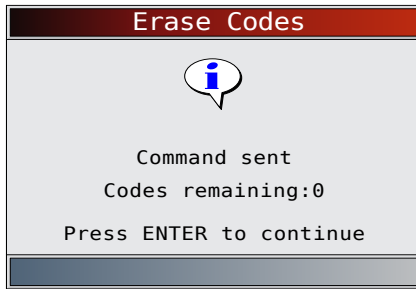
- Selecting **NO** displays a "Command canceled" message.



2. Select **YES** to erase diagnostic results and codes.
  - Use the **◀ LEFT** arrow key.
  - Press **ENTER**.



3. Observe "Command sent" message is displayed.
  - Press **ENTER**.



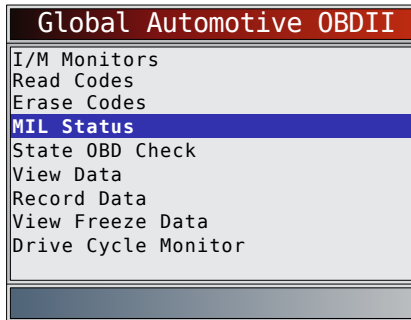
4. Return to **HD OBD** menu or **Global Automotive OBDII** menu.

- Press **BACK**.

## 6.4 MIL Status

From **HD OBD** menu or **Global Automotive OBDII** menu:

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



2. View **MIL Status**.
  - Press **ENTER** to return to **HD OBD** menu or **Global Automotive OBDII** menu.



## 6.5 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.

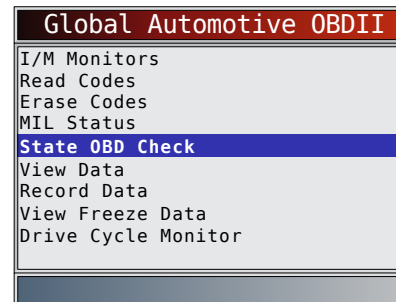
The number of codes found are only Global OBD II codes and not pending codes.

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

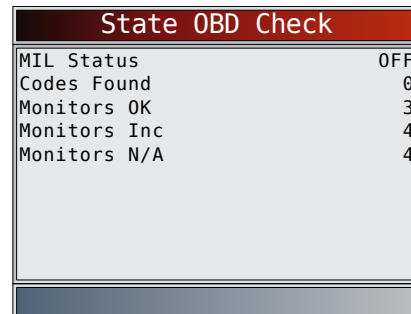
Refer to "6.1 I/M Monitors (Emissions)" on page 28 and "6.2 Read Codes" on page 29 for more detailed information about the results.

From **HD OBD** menu or **Global Automotive OBDII** menu:

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



2. View **State OBD Check** display.



3. Return to **HD OBD** menu or **Global Automotive OBDII** menu.
  - Press **BACK**.

## 6.6 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

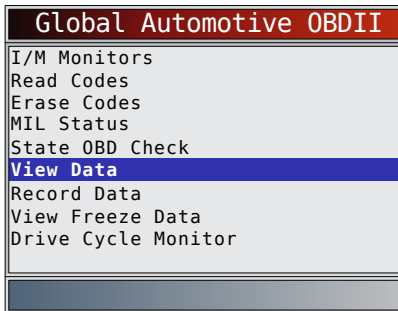
**View Data** can be shown as:

- Entire Data List
- Custom Data List

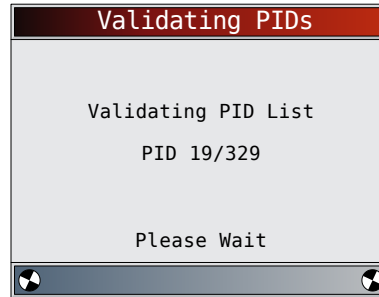
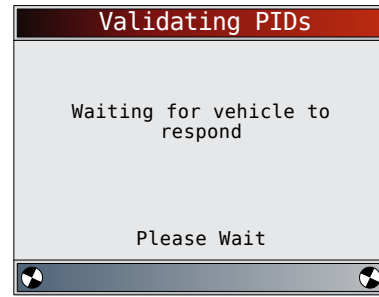
Apart from **Read Codes**, **View Data** is the most useful diagnostic function for isolating the cause of a vehicle operation problem.

From **HD OBD** menu or **Global Automotive OBDII** menu:

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



2. Observe while the scan tool validates PID MAP.
  - PID MAP validation is the tool asking the vehicle which PIDs are supported. Refer to “8 Appendix A—Global OBD II PID Definitions” on page 42 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.

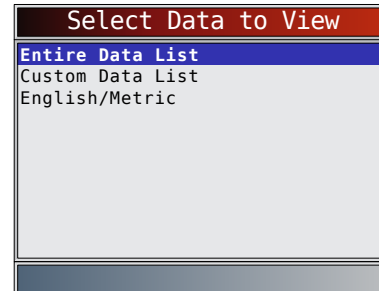


### View Entire List



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**.

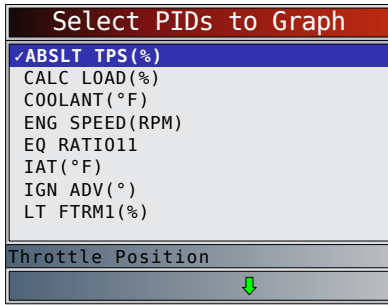



2. View PIDs on scan tool.
  - Use the ▲ **UP** and ▼ **DOWN** keys.
  - Refer to “8 Appendix A—Global OBD II PID Definitions” on page 42.

|   |      |
|---|------|
| 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  |
| <b>Absolute Load Value</b>  |      |
|   |      |

If Long PID/SPN Names is turned ON, the expanded text for the PID will scroll on the bottom line of display. Refer to “Long PID/SPN Names” on page 13.

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

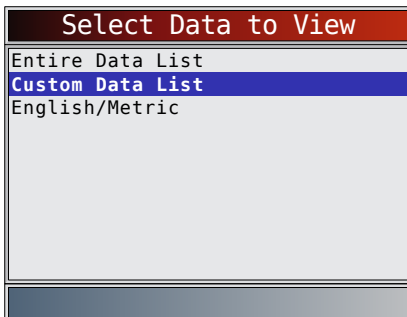


- Use the **RIGHT** arrow key to select/deselect PIDs. The highlighted PID from when **ENTER** was pressed is already selected
  - Use the **LEFT** arrow key to deselect all PIDs.
  - Press **ENTER** to view graph of selected PIDs.
  - When graphing two PIDs, use the **UP** and **DOWN** keys to highlight 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.
- Return to PID screen.
    - Press **BACK**.
  - Return to **Select Data to View** menu.
    - Press **BACK**.
  - Return to **Datastream Menu**.
    - Press **BACK**.

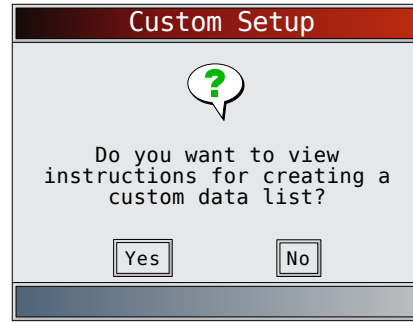
### Custom List Select

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:

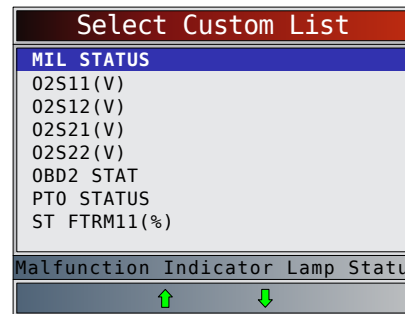
- Select **Custom List Select**.
  - Use the **UP** and **DOWN** keys until **Custom Data List** is highlighted.
  - Press **ENTER**.



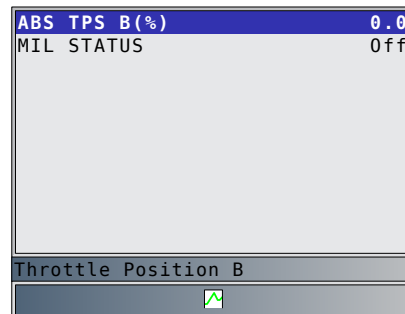
- Select View Instructions or Not.
  - Use the **LEFT** and **RIGHT** keys.
  - Press **ENTER**.




- 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  $\sqrt{\quad}$  symbol.
  - The **LEFT** arrow deselects all marked data parameters.
  - The **ENTER** key starts recording data or displaying selected data parameters.
  - If Long PID/SPN Names is turn ON, the expanded text for the PID will scroll on the bottom line of display. Refer to “Long PID/SPN Names” on page 13.
  - Selected PIDs are kept until you exit View Data and return to the **Datastream Menu**.



- View PIDs on scan tool.
  - Use the **UP** and **DOWN** arrow key.
  - Refer to “8 Appendix A–Global OBD II PID Definitions” on page 42.



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 32 for instructions on how to select PIDs to graph and how to view graph.

- Return to Select Data to View Menu.
  - Press **BACK**.



6. Return to **HD OBD** menu or **Global Automotive OBDII** menu.
  - Press **BACK**.

## 6.7 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.

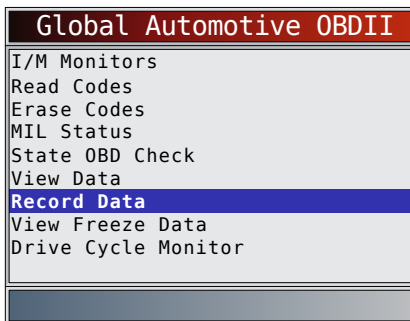


### CAUTION

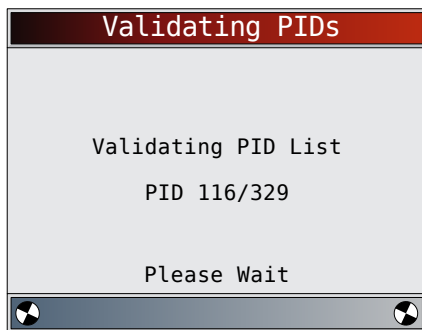
Two people must be in vehicle when driving. One to drive and the other to operate the scan tool.

From **HD OBD** menu or **Global Automotive OBDII** menu:

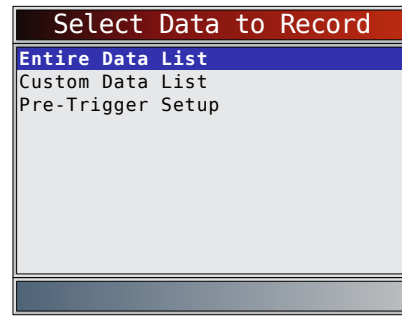
1. Select **Record Data**.
  - Use the **▲ UP** and **▼ DOWN** keys until **Record Data** is highlighted.
  - Press **ENTER**.



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 overwrite.
  - Scan tool validates list of global PIDs from vehicle.



3. Refer to "6.6 View Data" on page 31 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.



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.



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 instructions on how to play back data.

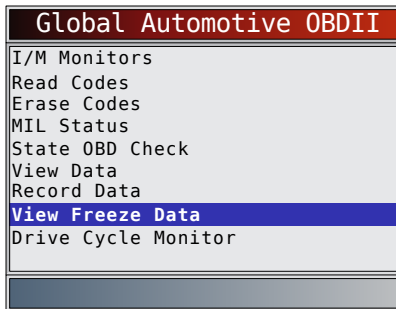


## 6.8 View Freeze Data

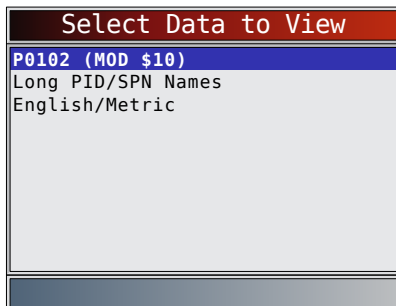
When an emission-related fault occurs, certain vehicle conditions are recorded by the on-board computer. This information is referred to as freeze frame data. **View Freeze Data** is a snapshot of the operating conditions at the time of an emission-related fault. **View Freeze Data** can be overwritten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

From **HD OBD** menu or **Global Automotive OBDII** menu:

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



2. Select frame if more than one frame is present.
  - Use the ▲ **UP** and ▼ **DOWN** keys until the desired frame is highlighted.
  - Press **ENTER**.



3. View PIDs on scan tool.
  - Use the ▲ **UP** and ▼ **DOWN** keys.
  - Refer to “8 Appendix A—Global OBD II PID Definitions” on page 42.

| 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 |       |

- If Long PID/SPN Names is turned on, the expanded text for the PID will scroll on the bottom line of the display. Refer to “Long PID/SPN Names” on page 13.
4. Select another frame to view (if available).

- Press **BACK**.
5. Return to **HD OBD** menu or **Global Automotive OBDII** menu.
    - Press **BACK**.

## 6.9 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 OBD II 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:

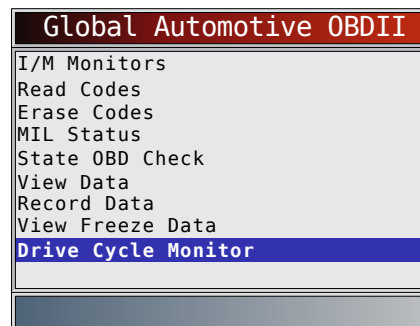
- “ok” - vehicle has been driven enough for function.
- “inc” (incomplete) - vehicle was not driven enough to complete all of the monitors.
- “n/a” (not applicable) - vehicle does not support that monitor.

Reset monitors by:

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

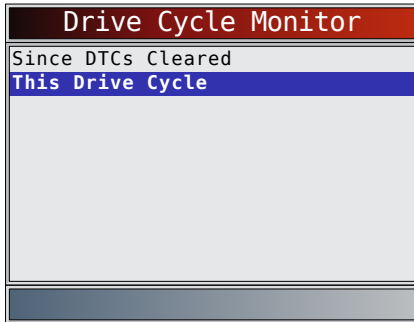
From **HD OBD** menu or **Global Automotive OBDII** menu:

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

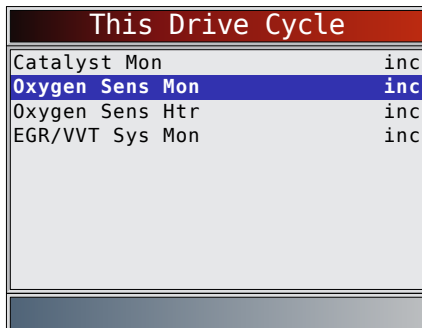


- Two types of drive cycle monitors are:
  - **Since DTCs Cleared** shows status of the monitors since the Diagnostic Trouble Codes were last erased.

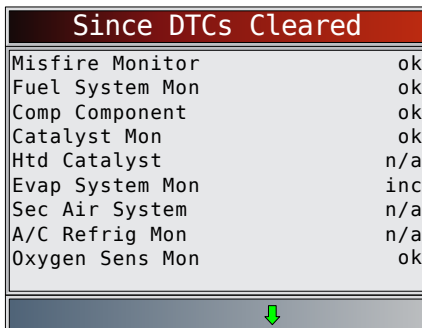
- **This Drive Cycle** shows status of monitors since start of current drive cycle. Refer to the vehicle service manual for more detailed information on emission-related monitors and their status.
- Some vehicles do not support **This Drive Cycle**. If vehicle supports both types of drive cycle monitors the **Drive Cycle Monitor** menu will display.



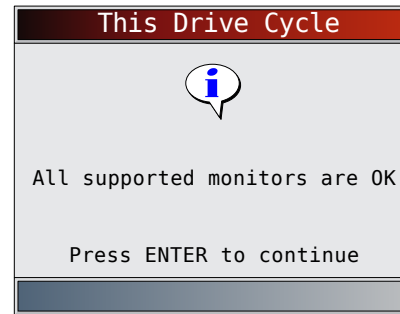
2. View summary of monitor status.
  - Use the ▲ **UP** and ▼ **DOWN** keys (if required).
3. Depending on the drive cycle monitors, either the **This Drive Cycle** or the **Since DTCs Cleared** screen will display.



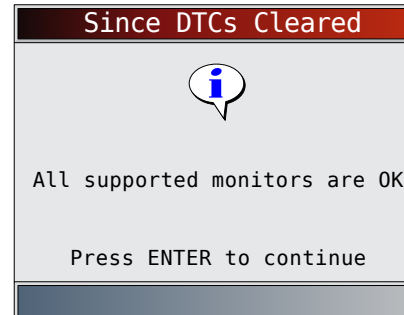
OR



- 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.



OR



4. Return to **Special Tests Menu**.
  - Press **BACK**.

### 6.10 O2 Monitor Tests

OB2 II 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. Refer to “6.11 Diagnostic Monitor Tests” on page 37 for 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.

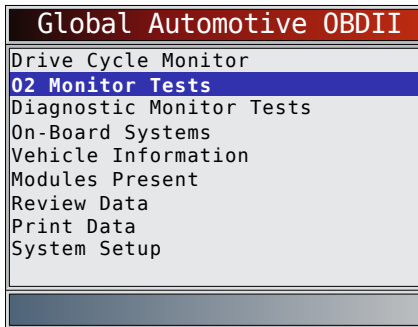
The following O2 Sensor Tests are available:

- Rich-to-lean sensor threshold voltage
- Lean-to-rich sensor threshold voltage

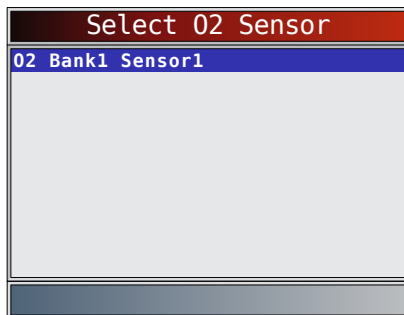
- Low sensor voltage for switch time
- High sensor voltage for switch time
- Rich-to-lean sensor switch time
- Lean-to-rich sensor switch time
- Minimum sensor voltage test cycle
- Maximum sensor voltage test cycle
- Time between sensor transitions
- Sensor period
- Manufacturer specific tests

From **HD OBD** menu or **Global Automotive OBDII** menu:

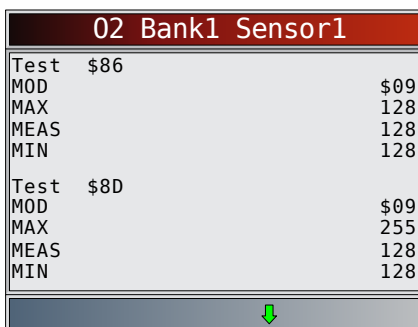
1. Select **O2 Monitor Tests**.
  - Use the ▲ **UP** and ▼ **DOWN** keys until **O2 Monitor Tests** is highlighted.
  - Press **ENTER**.



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



- 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.



4. Return to **O2 Sensor Tests** menu.
  - Press **BACK**.
5. Return to **HD OBD** menu or **Global Automotive OBDII** menu.
  - Press **BACK**.

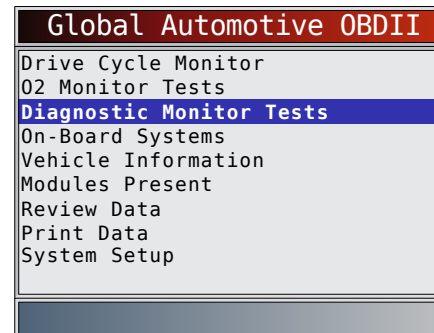
### 6.11 Diagnostic Monitor Tests

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.

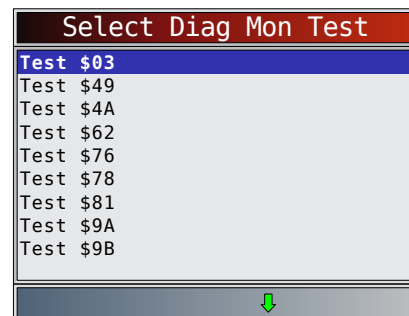
From **HD OBD** menu or **Global Automotive OBDII** menu:

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



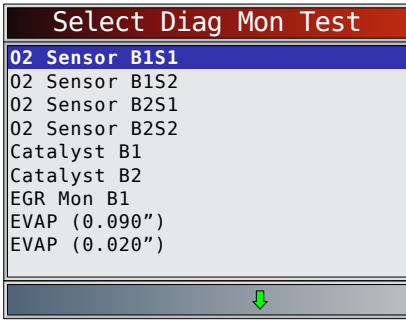
- Applicable diagnostic monitor tests are displayed.
2. Review test results displayed on scan tool.
    - Use the ▲ **UP** and ▼ **DOWN** keys until desired result is highlighted.
    - Press **ENTER**.

Non-CAN Vehicles



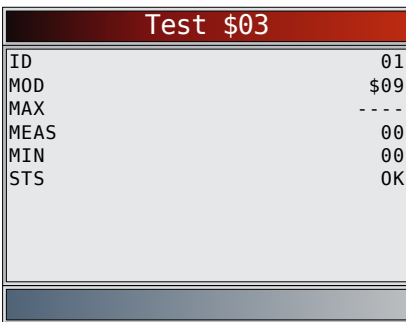
Refer to appropriate vehicle service manual for test IDs and definitions.

CAN Vehicles

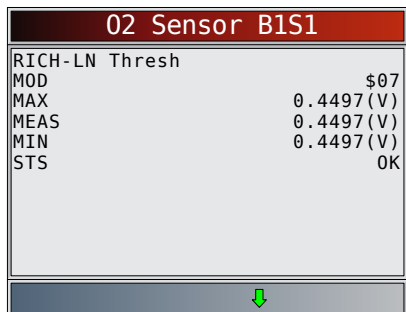


On Non-CAN vehicles the scan tool displays:

- 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)



- 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.



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

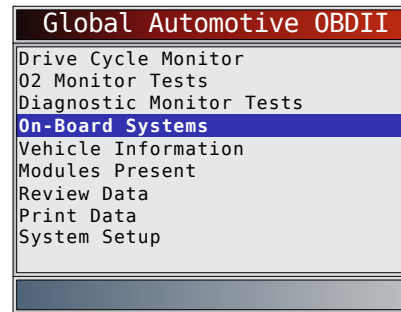
## 6.12 On-Board Systems

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

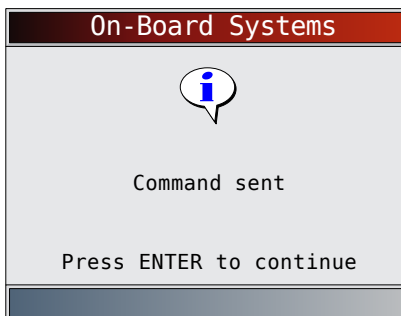
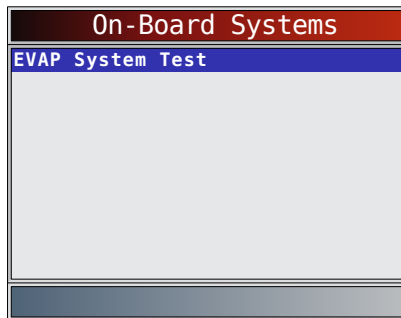
- Some manufacturers do not allow tools to control vehicle systems. A vehicle not supporting an on-board system is identified by a message that is displayed when selected.
- Refer to the vehicle service manual for on-board systems instructions.
- The manufacturer is responsible for determining the criteria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

From **HD OBD** menu or **Global Automotive OBDII** menu:

- Select **On-Board Systems**.
  - Use the **▲ UP** and **▼ DOWN** keys until **On-Board Systems** is highlighted.
  - Press **ENTER**.



- A list of on-board systems and components available for testing are shown on the display.
- Select test.
    - Use the **▲ UP** and **▼ DOWN** keys until desired test is highlighted.
    - Press **ENTER**.



- Return to **On-Board Systems** menu.

- Press **ENTER**.
4. Return to **HD OBD** menu or **Global Automotive OBDII** menu.
- Press **BACK**.

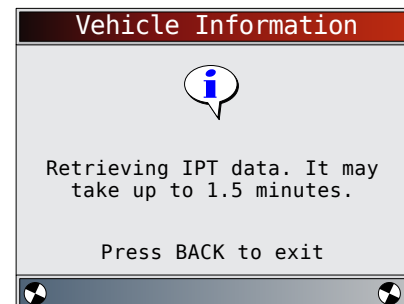
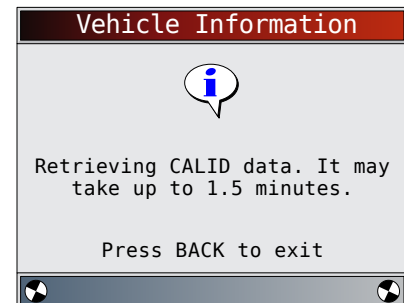
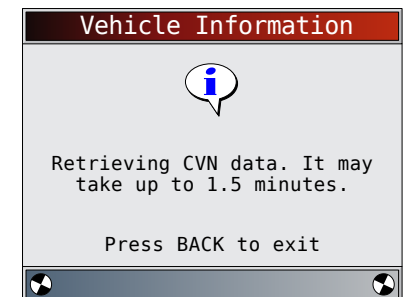
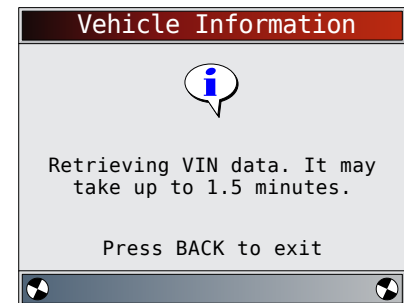
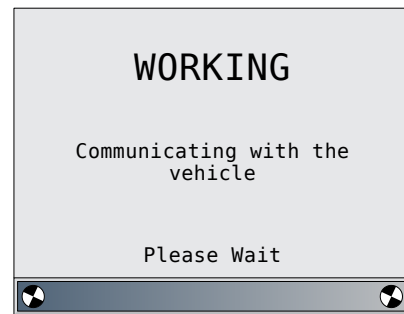
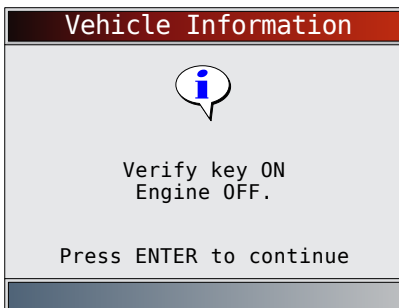
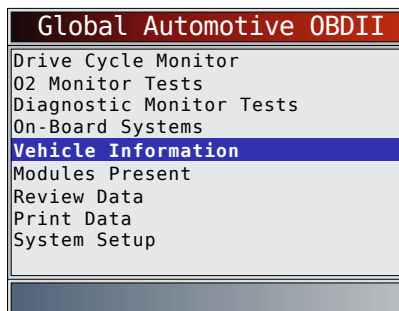
### 6.13 Vehicle Information

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.

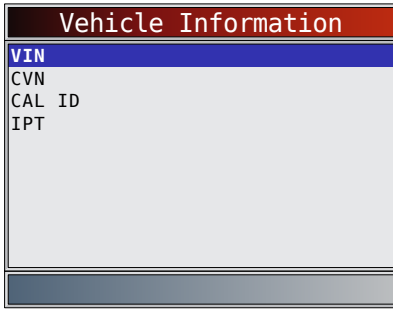
- **Vehicle Information** function applies to model year 2000 and newer OBD II compliant vehicles.
- The scan tool cannot verify if data is correct for scanned vehicles.
- CVNs are calculated values required by OBD II regulations.
- The CVN calculation may take several minutes.
- CVNs are reported to 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 **HD OBD** menu or **Global Automotive OBDII** menu:

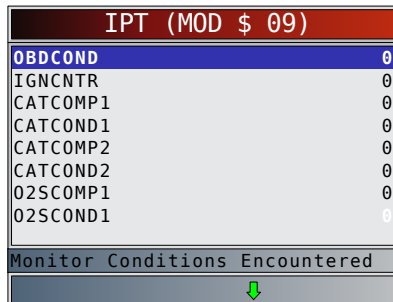
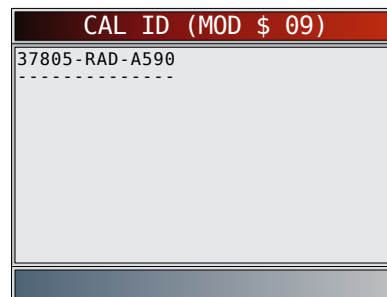
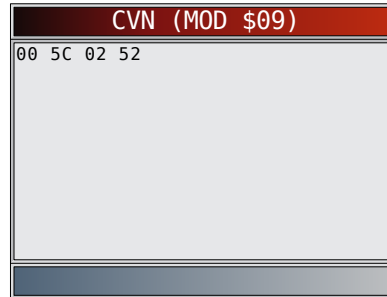
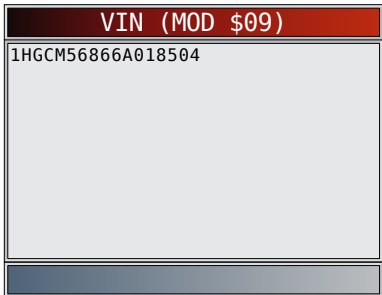
1. Select **Vehicle Information**.
  - Use the **▲ UP** and **▼ DOWN** keys until **Vehicle Information** is highlighted.
  - Press **ENTER**.



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



- 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).



- 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                |

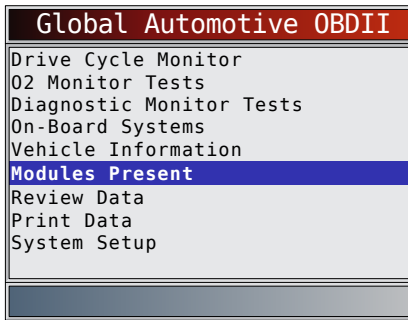
- If message INVALID displays on screen, the data returned from the vehicle is incorrect, or is not formatted in accordance with OBD II specifications.
- Return to **Vehicle Information** menu.
    - Press **BACK**.
  - Return to **HD OBD** menu or **Global Automotive OBDII** menu.
    - Press **BACK**.

### 6.14 Modules Present

The scan tool identifies the module IDs and communication type for all Global OBD II modules in the vehicle. From the **HD OBD** menu or **Global Automotive OBDII** menu:

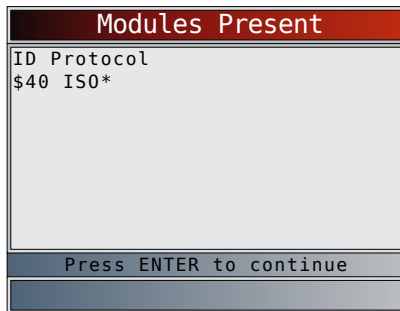
- Select **Modules Present**.
  - Use the ▲ **UP** and ▼ **DOWN** keys until **Modules Present** is highlighted.
  - Press **ENTER**.



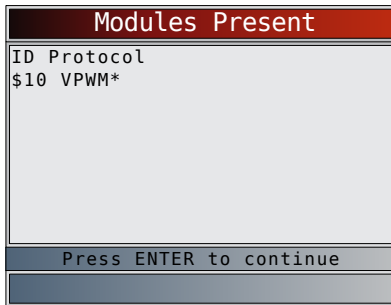


The types of protocols (communication types) supported by the scan tool are:

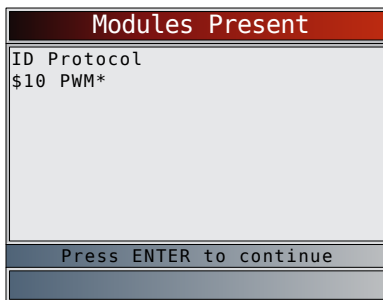
- ISO 9141-2 protocol is shown as ISO.



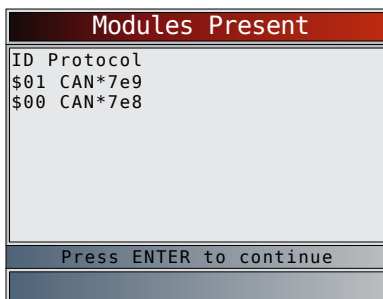
- SAE J1850 protocol is shown as VPWM or PWM.



OR

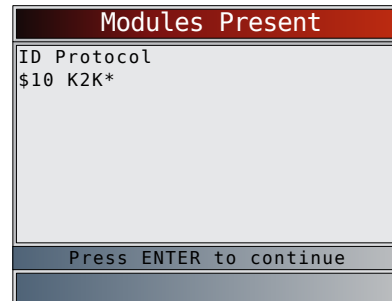


- ISO 15765-4 protocol is shown as CAN.



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).



In the above examples, the \* indicates the protocol used to communicate to the vehicle's control module.

## 7 Troubleshooting

### 7.1 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.

### 7.2 Scan Tool Does Not Power Up



#### WARNING

Review Safety Messages on page 4 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.

### 7.3 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**.



### 7.4 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**.



### 7.5 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. Lithium types last longer than the alkaline types, but 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.



### 7.6 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.

### 7.7 Technical Support

Toll-Free Number: 1-855-267-2483.

## 8 Appendix A—Global OBD II 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  |
| AECD10_TIME1, TIME 2 | Total Run Time with EI-AECD #10 Timer 1 Active, #2 Timer Active |
| AECD11_TIME1, TIME 2 | Total Run Time with EI-AECD #11 Timer 1 active, #2 Timer Active |
| AECD12_TIME1, TIME 2 | Total Run Time with EI-AECD #12 Timer 1 active, #2 Timer Active |
| AECD13_TIME1, TIME 2 | Total Run Time with EI-AECD #13 Timer 1 active, #2 Timer Active |
| AECD14_TIME1, TIME 2 | Total Run Time with EI-AECD #14 Timer 1 active, #2 Timer Active |
| AECD15_TIME1, TIME 2 | Total Run Time with EI-AECD #15 Timer 1 active, #2 Timer Active |
| AECD16_TIME1, TIME 2 | Total Run Time with EI-AECD #16 Timer 1 active, #2 Timer Active |
| AECD17_TIME1, TIME 2 | Total Run Time with EI-AECD #17 Timer 1 active, #2 Timer Active |

| PID                  | PID Description  |
|----------------------|--|
| AECD18_TIME1, TIME 2 | Total Run Time with EI-AECD #18 Timer 1 active, #2 Timer Active              |
| AECD19_TIME1, TIME 2 | Total Run Time with EI-AECD #19 Timer 1 active, #2 Timer Active              |
| AECD2_TIME1, TIME 2  | Total Run Time with EI-AECD #2 Timer 1 Active, #2 Timer Active               |
| AECD20_TIME1, TIME 2 | Total Run Time with EI-AECD #20 Timer 1 active, #2 Timer Active              |
| AECD3_TIME1, TIME 2  | Total Run Time with EI-AECD #3 Timer 1 Active, #2 Timer Active               |
| AECD4_TIME1, TIME 2  | Total Run Time with EI-AECD #4 Timer 1 Active, #2 Timer Active               |
| AECD5_TIME1, TIME 2  | Total Run Time with EI-AECD #5 Timer 1 Active, #2 Timer Active               |
| AECD6_TIME1, TIME 2  | Total Run Time with EI-AECD #6 Timer 1 Active, #2 Timer Active               |
| AECD7_TIME1, TIME 2  | Total Run Time with EI-AECD #7 Timer 1 Active, #2 Timer Active               |
| AECD8_TIME1, TIME 2  | Total Run Time with EI-AECD #8 Timer 1 Active, #2 Timer Active               |
| AECD9_TIME1, TIME 2  | Total Run Time with EI-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   | Catalytic Converter Temp Bank1, Temp Bank 3                                  |
| CAT TEMP21, TEMP22   | Catalytic Converter Temp Bank2, Temp Bank 4                                  |
| CLR DIST             | Distance since erase   |
| CLR TIME             | Minutes Run since Erase  |
| 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         |

| PID                  | PID Description  |
|----------------------|--|
| 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  |
| 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                 |

| PID                              | PID Description   |
|----------------------------------|---|
| 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                     | O2 Sensor Lambda Bank 1 Sensor 1, Bank 2 Sensor 1   |
| LAMBDA12, 22                     | O2 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_DESUL                    | NOx Adsorber Desulfurization Status   |
| NOX_ADS_REGEN                    | NOx Adsorber Regen Status   |
| NWI_TIME                         | Total Run Time by the Engien while NOx warning mode is activated  |
| O2S                              | O2 Voltage or Current indicates Bank/Sensor   |
| O2S11_PCT, O2S21_PCT             | O2 Sensor Concentration Bank 1 Sensor 1, Bank 2 Sensor 1  |
| O2S12_PCT, O2S22_PCT             | O2 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   |

| PID   | PID Description   |
|---|---|
| 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 RE-AG 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  |
| 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   |

| PID                | PID Description                                       |
|--------------------|---|
| 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                         |

## 9 Appendix B—Glossary

### A/C:

Air conditioner

### 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.

### 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

### Accel:

Accelerator

### Accsry:

Accessory

### 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.

### Adp:

Adaptive

### AFT:

Aftertreatment

### AFT 1:

Aftertreatment 1

### AFT 2:

Aftertreatment 2

### Alt:

Alternator

### AP:

Absolute pressure

### APP:

Acceleration pedal position (sensor)

### Appl:

Application

### ASR:

Acceleration slip regulation

### Assm:

Assembly

### Aux:

Auxiliary

### Avail:

Available

### Avg:

Average

### 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.

### BAP:

Barometric absolute pressure

### Baro:

Barometric

### BARO:

Barometric pressure sensor. See MAP sensor.

### Batt:

Battery

### 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.

**Cal:**

Calibration

**Calc:**

Calculated

**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.

**CC:**

Cruise control

**Cfg:**

Configuration

**Chnl:**

Channel

**Circ:**

Circuit

**CKP REF:**

Crankshaft position reference.

**CKP:**

Crankshaft position. See CPS.

**CKT:**

Circuit

**Clnt:**

Coolant

**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.

**Cmd:**

Command

**Cmn:**

Common

**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.

**Cont:**

Continuous

**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).

**Ctrl:**

Control

**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

**Cyl:**

Cylinder

**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.

**Decel:**

Deceleration

**Dem:**

Demand

**DEPS:**

Digital engine position sensor.

**Des:**

Desired

**Detonation:**

See knock.

**Dev:**

Deviation

**DI/DIS:**

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

**Diff:**

Differential

**Dist:**

Distance

**DP:**

Particulate

**DPF:**

Diesel particulate filter

**DPFE:**

Differential pressure feedback-exhaust gas recirculation sensor

**Drvr:**

Driver

**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

**Eco:**

Economy

**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.

**Eng:**

Engine

**EOP:**

Engine oil pressure (switch)

**EOT:**

Engine oil temperature (sensor)

**EPA:**

Environmental protection agency

**Equip:**

Equipment

**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:**

Estimated

**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

**Exh:**

Exhaust

**FC:**

Fan control

**Fltr:**

Filter

**Freeze frame:**

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

**Freq:**

Frequency

**Frict:**

Friction

**FTP:**

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

**Gen:**

Generator

**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.

**HRes:**

High Resolution

**Htr:**

Heater

**HVAC:**

Heating, ventilation, & air conditioning (system)

**Hydr:**

Hydraulic

**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.

**Id:**

Identification

**Id:**

Identifier

**Ign:**

Ignition

**IMRC:**

Intake manifold runner control

**Inj:**

Injector



**Inp:**

Input

**Inst:**

Instant

**Intk:**

Intake

**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.

**JStick:**

Joystick

**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

**LT:**

Long-term

**LTFT:**

Long term fuel trim

**Lvl:**

Level

**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.

**Max:**

Maximum

**Mgt:**

Management

**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.

**Min:**

Minimum

**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.

**Neu:**

Neutral

**Nom:**

Nominal

**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 349°C (660°F). 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.

**OBD II:**

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

**OP:**

Operating

**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.

**Out:**

Output

**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).

**Pct:**

Percent

**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.

**Perf:**

Performance

**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.

**Pos:**

Position

**Pot:**

Potential

**Press:**

Pressure

**PROM:**

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

**Prop:**

Propulsion

**Psngr:**

Passenger

**PSPS:**

Power steering pressure switch

**PTO:**

Power takeoff

**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

**Pwr:**

Power

**PZM:**

Platform zone module

**QDM:**

Quad driver module

**RAM:**

Random access memory

**Recirc:**

Recirculation

**Ref:**

Reference

**Regen:**

Regenerative

**Rel:**

Relative

**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.

**Req:**

Requested

**Req:**

Request

**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

**Rtrdr:**

Retarder

**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.

**Snsr:**

Sensor

**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.

**Spd:**

Speed

**Src:**

Source

**ST:**

Short-term

**Std:**

Standard

**STFT:**

Short term fuel trim

**Stim:**

Stimulation

**STS:**

Service throttle soon

**Sup:**

Supplemental

**Sw:**

Switch

**Sw'd:**

Switched

**Sys:**

System

**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.

**Temp:**

Temperature

**TFP:**

Transmission fluid pressure

**TFT:**

Transmission fluid temperature (sensor)

**Thresh:**

Threshold

**Throt:**

Throttle

**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.

**Torq:**

Torque

**Tot:**

Total

**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.

**Trans:**

Transmission

**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.

**Turbo:**

Turbocharger

**Util:**

Utility

**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 OBD II compliant.

**Veh:**

Vehicle

**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

**Vtg:**

Voltage

**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.

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