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Visit our Web site at:
http://diagnostics.snapon.com

For Technical Assistance Call:
1-800-424-7226
Safety Information

For your own safety and the safety of others, and to prevent damage to the equipment and vehicles upon which it is used, it is important that the accompanying Safety Information be read and understood by all persons operating, or coming into contact with, the equipment. We suggest you store a copy near the unit in sight of the operator.

This product is intended for use by properly trained and skilled professional automotive technicians. The safety messages presented throughout this manual are reminders to the operator to exercise extreme care when using this test instrument.

There are many variations in procedures, techniques, tools, and parts for servicing vehicles, as well as in the skill of the individual doing the work. Because of the vast number of test applications and variations in the products that can be tested with this instrument, we cannot possibly anticipate or provide advice or safety messages to cover every situation. It is the automotive technician’s responsibility to be knowledgeable of the system being tested. It is essential to use proper service methods and test procedures. It is important to perform tests in an appropriate and acceptable manner that does not endanger your safety, the safety of others in the work area, the equipment being used, or the vehicle being tested.

It is assumed that the operator has a thorough understanding of vehicle systems before using this product. Understanding of these system principles and operating theories is necessary for competent, safe and accurate use of this instrument.

Before using the equipment, always refer to and follow the safety messages and applicable test procedures provided by the manufacturer of the vehicle or equipment being tested. Use the equipment only as described in this manual.

Read, understand and follow all safety messages and instructions in this manual, the accompanying safety manual, and on the test equipment.

Safety Message Conventions

Safety messages are provided to help prevent personal injury and equipment damage. All safety messages are introduced by a signal word indicating the hazard level.

⚠️ DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury to the operator or to bystanders.

⚠️ WARNING

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

⚠️ CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor injury to the operator or to bystanders.
Safety messages contain three different type styles.

- Normal type states the hazard.
- Bold type states how to avoid the hazard.
- Italic type states the possible consequences of not avoiding the hazard.

An icon, when present, gives a graphical description of the potential hazard.

Example:

**WARNING**

Risk of unexpected vehicle movement.
- **Block drive wheels before performing a test with engine running.**
  
  *A moving vehicle can cause injury.*

---

**Important Safety Instructions**

For a complete list of safety messages, refer to the accompanying safety manual.

---

**SAVE THESE INSTRUCTIONS**
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Chapter 1 Using This Manual

This manual contains instructions for testing Asian import vehicles. Some of the Illustrations shown in this manual may contain modules and optional equipment that are not included on your system. Contact your sales representative for availability of accessories and optional equipment.

1.1 Conventions

This manual uses the conventions described below.

1.1.1 Bold Text

Bold text is used for emphasis and to highlight selectable items such as buttons and menu options.

Example:

• Select OK to continue.

1.1.2 Terminology

Certain terms are used to command specific actions throughout this manual. Those terms are described below.

Select

The term “select” means to highlight a menu item or other option, then pressing the Y/a, OK, Accept, or similar button to activate it.

Example:

• Select Functional Tests.

Scroll

The term “scroll” means moving the cursor or changing data by using the directional arrow buttons, scroll bars, or other means.

Example:

• Scroll to see any other codes and the data list.
Scan Tool

The term “scan tool” is used to refer to any tool that communicates directly with the vehicle data stream. When necessary, the term “Scanner” is used to distinguish Snap-on equipment from another diagnostic device, such as the factory scan tool from the manufacturer.

1.2 Notes and Important Messages

The following messages appear throughout this manual.

1.2.1 Notes

A NOTE provides helpful information such as explanations, tips, and comments.

Example:

NOTE:
For additional information refer to...

1.2.2 Important

IMPORTANT indicates a situation which, if not avoided, may result in damage to the test equipment or vehicle.

Example:

IMPORTANT:
To avoid incorrect TPS adjustment or component damage, be sure to follow the on-screen instructions. Refer to a vehicle service manual for complete test or adjustment procedures.
The Asian Import Vehicle Communication Software (VCS) allows you to test multiple vehicle systems: engine, transmission, ABS and airbag (SRS). The functional and component tests offered by the software allow for simplified diagnostics and troubleshooting.

The Asian Import VCS establishes a data link between the scan tool and the electronic control systems of the vehicle being serviced. This data link allows you to view diagnostic trouble codes (DTCs), serial data and freeze-frame information available from the electronic control module (ECM). On models with bi-directional communication, the VCS also lets you perform certain system and component tests and provides the ability to switch off the malfunction indicator lamp (MIL) after repairs are made.

The amount and type of information and tests available with the Asian Import VCS varies by the year, make, model and equipment options of the test vehicle. With the software you can: interpret electronic control module trouble codes, read input and output signals, test specific systems and components, check the operation of certain actuators (solenoids, valves, and relays), and record and view data movies. Manufacturer specific sections feature detailed locations of hard to find connectors and information on manual code reading. This manual also includes chapters on data parameters, OBD-II data parameters, and scan tool specific troubleshooting advice.

The first two sections of this manual overview safety and usage conventions. The remainder of this manual is divided into the following chapters:

- “Chapter 3: Operations” offers general software operating explanations and procedures.
- Chapters 4–16 offer testing information and procedures for control systems of the following manufacturers:
  - Chapter 4: Acura
  - Chapter 5: Chrysler Imports
  - Chapter 6: Daihatsu
  - Chapter 7: Geo
  - Chapter 8: Honda
  - Chapter 9: Hyundai
  - Chapter 10: Isuzu
  - Chapter 11: Kia
  - Chapter 12: Mazda
  - Chapter 13: Mitsubishi
  - Chapter 14: Nissan/Infiniti
  - Chapter 15: Subaru
  - Chapter 16: Toyota/Lexus/Scion
- “Chapter 17: Generic OBD-II Operations” provides information about testing in the Generic OBD-II Test Mode.
- “Chapter 18: Data Parameters” provides definitions for data parameters.
- “Appendix A: Other Software Available” lists the other software titles available from Snap-on.
- “Appendix B: Troubleshooting” offers advice for troubleshooting scan tool-to-vehicle communication and other issues.
- “Glossary of Terms” lists terms and acronyms used in this manual and in Asian Import manufacturer’s literature.
This section explains how to begin using basic scan tool setup and test functions. This information is specific to Asian Import vehicles. For general scan tool functionality, see the user manual appropriate to your diagnostic tool. Figure 3-1 outlines the workflow of using the VCS software.

NOTE:
The exact order of test operation steps may vary depending on the test vehicle. Be sure to follow all on-screen instructions.

3.1 Selecting the Software

The first step in testing with the Vehicle Communication Software (VCS) is selecting the correct software for your test vehicle.

Two types of screens display when you turn on your scan tool:

- The inicial menu displays if you do not have a vehicle in memory.
- The Current Vehicle ID screen displays if you have a vehicle in memory.
Operations

Identifying a Vehicle

To select the software from the initial menu:
1. Select Asian from the Vehicle Communication menu.
   The software loads for a moment and then the Software Confirmation screen displays.
2. Select to confirm the software.
   The Manufacturer Selection menu displays.
3. Select the manufacturer of the test vehicle from the list.

To select the software from the Current Vehicle ID screen:
1. Select to accept if you want to test the same vehicle, or press select cancel if you want to test a different vehicle.
   – The System Selection menu displays if the same vehicle was selected.
   – The Software Confirmation screen displays if you selected to cancel.
2. Follow the on-screen instructions to continue.

3.2 Identifying a Vehicle

After you have selected the software, you are prompted to identify the test vehicle by entering vehicle identification number (VIN) characters and answering questions.

NOTE:
Because of midyear manufacturing changes in engine computer systems, you should always enter a new identification when you test a different vehicle, even when two vehicles are the same year, model, and have the same engine and accessories installed.

To identify a vehicle:
1. From the Manufacturer Selection menu, select the vehicle manufacturer.
   The first in a series of Vehicle Identification screens displays.
2. Scroll and select to enter VIN characters, and answer any questions.
   When you are finished, a Vehicle ID Confirmation screen displays.
3. Select to continue if the vehicle ID is correct.
   The System Selection menu or Connection Instruction screen displays.

3.3 Selecting a System

A System Selection menu prompts you to select which vehicle control system to test. Menus vary by manufacturer and model. Refer to the manufacturer-specific chapters of this manual for instructions on selecting a system to test.
3.4 Connecting to the Vehicle

A Connection Instruction screen tells you how to connect the supplied vehicle test adapters to the test vehicle you identified.

Each test adapter plugs into a specific vehicle diagnostic connector and attaches to one end of the data cable. The other end of the data cable attaches to the scan tool.

The following adapters are available to connect the scan tool to Asian Import vehicles. See the manufacturer-specific chapters of this manual for connector locations.

![MULTI-1 adapter](image1)

![OBD-II adapter with Personality Key™](image2)

![TOYOTA-1 adapter](image3)

![TOYOTA-2 adapter, MAZDA-1 adapter](image4)

![NISSAN-1 adapter (12-pin)](image5)

![NISSAN-2 adapter (16-pin)](image6)

![HON-1 adapter](image7)

![HYUNDAI-2 adapter](image8)
1— Ground
2— Mazda & Ford (2E)
3— Isuzu & Geo with GM system (2D)
4— Subaru (2C)
5— Mazda & Ford (2B)
6— Special applications (2A)

Figure 3-14 MULTI-2 Asian adapter
Follow the on-screen instructions to connect the scan tool to the vehicle. Then, select to continue and the Main menu for the identified vehicle displays.

### 3.5 Main Menu Selections

Depending on the vehicle, the following main menu options may be available:

- **Code Functions** lets you read and interpret electronic control module (ECM) diagnostic trouble codes (DTCs).
- **Codes and Data** lets you read input and output signals if applicable (switches, sensors, and actuators). See the manufacturer sections of the manual for specific information.
- **Functional Tests** provides specific subsystem and component tests. Tests vary by make and model, see the manufacturer-specific sections of the manual for specifics.
- **Actuator Tests** lets you check the operation of certain actuators, such as solenoid valves and relays. Tests vary by make and model, see the manufacturer-specific sections of the manual for specifics.
- **Custom Setup** lets you customize certain scan tool functions. See the manual for your diagnostic tool for details.
- **Movies** lets you record and view data. See the manual for your diagnostic tool for details.

### 3.6 Code Functions

Selecting Code Functions displays the Code Functions menu.

Depending on the vehicle type, six primary Code Functions selections may be available:

- **Auto Code Read** reads all available electronic codes automatically.
- **How To Get Codes** helps you to locate the test connectors or code lamps for getting codes, and helps you identify the code type.
- **Clear Codes** clears (erases) trouble codes from the vehicle ECM memory.
- **Print Codes** prints selected trouble code definitions.
- **Manual Code Entry** lets you read codes that can be identified by visual observation of a flashing lamp (LED) and manually entering data into the scan tool.
- **Review Codes** lets you review codes stored in scan tool memory, either through automatic code reading or manual code entry.
3.6.1 Reading Different Code Types

Depending on the vehicle, the diagnostic connector may have automatic code reading or you may have to read codes by observing a flashing lamp (LEDs). After you enter the vehicle ID, the scan tool tells you which type of system is on the vehicle you are testing.

For vehicles with diagnostic connectors that have automatic code reading (Auto Code Read), connection instructions for code reading display at the end of the vehicle ID sequence. Instructions for activating flash codes are available by selecting How To Get Codes.

Flash Codes

Different types of code pulse patterns are used by different manufacturers for different models. When a vehicle has indicator lamps (LEDs) that flash trouble codes, the scan tool gives you the code type used for the vehicle you are testing and brief description of the code flashing pattern.

Five general code patterns are used:

- **Straight Count**—flashes the lamp or LED the number of times equal to the trouble code with a noticeable pause between multiple codes.
  For example, eight equal flashes is Code 8.

- **Tens/Ones**—flashes a 2-digit trouble code with a noticeable pause between each digit. The first set of flashes is the 10s digit; the second set of flashes is the 1s digit.
  For example, Flash–Flash–pause–Flash–Flash–Flash is Code 23.
• **Long/Short**—flashes a 2-digit trouble code with the 10s digit pulses staying on longer than the 1s digit pulses. For example, Long–Long–pause–Short–Short–Short is Code 23.

• **Main code and Sub-code**—main code will flash first, then pause. Sub-code will follow.

• **4-LED**—turns on one-to-four LEDs to display a binary code. The LEDs stay on until the code is cleared.

• **2-LED**—flashes a 2-digit trouble code with the 10s digit flashed on one LED and the 1s digit flashed on the other LED.

### 3.6.2 Automatic Code Reading

Selecting Auto Code Read from the Code Functions menu displays a “gathering codes” or “incoming codes”. LEDs flash simultaneously as the codes are received by the scan tool.

---

**NOTE:**
Some vehicles transmit codes very slowly. Allow several seconds after receiving any code to ensure that no more codes follow.

### 3.6.3 Clearing Codes

The Clear Codes selection is available from the Code Functions menu after codes have been received. Selecting Clear Codes provides specific information for clearing ECM trouble codes.

Trouble codes are often cleared by removing the battery ground cable or removing a fuse. In some cases however, the Auto Code Read function lets the scan tool clear codes automatically. Select from the menu and follow the on-screen instructions for automatic code clearing.

---

**NOTE:**
If the vehicle ECM does not receive the code-clearing command, the “Clearing Codes” message stays on the screen indefinitely.

### 3.6.4 Printing Codes

See the manual for your diagnostic tool for information about setting up a printer.

### 3.6.5 Manual Code Entry

If you are testing a vehicle that can only display codes manually, you receive connection instructions from the Connection Instruction screen.

Select How To Get Codes from the Code Function menu to see on-screen instructions about reading manual codes from the vehicle you are testing.
3.6.6 How to Get Codes

Selecting How To Get Codes gives instructions for observing codes manually or automatically, depending on the vehicle. The on-screen instructions are supplemented in the manufacturer-specific chapters of this manual.

3.6.7 Reviewing Codes

The Review Codes selection is only available after the scan tool has received codes from manual code entry. Selecting Review Codes displays a screen that lists all codes in memory.
This chapter contains information for testing Acura vehicles with the Asian Import Vehicle Communication Software (VCS). The following Acura systems may be available for testing:

- Engine
- Transmission
- Antilock Brake System (ABS)
- Airbag (SRS)

### 4.1 Testing Engine Systems

Acura engine system testing includes:

- “Code Reading Connectors and Locations” on page 12
- “ECM Locations 1986 to 1990 with ECM LED” on page 14
- “SCS mode” on page 16
- “Code Type” on page 17
- “Manual Code Reading (Engine Codes)” on page 17
- “Multiple Codes” on page 18

#### 4.1.1 Code Reading Connectors and Locations

Refer to Figure 4-1 for common diagnostic connector locations for Acura vehicles. Connector configurations are shown in Figure 4-2, Figure 4-3 and Figure 4-4.
Refer Table 4-1 to determine which adapter to use to test a specific model.

**Table 4-1 Common connector locations**

<table>
<thead>
<tr>
<th>VEHICLE</th>
<th>YEAR</th>
<th>SCS 2-PIN</th>
<th>DLC 3-PIN</th>
<th>DLC 16-PIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2 CL</td>
<td>1997</td>
<td>3</td>
<td></td>
<td>5*</td>
</tr>
<tr>
<td>2.3 CL</td>
<td>1998–99</td>
<td>3</td>
<td></td>
<td>5*</td>
</tr>
<tr>
<td>2.5 TL</td>
<td>1995–98</td>
<td>2</td>
<td></td>
<td>5*</td>
</tr>
<tr>
<td>3.0 CL</td>
<td>1997–99</td>
<td>3</td>
<td></td>
<td>5*</td>
</tr>
<tr>
<td>3.2 CL</td>
<td>2001–02</td>
<td></td>
<td></td>
<td>5*</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>3.2 TL</td>
<td>1996–98</td>
<td>2</td>
<td></td>
<td>5*</td>
</tr>
<tr>
<td></td>
<td>1999–2002</td>
<td></td>
<td></td>
<td>5*</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>3.5 RL</td>
<td>1996–2003</td>
<td>2</td>
<td></td>
<td>5*</td>
</tr>
<tr>
<td>Integra</td>
<td>1992–95</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1996–2001</td>
<td>1</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>MDX</td>
<td>2001–04</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>NSX</td>
<td>1995–2003</td>
<td>1</td>
<td></td>
<td>3*</td>
</tr>
<tr>
<td>RSX</td>
<td>2002–04</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>SLX</td>
<td>1996–99</td>
<td></td>
<td></td>
<td>6**</td>
</tr>
<tr>
<td>3.2 TL</td>
<td>2004</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>NSX</td>
<td>2004</td>
<td>2</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>TSX</td>
<td>2004</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>3.5 RL</td>
<td>2004</td>
<td>3</td>
<td></td>
<td>5*</td>
</tr>
</tbody>
</table>

* Remove ashtray
** Remove the DLC cover
4.1.2 ECM Locations 1986 to 1990 with ECM LED

Table 4-2 LED locations

<table>
<thead>
<tr>
<th>VEHICLE</th>
<th>YEAR</th>
<th>LED LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integra</td>
<td>1986–89</td>
<td>1</td>
</tr>
<tr>
<td>Legend Sedan</td>
<td>1986–90</td>
<td>2</td>
</tr>
</tbody>
</table>

1—1995 2.5, 3.2 TL
2—1995 NSX
3—16-pin Data Link Connector (DLC)—Use OBD-II adapter.

Figure 4-6 Acura data link connector (DLC) locations
1— 16-pin DLC
2— OBD-II adapter

Figure 4-7  Acura DLC and adapter

1— 1986–89 Integra, 1986–90 Legend Sedan

Figure 4-8  Acura control module locations for LED code flashers

1— Service check connector
2— Jump wire
3— ECM
4— TCM

Figure 4-9  Acura check connector locations for Check Engine Lamp code flashers
4.1.3 SCS mode

Purpose of SCS (Service Check Signal) mode:

- Enables a diagnostic mode
- Flash out DTCs stored for the PCM, ABS, TCS, and SRS modules
- Code clearing on certain ABS systems
- Bypass two trip detection mode for ODB-II drive cycles

**NOTE:**
Certain OBD-II vehicles use a separate 2 pin SCS connector. Other ODB-II models use a SCS pin in the 16 PIN DLC. Both function the same way. For specific applications, refer to “Code Reading Connectors and Locations” on page 12.

Models with a separate 2 pin SCS connector:

Acura tool 07PAZ-0010100, or equivalent, is used to jump the 2-pin SCS connector. With the SCS jumped, the ABS lamp flashes a Type 4 code once per ignition cycle.

Models with the SCS in the 16 pin DLC:

The scan tool grounds the appropriate pin of the DLC, which enables the SCS mode. Follow the on-screen instructions.

**NOTE:**
The K-18 key must be used for SCS mode.

The SCS help briefly explains the two trip bypass operation (PCM only, see the section on “Two-trip detection bypass”)

ABS code clearing using SCS mode (certain 1997 and later models)

When instructed by the scanner, ABS codes may be cleared using the SCS mode.

Airbag code reading message (typical, using SCS mode)

The SCS mode can be used to retrieve airbag codes, which flash as a Type 6 code on the SRS lamp. Follow the on-screen instructions. Airbag codes are cleared using the message erase signal (MES) connector located in the fuse box.

**NOTE:**
The MES connector is not the same as the SCS connector.
Two-trip detection bypass

Use SCS mode to bypass ODB ‘two trip detection’ and re-create certain DTCs during diagnosis. Some codes require a back driving sequence (two road tests) where the fault must occur in a similar operating condition.

**NOTE:**
On ODB-II vehicles with the separate 2 pin SCS connector, jumper the 2 pin connector for the SCS mode functions.

A DTC can be captured in one driving event by connecting the scanner and selecting ‘SCS’ mode from the main menu (on applicable vehicles). For scan data usage during SCS mode, manually jump the DLC from the backside while the scanner is connected to the DLC.

![Figure 4-10 Data connector from the wire side (Honda numbering, not the same as SAE)](image)

4.1.4 Code Type

For those systems that rely on manual code reading, you must interpret a DTC from a flashing indicator lamp. The code flash sequence varies by model and system. The Scanner™ therefore refers you to a certain ‘code type’ (for example Code Type 03). Code type is a specific labeling system that identifies the appropriate section in this manual for each subsystem.

4.1.5 Manual Code Reading (Engine Codes)

There are 2 types of manual engine codes:

- Type 02, see Figure 4-11 and Table 4-3
- Type 03, see Figure 4-12 and Table 4-4
4.1.6 Multiple Codes

The 1990 and later Integra and the 1991 Legend and NSX pulse multiple codes with a 2-second pause between each code. All other Acura models, including the 1990 Legend, with an ECM, do not have multiple code memory.

To read codes for vehicles without multiple code capability:
1. Read the trouble code.
2. Fix the problem.
3. Reset the ECM.
4. Drive the vehicle.
5. Check the LED for a new code.
6. Continue until no codes are present.
4.2 Testing Transmission Systems

These instructions for reading manual codes only apply to 2001 and earlier models. 2002 and later models have Codes and Data selections available from the Main Menu.

4.2.1 Code Reading Connector Locations

Figure 4-13 and Figure 4-14 provide diagnostic connector locations and adapter information.

Figure 4-13 1991–95 NSX, 1992–95 Vigor transmission service check connector locations

1— Service check connector
2— Jump wire

Figure 4-14 Acura transmission service check connector locations

1— 1987–90 Legend Coupe
2— 1988–90 Legend Sedan
3— 1990–95 Integra
4— LED display
Figure 4-15 shows common transmission diagnostic connector locations for Acura vehicles.

Refer to Table 4-5 to determine which adapter to use to test a specific model.

<table>
<thead>
<tr>
<th>VEHICLE</th>
<th>YEAR</th>
<th>SCS 2-PIN</th>
<th>DLC 3-PIN</th>
<th>DLC 16-PIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2 CL</td>
<td>1997</td>
<td>3</td>
<td></td>
<td>5*</td>
</tr>
<tr>
<td>2.3 CL</td>
<td>1998–99</td>
<td>3</td>
<td></td>
<td>5*</td>
</tr>
<tr>
<td>2.5 TL</td>
<td>1995–98</td>
<td>2</td>
<td></td>
<td>5*</td>
</tr>
<tr>
<td>3.0 CL</td>
<td>1997–99</td>
<td>3</td>
<td></td>
<td>5*</td>
</tr>
<tr>
<td>3.2 CL</td>
<td>2001–02</td>
<td></td>
<td>5*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2 TL</td>
<td>1996–98</td>
<td>2</td>
<td></td>
<td>5*</td>
</tr>
<tr>
<td></td>
<td>1999–02</td>
<td></td>
<td></td>
<td>5*</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>3.5 RL</td>
<td>1996–2003</td>
<td>2</td>
<td></td>
<td>5*</td>
</tr>
<tr>
<td>Integra</td>
<td>1996–2001</td>
<td>1</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>MDX</td>
<td>2001–04</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>NSX</td>
<td>1995–2003</td>
<td>1</td>
<td></td>
<td>3*</td>
</tr>
<tr>
<td>RSX</td>
<td>2002–04</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>SLX</td>
<td>1996–99</td>
<td></td>
<td></td>
<td>6**</td>
</tr>
<tr>
<td>TSX</td>
<td>2004</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>3.2 TL</td>
<td>2004</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>NSX-T</td>
<td>2004</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>3.5 RL</td>
<td>2004</td>
<td>3</td>
<td></td>
<td>5*</td>
</tr>
</tbody>
</table>

* Remove ashtray
** Remove the DLC cover
4.2.2 Manual Code Reading (Transmission Codes)

There are 2 types of manual transmission codes:

- Type 02, see Figure 4-16 and Table 4-6
- Type 03, see Figure 4-17 and Table 4-7.

![Figure 4-16 Acura transmission Code Type 02](image)

**Table 4-6 Acura transmission Code Type 02**

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Straight count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>Red LED on TCM</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Turn the ignition on.</td>
</tr>
<tr>
<td>When done:</td>
<td>Turn the ignition off, then clear codes.</td>
</tr>
</tbody>
</table>

Only one code displays at a time except on some late-model cars. After repairs, clear codes and test drive, then check for other codes.

![Figure 4-17 Acura transmission Code Type 03](image)

**Table 4-7 Acura transmission Code Type 03**

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Long and short</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>Red LED on TCM or gear indicator lamp on dash</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Turn the ignition on; except for 1991 and later Vigor, Legend, and NSX, jumper the check connector, then turn the ignition on.</td>
</tr>
<tr>
<td>When done:</td>
<td>Turn the ignition off, then clear codes.</td>
</tr>
</tbody>
</table>

Only one code displays at a time except on some late-model cars. After repairs, clear codes and test drive, then check for other codes.
4.3 Testing Antilock Brake Systems (ABS)

Acura antilock brake system (ABS) testing includes the following:

- “Code Reading Connectors and Locations” on page 22
- “ABS Codes and Data Testing” on page 23
- “Manual Code Reading (ABS Codes) and Clearing Codes” on page 25

4.3.1 Code Reading Connectors and Locations

Diagnostic connector locations and test adapter information for Acura ABS are shown in Figure 4-18, Figure 4-19 and Figure 4-20.

**Figure 4-18** 1991–95 NSX, 1992–94 Vigor, 1991–94 Legend ABS controller and service check connector locations

1.—ABS indicator lamp
2.—Service check connector
3.—Jump wire

**Figure 4-19** 1986–90 Legend ABS controller and service check LED location
1— 4-door
2— 3-door
3— Access cover

Figure 4-20 1990–93 Integra ABS controller and service check connector locations

1— Jump pin 4 to pin 12
2— DLC

Figure 4-21 1996–97 SLX ABS controller and service check connector locations

4.3.2  ABS Codes and Data Testing

The following selections are available for ABS testing:

- “ABS Main Menu” on page 23
- “Codes and Data Menu” on page 24
- “Data (No Codes)” on page 24
- “Codes Only” on page 24
- “Clear Codes” on page 25

ABS Main Menu

After selecting ABS from the System Selection menu, the Main Menu (ABS) is displayed. Selections vary by model and year.
The following main menu selections are discussed:

- "Codes and Data Menu"
- Movies, Custom Setup, and Troubleshooter are discussed in detail in the user manual for your diagnostic tool.

**Codes and Data Menu**

When Codes and Data Menu is selected, a submenu with the following options displays:

- **Data (No Codes)** —begins communication with the ABS module and displays data parameters.
- **Codes Only**—gathers and displays ABS trouble codes.
- **Clear Codes**—clears ABS memory codes from the ABS ECM memory.
- **Review Codes**—allows you to view codes. (This menu item appears only after code gathering.)
- **Print Codes**—allows you to print codes. (This menu item appears only after code gathering.)

**Data (No Codes)**

This section has information on viewing ABS data using the scan tool.

1. Enter in the vehicle ID.
2. Turn the ignition on.
3. Select **Data (No Codes)**
4. Turn the ignition off after completing the ABS data tests.

**Codes Only**

This section has information on retrieving ABS codes using the scan tool.

1. Select **Codes Only**.
   
   A "key on" verification screen displays. Make sure the ignition is switched on.
2. Select to continue.
   
   An ‘initializing communication” screen appears while the scan tool establishes communication with the vehicle.

**NOTE:**

The “initializing communication” screen means the scan tool is attempting to start the test, however it does not mean the vehicle has responded. If the message stays on the screen more than a few minutes, the test did not start.

1. If no codes are detected during the test a “P0000 no faults present” message displays.
2. The Code List, which shows all codes in memory displays if codes are present.
Clear Codes

This section has information on clearing ABS codes using the scan tool.

To clear codes:
1. Select Clear Codes.
   A “key on” verification screen displays. Make sure the ignition is switched on.
2. Select to continue.
   A code clearing confirmation screen displays.
3. Select to clear ABS codes.
4. The DTCs Cleared screen appears,
5. Select to exit.

4.3.3 Manual Code Reading (ABS Codes) and Clearing Codes

There are several types of manual codes for Acura ABS:

- Type 02, see Figure 4-22 and Table 4-8 on page 25
- Type 04, see Figure 4-23 and Table 4-9 on page 26
- Type 5a, see Figure 4-24 and Table 4-10 on page 27
- Type 06, see Figure 4-25 and Table 4-11 on page 27
- Type 12, see Figure 4-26 and Table 4-12 on page 28

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Straight count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>ABS lamp on dash</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Jumper the check connector, then turn the ignition on.</td>
</tr>
<tr>
<td>When done:</td>
<td>Turn the ignition off, then clear codes.</td>
</tr>
</tbody>
</table>

Only one code displays at a time except on some late-model cars. After repairs, clear codes and test drive, then check for other codes.
Table 4-9 Acura ABS Code Type 04

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>10s and 1s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>ABS warning lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>For 2003–04 NSX: Short SCS connector and turn key on; (do not press brake pedal). ABS indicator will stay on for 2 seconds then turn off. Main code will flash then pause 0.4 seconds, sub-code will flash and pause 3.6 seconds. If a DTC is not available, the ABS lamp will go off for 3.6 seconds then come back on. For other models: Short SCS connector and turn key on; ABS indicator light will stay on for 2 seconds then turn off; main code will flash then pause 0.4 seconds; sub-code will flash and pause 3.6 seconds; stored codes will flash only one time per ignition cycle; cycle key at least once to verify codes.</td>
</tr>
<tr>
<td>Clear codes:</td>
<td>For 2000–02 3.5 RL: Press parking brake pedal; with SCS shorted, hold VSA switch in the off position and turn the ignition on; hold for 3–5 seconds until VSA light blinks 4 times; this signals that codes have been cleared. For 2003-2004 RL: Press parking brake pedal. Push VSA ‘OFF’ switch, hold it, then turn ignition on. Hold VSA switch for 3-5 seconds, then release VSA switch. After 3 seconds, the VSA indicator should blink 4 times. This signals that the codes have been cleared. For 2003–04 NSX: With the SCS shorted, press the brake pedal and cycle ignition on. After the ABS indicator goes off, release the brake pedal. After the ABS indicator comes back on, depress brake pedal again. After the ABS indicator goes off again, release the brake pedal. After a few seconds the ABS indicator will blink twice and the DTC is cleared. Turn ignition off and un-short the SCS connector. For other models: With the SCS shorted, cycle key on with brake pedal pressed; ABS light will turn on, then shut off; release pedal and light will turn on; press brake pedal until light turns off and release pedal.</td>
</tr>
</tbody>
</table>
Table 4-10  Acura ABS Code Type 5a

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>10s and 1s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>ABS warning lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>After bringing the vehicle to a complete stop and making sure the brake pedal is not depressed, turn the ignition switch to the off position. Connect terminals 12 and 4 on the OBD-II 16-pin DLC. Turn the ignition switch to the ON position.</td>
</tr>
<tr>
<td>Clear codes by:</td>
<td>Within three seconds after entering the diagnostic mode, pulsate the brake switch on and off at least six times.</td>
</tr>
<tr>
<td>When done:</td>
<td>Turn the ignition off, disconnect connectors, then clear codes.</td>
</tr>
</tbody>
</table>

All codes repeat three times and are followed by a 1.2-second pause. Code 12 always flashes first to confirm the system is in the diagnostic mode. Any current codes follow code 12. Code 13 indicates the presence of history codes which then follow. If only history codes are present, the diagnostic sequence will first flash code 12, then code 13, followed by the history codes. The code display cycle repeats as long as the system is in the diagnostic state.

Table 4-11  Acura ABS Code Type 06

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Main code and sub-code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>ABS warning lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Short the SCS connector and turn key on; ABS indicator light will stay on for 2 seconds then turn off; main code will flash then pause 1 second; sub-code will flash and pause 5 seconds; stored codes will flash only one time per ignition cycle; cycle key at least once to verify codes.</td>
</tr>
<tr>
<td>When done:</td>
<td>To clear codes, remove ABS B2 (15A) fuse in the ABS fuse box for 10 seconds. <strong>NSX only</strong>: Remove #2 and #3 ABS fuse for 10 seconds.</td>
</tr>
</tbody>
</table>
4.4 Testing Supplemental Restraint Systems (SRS)

Testing Acura supplemental restraint systems (SRS), or airbag systems, includes:

- “SRS Main Menu” on page 28
- “Manual Code Reading (SRS)” on page 29
- “Code Clearing (SRS Codes)” on page 31

4.4.1 SRS Main Menu

After selecting SRS from the System Selection menu, the Main Menu (SRS) displays. Selections vary by model and year.

Codes and Data Menu

When Codes and Data Menu is selected, a menu with the following choices displays

- **Data (No Codes)**—begins communication with the SRS module and displays data parameters.
- **Codes Only**—gathers and displays SRS trouble codes.
- **Clear Codes**—clears SRS memory codes from the SRS ECM memory.
- **Review Codes**—allows you to view codes. (This menu item appears only after code gathering.)
- **Print Codes**—allows you to print codes. (This menu item appears only after code gathering.)
Data (No Codes)

This section has information on viewing SRS data using the scan tool.

To enter and exit SRS data:
1. Enter in the vehicle ID.
2. Turn the ignition on.
3. Select Data (No Codes)
4. Turn the ignition off after completing the SRS data tests.

Codes Only

This section has information on retrieving SRS codes using the scan tool.

To gather codes:
1. Select Codes Only.
   A “key on” verification screen displays. Make sure the ignition is switched on.
2. Select to continue.
   An “initializing communication” message displays.

NOTE:
The “initializing communication” screen means the scan tool is attempting to start the test, however it does not mean the vehicle has responded. If the message stays on the screen more than a few minutes, the test did not start.

3. The Code List, which shows all codes in memory displays if codes are present.

Clear Codes

This section has information on clearing SRS codes using the scan tool.

To clear codes:
1. Select Clear Codes.
   A “key on” verification screen displays. Make sure the ignition is switched on.
2. Select to continue.
3. When the confirmation message displays, select to clear ABS codes.
   The DTCs Cleared message displays.
4. Select to exit.

4.4.2 Manual Code Reading (SRS)

There are 2 types of manual SRS codes:

- Type 06, see Figure 4-27 and Table 4-13 on page 30
- Type 07, see Figure 4-28 and Table 4-14 on page 30
Acura Testing Supplemental Restraint Systems (SRS)

Table 4-13 Acura SRS Code Type 06

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Main code and sub-code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>SRS warning lamp</td>
</tr>
</tbody>
</table>

Start codes by: Short the SCS connector and turn key on; SRS warning lamp will turn on then turn off after 3.0 seconds; if the code is greater than 10, four quick flashes (0.1 seconds each) = 10; main code will flash and pause 2.0 seconds and flash again if code is greater than 1; after a 2.0 second pause, sub-code will now flash in 0.3 second pulses, followed by more flashes if code is greater than 1.

When done: Clear codes. If the SCS connector is shorted and SRS has no stored DTC, it’s normal to see the SRS light remain on continuously.

Computer can store up to 3 most recent codes. The SCS is part of the 16-pin DLC; ground pin #9 to activate.

3.5 RL only: SCS connector is separate from the 16-pin DLC. The 2-pin SCS connector is located under the glove box.

Table 4-14 Acura SRS Code Type 07

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Main code and sub-code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>SRS warning lamp</td>
</tr>
</tbody>
</table>

Start codes by: Short the SCS connector and turn key on; SRS warning lamp will turn on then turn off after 2.0 seconds, main code will flash, pause 1.2 seconds, and flash again if code is greater than 1; add the flashes together for main code; after a 2.0 second pause, sub-code will now flash in 0.3 second pulses and flash again if code is greater than 1; add the flashes together for sub-code.

When done: Clear codes.

Computer can store up to 3 most recent codes. If the SCS connector is shorted and SRS has no stored DTC, it’s normal to see the SRS light remain on continuously. 1995–96 2.5 TL models are different, if no DTCs are stored, the SRS lamp will flash continuously without pausing.
4.4.3 Code Clearing (SRS Codes)

To clear DTCs from the SRS unit on all models except SLX and NSX:

1. Switch the ignition off.
2. Connect the SCS service connector (Acura 07PAZ-0010100) to the yellow 2-pin MES connector (Figure 4-29).
   A jumper wire can be used as long as you maintain good contact between the terminals.
3. Switch the ignition on.
   The SRS indicator lamp lights for about 6 seconds, then switches off.
4. Remove the SCS service connector from the MES connector within 4 seconds of the lamp switching off.
5. When the SRS indicator lamp lights again, connect the SCS service connector to the MES connector within 4 seconds of the lamp switching on.
6. When the SRS indicator lamp switches off, remove the SCS service connector from the MES connector within 4 seconds.
   The SRS lamp flashes twice to indicate memory has been erased.
7. Switch the ignition off and wait ten seconds.

Figure 4-29 SCS Service Connector. Use Acura tool 07PAZ-0010100 (or use jumper wire equivalent)

Figure 4-30 SRS code clearing

1— SRS indicator lamp
2— MES connector terminals
1— Memory Erase Signal (MES) 2P connector
2— SCS Service connector (Acura 07PAZ-0010100)

Figure 4-31 Acura OBD-II SRS MES connector (1 of 2)

1— MES connector
2— SCS service connector (Acura 07PAZ-0010100)

Figure 4-32 2004 TSX/TL SRS code clearing (left side of dash)

1— MES 2P connector
2— SCS Service connector (Acura 07PAZ-0010100)

Figure 4-33 Acura OBD-II SRS MES connector location (2 of 2)
This chapter contains information for testing Chrysler Imports vehicles with the Asian Import Vehicle Communication Software (VCS). The following Chrysler Import systems may be available for testing:

- Engine
- Transmission
- Antilock Brake System (ABS)
- Supplemental Restraint System (SRS)

5.1 Testing Engine, Transmission, ABS, and SRS

Chrysler Import testing includes:

- “Code Reading Connectors and Locations” on page 33
- “ABS Manual Code Reading” on page 36
- “Clearing Codes” on page 36
- “Codes and Data (Slow)” on page 37
- “Actuator Tests” on page 37

5.1.1 Code Reading Connectors and Locations

Figure 5-1 below and Table 5-1 on page 34 provide Chrysler Import diagnostic connector location information.
Connectors and adapters for reading Chrysler Import codes are shown in:

- Figure 5-2—Engine codes for most vehicles before 1987
- Figure 5-3—Engine and transmission codes for most OBD-I vehicles after 1988
- Figure 5-4—Airbag (SRS) codes for most 1994 and earlier vehicles
- Figure 5-5—Codes for most OBD-II vehicles with 12-pin and 16-pin connectors

### Table 5-1 Common connector locations

<table>
<thead>
<tr>
<th>VEHICLE</th>
<th>YEAR</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avenger/Sebring</td>
<td>1995–2000</td>
<td>2</td>
</tr>
<tr>
<td>Colt Turbo</td>
<td>1994–96</td>
<td>5</td>
</tr>
<tr>
<td>Colt Wagon</td>
<td>1988–90</td>
<td>3</td>
</tr>
<tr>
<td>Colt/Summit</td>
<td>1989–96</td>
<td>1</td>
</tr>
<tr>
<td>Conquest</td>
<td>1984–86</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>1987–89</td>
<td>7</td>
</tr>
<tr>
<td>Laser/Talon</td>
<td>1990–94</td>
<td>1</td>
</tr>
<tr>
<td>Raider</td>
<td>1989</td>
<td>7</td>
</tr>
<tr>
<td>Stratus Coupe</td>
<td>2004</td>
<td>4</td>
</tr>
<tr>
<td>Sebring Coupe</td>
<td>2004</td>
<td>4</td>
</tr>
<tr>
<td>Stealth</td>
<td>1991–93</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1994–96</td>
<td>2</td>
</tr>
<tr>
<td>Talon</td>
<td>1995–98</td>
<td>2</td>
</tr>
<tr>
<td>Truck</td>
<td>1990–94</td>
<td>1</td>
</tr>
<tr>
<td>Vista</td>
<td>1987–91</td>
<td>6</td>
</tr>
<tr>
<td>Vista/Summit Wagon</td>
<td>1992–96</td>
<td>1</td>
</tr>
</tbody>
</table>

Connectors and adapters for reading Chrysler Import codes are shown in:

1—Connectors
2—MULTI-1 adapter
3—Black
4—Green (preferred) or Yellow

Figure 5-2 Connectors and adapter for most vehicles before 1987
Figure 5-3 Connector and adapter for most OBD-I vehicles

1— Connector
2— HYUN-2 adapter

Figure 5-4 Connector and adapter for SRS system on most 1994 and earlier vehicles

1— HYUN-2 adapter
2— Connector

Figure 5-5 Connectors and adapters for most OBD-II vehicles

1— Connectors
2— MITSU-1 adapter
3— OBD-II adapter

NOTE:
Most OBD-II vehicles have 16-pin and 12-pin connectors and use the MITSU-1 adapter connected through the OBD-II connector. The MITSU-1 lead with the 12-pin connector is not connected on all vehicles. Follow on-screen instructions for the correct hookup.
IMPORTANT:
Do not use the battery pack when connecting to Chrysler Import vehicles. Use the Lighter Power Cable or Battery Power Cable.

5.1.2 ABS Manual Code Reading

Chrysler Import anti-lock brake systems (ABS) transmit Type 11 codes. Figure 5-6 shows how codes display. Table 5-2 explains how to read the codes.

![Figure 5-6 Chrysler Imports anti-lock brake Code Type 11](image)

Table 5-2 Chrysler Import ABS codes type 11

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>For code output: long and short</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>ABS warning lamp</td>
</tr>
</tbody>
</table>
| Start codes by:| 16-pin OBD-II DLC: jumper terminal 1 to ground; or analog meter across terminals 4 or 5 to terminal 8.  
12-pin connector: analog meter across terminals 4 and 12. |
| When done:     | Turn the ignition off, then clear codes. |

Code display cycle repeats as long as system is in the diagnostic state. A battery surge that causes the ABS system to fail may cause Code 16 to set.

5.1.3 Clearing Codes

Trouble codes can be cleared from PCM memory with the scan tool on most 1988 and later models. Select Clear ECM Codes from the main menu.

If code clearing fails for any reason, the previous codes reappear at the top of the data list. If this happens, repeat code clearing.
5.1.4 Codes and Data (Slow)

Some 1988 and later models with the 3.0L SOHC V6 engine transmit data at a 63 baud rate. The Main Menu for these vehicles displays Codes and Data (Slow).

5.1.5 Actuator Tests

The Actuator Tests selection is available from the Main Menu for most pre-OBD-II models. All actuator tests are key-on, engine-off tests, except for the injector and timing tests, which are explained in “Injector Tests (Engine Running Only)”.

Selecting Actuator Tests for these vehicles displays a list of available tests. The available tests vary by year and model.

During testing, you must monitor the selected actuator with a voltmeter, ammeter, or by listening for actuator activation. A completed test does not mean that the actuator is operating. The scan tool only monitors the engine control module (ECM) commands to the actuator.

Select an actuator test and the scan tool commands the ECM to activate it. About 5 seconds later, the engine controller deactivates the actuator.

NOTE:

All actuator tests except for injector tests must be performed with the key on and engine off (KOEO). If you select a KOEO test with the engine running, a “test rejected” message displays.

Injector Tests (Engine Running Only)

The injector tests available from the actuator test menu are performed with the key on and engine running (KOER) and are available on most pre-OBD-II vehicles.

The number of injector tests available varies by the number of cylinders and type of fuel-injection system (a 4-cylinder MPI system has four tests; a six cylinder system has six).

When you select an injector test, the scan tool commands the ECM to disable the selected injector. About 5 seconds later, the ECM stops the test and the injector is enabled.

5.1.6 EVAP Monitoring Test

The EVAP Monitoring Test is available on most 2001 and later models. This test will force the PCM to run the evaporative system self test. The test can be used to confirm repairs made to the evaporative system without taking the vehicle on an EVAP drive cycle road test. If the system fails, the test DTCs will be set in Codes.
5.1.7 4ITE/F4AC1 Quick Learn

Selecting Quick Learn initiates a quick learn test and is usually performed when battery power to the PCM is interrupted. During normal operation, the transmission control module (TCM) continually monitors and “learns”, or updates, clutch volume index (CVI) values.

Newer clutches require less volume, or lower CVI, while worn clutches require more volume, or a higher CVI. If battery power is interrupted, the TCM reverts to baseline values and must “relearn” each clutch circuit.

The transmission learning that occurs during normal operation is intended to compensate for normal wear. However, simply driving the vehicle to “relearn” CVI values is time-consuming, and typically the transmission shift quality is poor. Quick learn allows the TCM to make coarse adjustments quickly, before the vehicle is driven.

5.1.8 4ITE/F4AC1 EMCC Reset

The EMCC Reset selection resets the electronically-modulated converter clutch (EMCC) logic program. The TCM on late-model vehicles with a 4ITE or F4AC1 transmission uses an EMCC logic. The EMCC logic adapts, or learns, during the break-in period on a new vehicle, or after being reset on a vehicle in service.

During the first 500 miles after an EMCC reset, there is no EMCC. During miles 500 to 1500, the TCM gradually decreases EMCC from a 200 RPM to a 60 RPM slip.

5.1.9 4ITE/F4AC1 Battery Disconnect

Selecting Battery Disconnect momentarily interrupts the power supply (B+) signal to the TCM. This resets all of the TCM learned values, without resetting the clock or radio presets.

5.1.10 4ITE/F4AC1 Pinion Factor

The TCM used with the 4ITE/F4AC1 transmission store a programmable value called pinion factor. The Pinion Factor selection provides a way to adjust speedometer calibration to compensate for a tire size change.

To reprogram the pinion factor:
1. Select Pinion Factor.
   A “tire size” screen displays.
2. Press Y if the displayed tire size is not correct.
   A tire size selection screen displays.
3. Select the correct tire size.
   Pinion factor programming takes about ten seconds, then the “tire size” screen displays.
5.1.11 4ITE/F4AC1 Clutch Volume Index (CVI) Display

When available, selecting CVI Display displays wear parameters for the automatic transmission clutches. The numbers next to each parameter represent the volume of fluid required to pressurize each clutch circuit.

The CVI values change as the TCM “learns” or updates clutch fill volumes during normal use and wear. New clutches have the maximum amount of friction material. Therefore, newer clutches require less volume and have a lower CVI value.

The range of “normal wear” for CVI values are:

- LR Clutch = 35 to 83
- 2-4 Clutch = 20 to 70
- UD Clutch = 24 to 70
- OD Clutch = 48 to 150

The OD Clutch value varies per model year. Refer to the Fast-Track Domestic Transmission Troubleshooter or the Chrysler Service Manual for correct OD clutch CVI values.

If battery power is interrupted, the TCM reverts to initial, or baseline, CVI values and the TCM must “relearn” each clutch circuit. Be aware, initial CVI values are not used during troubleshooting. They are startup values only.

To **teach** clutch volumes to the transmission control module:

1. Run the quick learn functional test.

**NOTE:**

The ATM tests actuate solenoids in the transmission. The parking brake must be set during the tests. The shift lever must be in park to exit an ATM test. If the shift lever is not in park, the scan tool does not exit the test.

2. Road test and run through a complete up and down shift sequence.

   Avoid moving the throttle on steady acceleration upshifts. The TCM must also learn high-speed and low-speed kickdown shifts. Refer to Chrysler test procedures for more detailed information.
This chapter contains information for testing Daihatsu vehicles with the Asian Import Vehicle Communication Software (VCS). The following systems may be available for testing:

- 1988–92 Charade, Engine
- 1990–92 Rocky, Engine
- 1989–92 Charade, Transmission
- 1991–92 Rocky, ABS
- Manual Code Reading

6.1 Testing Engine, Transmission, and ABS

Testing Daihatsu engine systems and ABS includes:

- “Code Reading Connectors and Locations” on page 40
- “Manual Code Reading” on page 41
- “Code Reading Connector Locations (Transmission)” on page 42

6.1.1 Code Reading Connectors and Locations

Diagnostic test connector location varies by model. On the 1990–92 Rocky it is on the right fender panel, and on the 1988–92 Charade it is on the upper section of the transmission.

To read engine codes automatically (Auto Code Read):

- Connect the MULTI-1 adapter with black terminal converters to the 6-pin connector as shown in Figure 6-1.

![Figure 6-1 Engine connector and MULTI-1 adapter (Auto Code Read)]
To read ABS codes from a 1991–92 Rocky automatically (Auto Code Read):

- Connect the MULTI-1 adapter with black terminal converters to the 6-pin connector located near the battery with a gray cover (Figure 6-2).

![6-Pin Connector](image)

1— White
2— Blue
3— Black

Figure 6-2 Daihatsu Rocky 6-pin diagnostic connector and MULTI-1 adapter

6.1.2 Manual Code Reading

Jump the appropriate connector pins to manually access Daihatsu engine and antilock brake system codes. Refer to Figure 6-4 and Table 6-1 on page 42 to read the codes.

To read engine codes manually (Flash Codes):

- Jump pins shown in Figure 6-3 and turn the ignition on. Engine and ABS codes flash the same. See Figure 6-7 and Table 6-1 for manual code reading information.

![Figure 6-3](image)

Figure 6-3 Jumper Engine connector. Pins as shown for flash codes (Flash Codes)

To read ABS codes manually (Flash Codes) from a 1991–92 Rocky:

- Jump pins as shown in Figure 6-4 and turn the ignition on. ABS codes and Engine codes flash the same. See Figure 6-7 and Table 6-1 on page 42 for manual code reading information.

![Figure 6-4](image)

Figure 6-4 Jumper ABS 6-pin connector pins shown for flash codes.
6.2 Testing Transmission Systems

The VCS allows 1989–92 Daihatsu Charade transmission testing.

6.2.1 Code Reading Connector Locations (Transmission)

To read codes automatically from a 1989 charade transmission (Auto Code Read):

- Connect the MULTI-1 adapter with black terminal converters to the 4-pin connector as shown in Figure 6-6. The connector is located near the brake booster and left strut tower.

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Straight count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>Depending on the control system, flashes Check Engine lamp, or ABS lamp.</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Jumper two terminals in a connector, then turn the ignition on.</td>
</tr>
<tr>
<td>When done:</td>
<td>Turn the ignition off, then clear codes.</td>
</tr>
<tr>
<td>Code 1 is a pass code (system OK). After repairing problem, clear codes and drive car; then check for other codes.</td>
<td></td>
</tr>
</tbody>
</table>

Table 6-1 Daihatsu engine and ABS codes

Code 3

Code 5

Repeat

Multi-1 Adapter

4-Pin Connector

1 — Yellow
2 — White
3 — Green
4 — Black

Figure 6-6 1989 transmission 4-pin connector and MULTI-1 adapter
To read codes automatically from 1990–92 Daihatsu Charade transmissions (Auto Code Read):

- Connect the MULTI-1 adapter with black terminal converters to 6-pin connector as shown in Figure 6-7. The connector is located near the bulkhead in the engine compartment.

![6-Pin Connector](image)

1 — Yellow
2 — White
3 — Green
4 — Black with ground extension

Figure 6-7 1990-1992 6-pin Transmission connector and MULTI-1 adapter
This chapter contains information for testing Geo vehicles with the Asian Import Vehicle Communication Software (VCS). The following Geo systems may be available for testing:

- Engine
- Transmission
- Antilock Brake System (ABS)

7.1 Testing Engine, Transmission, and Antilock Brake Systems

NOTE:
Operations described in this section are not available on all tool platforms.

Geo engine, transmission, and antilock brake system testing includes:

- “Code Reading Connectors and Locations” on page 44
- “Hard Codes and Soft Codes” on page 51
- “Clearing Codes” on page 51
- “Field Service Functional Tests” on page 52
- “Prizm Actuator Tests” on page 52

7.1.1 Code Reading Connectors and Locations

Code reading test connector location, procedure, and adapter use varies by model.

To read 1989–95 Prizm engine codes:
- Connect the TOY-1 adapter to the connector in the box marked “diagnosis” on either fenderwell (Figure 7-1).
To read 1989–95 Prizm engine codes (optional):
- Jump diagnosis connector pins as shown in Figure 7-2.

To read 1989–92 Metro (except 1992 1.3L) engine codes:
- Connect the MULTI-1 adapter with red terminal converters to the connector near the left side of the engine (Figure 7-3).
To read 1989 Spectrum and 1990–94 Storm engine codes:
• Connect the MULTI-2-D adapter to the connector near the passenger kick panel (Figure 7-4).

To read 1989 Spectrum and 1990–94 Storm engine codes (optional):
• Jump pins as shown in Figure 7-5.

To read 1989–95 Tracker engine codes:
• Jump pins as shown in Figure 7-6 on the connector near the left side of the engine.
To read 1992–95 Metro (except 1992 1.0L) engine codes:
- Jump pins as shown in Figure 7-7 on the connector near the left strut tower on the firewall.

To read 1992–94 Storm 1.8L transmission codes:
- Connect the MULTI-1 adapter to the 5-pin connector under the glove box (Figure 7-8).

To read 1992–94 Storm 1.8L transmission codes (optional):
- Jump pins as shown in Figure 7-9.
To read 1992–95 1.3L and 1995 1.0L Metro transmission codes:
- Connect the MULTI-1 adapter to the 3-pin connector (Figure 7-10) under the left side of the dashboard.

![Diagram of connector and adapter](image)

1 — Connector  
2 — MULTI-1 adapter  
3 — Green  
4 — White  
5 — Black

**Figure 7-10** 1992–95 1.3L and 1995 1.0L Metro connector and adapter

To read 1992–94 1.0L Metro transmission codes:
- Connect the MULTI-1 adapter as shown in Figure 7-11.

![Diagram of connector and adapter](image)

1 — Diagnostic connector 701 — pink wire and black/white wire  
2 — Diagnostic connector 705 — black wire and pink/black wire  
3 — Black  
4 — White  
5 — Green  
6 — Steering column  
7 — MULTI-1 adapter

**Figure 7-11** 1992–94 1.0L Metro transmission connector and adapter
To read 1992 Prizm with 4AGE and 1993–95 Prizm with 7AFE transmission codes:

- Connect the TOY-1 adapter to the connector shown in Figure 7-12.

![Figure 7-12 1992 Prizm with 4AGE and 1993–95 Prizm with 7AFE transmission](image)

1—Connector
2—TOY-1 adapter

Figure 7-12 1992 Prizm with 4AGE and 1993–95 Prizm with 7AFE transmission

To read 1990–95 Tracker Kelsey-Hayes RWAL ABS codes:

1. Locate the connector under the dash, left of the steering column near the fuse box.
2. Turn the key on with the engine off.
3. Release the parking brake and jump pins 3 and 5 (Figure 7-13) for two seconds, then remove the wire to flash codes.

![Figure 7-13 1990–95 Tracker RWAL ABS connector jump pins](image)

Figure 7-13 1990–95 Tracker RWAL ABS connector jump pins

**Manual Code Reading**

Several different types of manual code display are used for Geo models:

- Type 01 engine codes, see Figure 7-14 and Table 7-1
- Type 09 engine codes, see Figure 7-15 and Table 7-2
- Type 01 transmission codes, see Figure 7-16 and Table 7-3
- Type 09 transmission codes, see Figure 7-17 and Table 7-4
- ABS codes, see Figure 7-18
Table 7-1  Engine Code Type 01

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>10s and 1s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>Check Engine lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Install a jumper wire between two pins and turn the ignition on.</td>
</tr>
<tr>
<td>When done:</td>
<td>Turn the ignition off, remove jumper wire, then clear codes.</td>
</tr>
<tr>
<td>Code 12 always appears first. Each code repeats three times, including code 12. The code display cycle repeats as long as system is in a diagnostic state.</td>
<td></td>
</tr>
</tbody>
</table>

Table 7-2  Engine Code Type 09

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>10s and 1s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>Check Engine lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Use TOY-1 adapter, turn the ignition on, and select Manual Codes.</td>
</tr>
<tr>
<td>When done:</td>
<td>Turn the ignition off, disconnect the scan tool, the clear codes.</td>
</tr>
</tbody>
</table>

Table 7-3  Transmission Code Type 01 (part 1 of 2)

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>10s and 1s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>ECONO lamp</td>
</tr>
</tbody>
</table>
Geo ABS codes flash in a straight count with one long flash at the end (Figure 7-18). The code repeats, only one code is stored.

<table>
<thead>
<tr>
<th>Table 7-3</th>
<th>Transmission Code Type 09 (part 2 of 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start codes by:</td>
<td>Connect the TOY-1 adapter, turn the O/D switch on, turn the ignition on, then select Manual Codes.</td>
</tr>
<tr>
<td>When done:</td>
<td>Turn the ignition off, disconnect the scan tool, then clear codes.</td>
</tr>
</tbody>
</table>

Geo ABS codes flash in a straight count with one long flash at the end (Figure 7-18). The code repeats, only one code is stored.

### 7.1.2 Hard Codes and Soft Codes

Some models separate hard codes from soft ("historical") codes.

### 7.1.3 Clearing Codes

Some 1987 and later models allow clearing trouble codes.

If the code-clearing operation fails for any reason, the previous codes reappear at the top of the data list when you return to Codes and Data. If this happens, repeat code clearing.
7.1.4 Field Service Functional Tests

**NOTE:**
Operations described in this section are not available on all tool platforms.

The Field Service functional test is available for most 1980½ and later Geo models with General Motors control systems.

**IMPORTANT:**
Do not enter Field Service mode while driving a vehicle. ECM changes to ignition timing, fuel delivery, and other engine functions may affect engine operation and vehicle control.

During Field Service, the VCS grounds diagnostic pin B in the ALDL connector. The ECM does not transmit data in this mode and new trouble codes cannot set. You can use Field Service to check or adjust ignition timing or the idle minimum air rate on some models.

With the key on and the engine off, the instrument panel Check Engine lamp flashes stored trouble codes if any are present or code 12 if no codes are present. With the key on and the engine off, the ECM also energizes all solenoids. You can use Field Service mode to test solenoid operation.

Field Service mode works differently depending on the engine:

- With a carbureted engine running, the Check Engine lamp stops flashing code 12 and new trouble codes cannot be set. The ECM also sets ignition timing to a fixed degree of advance, which lets you check and adjust timing. You also can use the Field Service mode for a system performance check on carbureted engines. Refer to a vehicle service manual for details.
- For some fuel-injected engines, the instrument panel Check Engine lamp flashes rapidly when the engine is running in open loop and slowly when in closed loop. Additionally, in closed loop, the length of the lamp flash indicates whether the exhaust is rich or lean. The lamp flash is longer if the exhaust is rich.

7.1.5 Prizm Actuator Tests

The 1996 and later Geo Prizm offers interactive bidirectional actuator tests. Most of the actuator tests are best performed with the key on and the engine running. The Fuel Pump and Fuel Pump Relay tests must be performed with the key and engine off.

Most tests automatically display data parameters to help determine actuator or system performance, but some tests do not display parameters and require you to monitor the selected actuator. Measure the signal using a digital multimeter, or listen for activation. For most tests, scrolling up and down switches the actuator on and off. Test completion does not mean that the actuator was activated.

**IMPORTANT:**
Do not enter any actuator test while driving a vehicle on a road test, unless the specific test requires you to do so. PCM changes to ignition timing, fuel delivery, and other engine functions may affect engine operation and vehicle control.

For engine testing, a typical list of actuator tests includes:

- Injector volume
• Idle air control duty cycle
• EGR system
• Fuel pump relay
• Fuel pump
• A/C clutch relay

For transmission testing, a typical list of actuator tests includes:

• O/D cut switch
• Converter lock up
• Shift

To perform an EGR system test:
1. From the Actuator Tests menu, select **EGR System**.
2. Select to continue when the activation screen displays.
   The EGR Test screen displays.
3. Raise the engine RPM to 2500. By scrolling up and down, you control the PCM command to
   the valve that switches sense vacuum to the EGR valve on and off.
   The EGR TEMP and ST TRIM parameters on the screen make it easy to determine if exhaust
   gas is indeed being recirculated.
   – With EGR SYS_OFF, expect low EGR TEMP.
   – With the EGR SYS_ON, the EGR TEMP should rise and the ST TRIM values
     should change.
4. After testing the EGR, press N to return to the menu.

To perform a Fuel Pump test:
1. From the Actuator Tests menu, select **Fuel Pump**.
2. Select to continue when the activation screen displays.
   The Fuel Pump test screen displays.
   The test runs for 30 seconds, then the pump shuts off and a test completed message displays.
3. Exit to return to the menu.
This chapter contains information for testing Honda vehicles with the Asian Import Vehicle Communication Software (VCS). The following Honda systems may be available for testing:

- Engine
- Transmission
- Antilock Brake System (ABS)
- Airbag (SRS)

### 8.1 Testing Engine and Transmission Systems

Honda engine system testing includes:

- “Code Reading Connectors and Locations” on page 54
- “SCS mode” on page 56
- “Code Type” on page 57
- “Manual Code Reading (1986–91) ECM LED ONLY” on page 59
- “Manual Code Reading” on page 62

#### 8.1.1 Code Reading Connectors and Locations

Refer to Figure 8-1 for common connector locations for Honda vehicles. Connector configurations are shown in Figure 8-2, Figure 8-3 and Figure 8-4 on page 55. Refer to Table 8-1 on page 55 to determine which adapter to use to test a specific vehicle.
### Table 8-1 Common connector locations

<table>
<thead>
<tr>
<th>VEHICLE</th>
<th>YEAR</th>
<th>SCS 2-PIN</th>
<th>DLC 3-PIN</th>
<th>DLC 16-PIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accord, 4-cylinder</td>
<td>1994–95</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1996–97</td>
<td>2</td>
<td></td>
<td>6*</td>
</tr>
<tr>
<td></td>
<td>1998–2004</td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Accord, V6</td>
<td>1995–97</td>
<td>2</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>1998–2004</td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Civic</td>
<td>1992–95</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1996–2000</td>
<td>1</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>2001–04</td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>CR-V</td>
<td>1997–2001</td>
<td>4**</td>
<td></td>
<td>4**</td>
</tr>
<tr>
<td></td>
<td>2002–04</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>del Sol</td>
<td>1993–95</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1996–97</td>
<td>1</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Element</td>
<td>2003–04</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Insight</td>
<td>2000</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Insight</td>
<td>2001–04</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Odyssey</td>
<td>1995</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1996–98</td>
<td>3</td>
<td></td>
<td>4**</td>
</tr>
<tr>
<td></td>
<td>1999–2004</td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Passport</td>
<td>1994–96</td>
<td>9</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1997–2002</td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Pilot</td>
<td>2003–04</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Prelude</td>
<td>1992–95</td>
<td>7</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1996</td>
<td>7</td>
<td></td>
<td>5***</td>
</tr>
<tr>
<td></td>
<td>1997–2001</td>
<td>4**</td>
<td></td>
<td>4**</td>
</tr>
<tr>
<td>S2000</td>
<td>2000–01</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2002–04</td>
<td></td>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

* Remove ashtray
** Remove the DLC cover
*** Remove the beverage cover

![Figure 8-2 OBD-II data link connector (DLC)](image)

![Figure 8-3 3-pin DLC](image)

![Figure 8-4 2-pin service check signal (SCS) connector](image)
8.1.2 SCS mode

Purpose of SCS (Service Check Signal) mode:

- Enables a diagnostic mode
- Flash out DTCs stored for the PCM, ABS, TCS, and SRS modules
- Code clearing on certain ABS systems
- Bypass two trip detection mode for ODB II drive cycles

**NOTE:**
Certain OBD-II vehicles use a separate 2 pin SCS connector. Other OBD-II models use a SCS pin in the 16 Pin DLC. Both function the same way. For specific applications, refer to “Code Reading Connectors and Locations”.

Models with a separate 2 pin SCS connector:
Select “How to get codes” from the codes menu, then follow the on-screen instructions.

Models with the SCS in the 16 pin DLC:
The scan tool grounds the appropriate pin of the DLC, which enables the SCS mode. Follow the on-screen instructions.

Two-trip detection bypass
Use SCS mode to bypass ODB 'two trip detection' and re-create certain DTCs during diagnosis. Some codes require a back driving sequence (two road tests) where the fault must occur in a similar operating condition.

**NOTE:**
On ODB II vehicles with the separate 2 pin SCS connector, jumper the 2 pin connector for the SCS mode functions.

A DTC can be captured in one driving event by connecting the Scanner™ and selecting ‘SCS” mode from the main menu (on applicable vehicles). For scan data usage during SCS mode, you can manually jump the DLC from the backside while the scanner is connected to the DLC.

![Figure 8-5 Data connector from the wire side (Honda numbering, not the same as SAE)
8.1.3 Code Type

For those systems that rely on manual code reading, you must interpret a DTC from a flashing indicator lamp. The code flash sequence varies by model and system. The scanner therefore refers you to a certain ‘code type’ (i.e. COPE TYPE 04). Code type is a specific labeling system that identifies the appropriate section in this manual for each subsystem.

ECM Locations - 1985 to 1991 ECM LED

![Diagram of ECM and LED locations]

**Figure 8-6 Common ECM and LED locations**

<table>
<thead>
<tr>
<th>VEHICLE</th>
<th>YEAR</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accord LXI</td>
<td>1986–89</td>
<td>1 Under seat</td>
</tr>
<tr>
<td>Civic</td>
<td>1985–87</td>
<td>4 Under seat</td>
</tr>
<tr>
<td></td>
<td>1988–91</td>
<td>2 Under carpet</td>
</tr>
<tr>
<td>CRX</td>
<td>1985–87</td>
<td>4 Under seat</td>
</tr>
<tr>
<td>Prelude</td>
<td>1985–87</td>
<td>5 Under left rear ashtray</td>
</tr>
<tr>
<td></td>
<td>1988–91</td>
<td>2 Under carpet</td>
</tr>
</tbody>
</table>
1— Remove ashtray to see LED flash
2— ECM

Figure 8-7 Sample ECM locations

1— Service Check connector
2— Jump wire

Figure 8-8 1990–later Accord and Prelude Service Check connector locations

1— White DLC
2— Jump wire

Figure 8-9 1994–95 Passport data link connector locations
8.1.4 Manual Code Reading (1986–91) ECM LED ONLY

There are 3 types of manual engine codes:

- Type 02, see Figure 8-10 and Table 8-3 on page 59
- Type 03, see Figure 8-11 and Table 8-4 on page 59
- Type 04, see Figure 8-12 and Table 8-5 on page 60

![Figure 8-10 Honda engine Code Type 02](image)

Table 8-3 Honda engine Code Type 02

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Straight count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>Engine—Red LED on ECM; Trans—Red LED on TCM</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Turn the ignition on.</td>
</tr>
<tr>
<td>When done:</td>
<td>Turn the ignition off, then clear codes.</td>
</tr>
</tbody>
</table>

Only one code displayed at a time except on some late model cares. After repairing the problem, clear codes and drive car; then check for other codes.

![Figure 8-11 Honda engine Code Type 03](image)

Table 8-4 Honda engine Code Type 03

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Long and short</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>Red LED on ECM; except 1990 and later Accord &amp; Prelude flash codes on CHECK engine lamp on dash</td>
</tr>
<tr>
<td>Read codes on:</td>
<td>Red LED on TCM or gear indicator lamp on dash</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Turn the ignition on; except for 1990 and later Accord &amp; Prelude, jumper the check connector, then ignition on.</td>
</tr>
<tr>
<td>When done:</td>
<td>Turn the ignition off, then clear codes.</td>
</tr>
</tbody>
</table>

One code displays at a time. Repair, clear codes and drive to check for codes.
8.2 Testing ABS

Testing Honda ABS includes:

- “ABS Codes and Data Testing” on page 60
- “Manual Code Reading” on page 62
- “Code Clearing for 1996–2002 Passport with 4-Wheel ABS” on page 65

8.2.1 ABS Codes and Data Testing

The following selections are available for ABS testing:

- “ABS Main Menu” on page 60
- “Codes and Data Menu” on page 61
- “Data (No Codes)” on page 61
- “Codes Only” on page 61
- “Clear Codes” on page 61

ABS Main Menu

After selecting ABS from the System Selection menu, the Main Menu (ABS) displays. Selections vary by model and year.

The following main menu selections are discussed:

- “Codes and Data Menu”
- Movies, Custom Setup, and Troubleshooter are discussed in detail in the user’s manual for your diagnostic tool.
**Codes and Data Menu**

The following selections are available:

- **Data (No Codes)**—begins communication with the ABS module and displays data parameters.
- **Codes Only**—gathers and displays ABS trouble codes.
- **Clear Codes**—clears ABS memory codes from the ABS ECM memory.
- **Review Codes**—allows you to view codes. (This menu item appears only after code gathering.)
- **Print Codes**—allows you to print codes. (This menu item appears only after code gathering.)

**Data (No Codes)**

This section has information on viewing ABS data using the scan tool.

*To enter and exit ABS data:*
1. Enter in the vehicle ID.
2. Turn the ignition on.
3. Select **Data (No Codes)**
4. Turn the ignition off after completing the ABS data tests.

**Codes Only**

This section has information on retrieving ABS codes using the scan tool.

*To gather codes:*
1. Select **Codes Only**.
   - A “key on” verification screen displays. Make sure the ignition is switched on.
2. Select to continue.
   - The “initializing Communication” message appears.

**NOTE:**

The “initializing Communication” screen means the scan tool is attempting to start the test, however it does not mean the vehicle has responded. If the message stays on the screen more than a few minutes, the test did not start.

If no codes are detected during the test a “P0000 no faults present” message displays

3. The Code List, which shows all codes in memory displays if codes are present.

**Clear Codes**

This section has information on clearing ABS codes using the scan tool.

*To clear codes:*
1. Select **Clear Codes**.
   - A “key on” verification screen displays. Make sure the ignition is switched on.
2. Select to continue.
   - A code clearing confirmation screen displays.
3. Select to clear ABS codes.
   The DTCs Cleared screen appears,
4. Select to exit.

8.2.2 Manual Code Reading

There are several types of manual codes for Honda ABS:

- Type 02, see Figure 8-13 and Table 8-6 on page 62
- Type 04, see Figure 8-14 and Table 8-7 on page 63
- Type 04a, see Figure 8-15 and Table 8-8 on page 63
- Type 05a, see Figure 8-16 and Table 8-9 on page 64
- Type 06, see Figure 8-17 and Table 8-10 on page 64

![Figure 8-13 Honda ABS Code Type 02](image)

Table 8-6 Honda ABS Code Type 02

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Main code and sub-code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>ABS warning lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Short the service check connector and turn the ignition switch on, but do not start the engine. The ABS indicator will stay on for 1 seconds then turn off, main code will flash then pause 1 second, sub-code will flash then turn off for 5 seconds, main code will flash then turn off for 5 seconds, main code will flash and then turn off for one second, sub code will flash</td>
</tr>
<tr>
<td>When done:</td>
<td>Disconnect the ABS B2 (15A) fuse in the under-hood fuse-relay box for at least three seconds to erase the ABS control unit's memory. Then turn the ignition key on again and recheck. The memory is erased if the connector is disconnected from the ABS control unit. Before starting the engine, disconnect the jumper wire from the service check connector, or else the Malfunction Indicator Lamp (MIL) will stay on with the engine running.</td>
</tr>
</tbody>
</table>
Table 8-7 Honda ABS Code Type 04

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>10s and 1s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>ABS warning lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Short the service check connector and turn key on, ABS indicator will stay on for 2 seconds then turn off, main code will flash then pause 0.4 seconds, sub-code will flash and pause 3.6 seconds, stored codes will flash only one time per ignition cycle, cycle key at least once to verify codes. Do not press the brake pedal when retrieving codes or the system will go into code clear mode.</td>
</tr>
<tr>
<td>When done:</td>
<td>Clear codes with SCS connector shorted. Cycle key to the ON position with brake pedal pressed, ABS light will turn on, then shut off, release pedal, light will turn on, press brake pedal until light turns off, release pedal.</td>
</tr>
</tbody>
</table>

Table 8-8 Honda ABS Code Type 04a

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>10s and 1s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>ABS warning lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Short the service check connector and turn key on, ABS indicator will stay on for 2 seconds then turn off, main code will flash then pause 0.4 seconds, sub-code will flash and pause 3.6 seconds, stored codes will flash only one time per ignition cycle, cycle key at least once to verify codes. Do not press the brake pedal when retrieving codes or the system will go into code clear mode.</td>
</tr>
<tr>
<td>When done:</td>
<td>Clear codes by cycling the ignition on and off 20 times.</td>
</tr>
</tbody>
</table>
Table 8-9 Honda ABS Code Type 05a

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Straight count (first long flash starts the code, the rest are short flashes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on</td>
<td>Rear ABS indicator lamp or brake lamp</td>
</tr>
<tr>
<td>Start codes by</td>
<td>With the key on, momentarily connect and disconnect terminals 12 and 4 on the OBĐ-II 16-pin DLC (Figure 8-2). Turn the ignition switch on.</td>
</tr>
<tr>
<td>Clearing codes</td>
<td>Codes are cleared every time the key is cycled off.</td>
</tr>
<tr>
<td>When done</td>
<td>Clear codes, diagnose, repair, test drive, and check for other codes.</td>
</tr>
</tbody>
</table>

If there is no code stored, the Rear ABS lamp goes off and remains off. If a code is stored, the lamp begins flashing. If the Rear ABS lamp stays on continuously, check to see if the DLC leads are shorted together. The leads must only be shorted momentarily.

The ECBM may display a code in mid-count when the diagnostic lead is first grounded. Allow the lamp to flash its sequence several times to be sure you are reading the code accurately. Remember, a long flash starts the code and the rest are short flashes.

The ECBM stores only one code at a time, even if there is more than one problem. Repair the first code, clear memory, then test drive to check for any other codes.

Table 8-10 Honda ABS Code Type 06

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Main code and sub-code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on</td>
<td>ABS warning lamp</td>
</tr>
<tr>
<td>Start codes by</td>
<td>Short the SCS and turn key on; ABS indicator light will stay on for 2 seconds then turn off; main code will flash then pause 1 second; sub-code will flash and pause 5 seconds; stored codes will flash only one time per ignition cycle; cycle key at least once to verify codes.</td>
</tr>
<tr>
<td>When done</td>
<td>Clear codes by removing the ABS B2 (15A) fuse from the ABS fuse box for 10 seconds.</td>
</tr>
</tbody>
</table>
8.2.3 Code Clearing for 1996–2002 Passport with Rear Wheel ABS

To read 1996–2002 Passport with RWAL codes:

- Jump pins 4 and 12 as shown in Figure 8-18.

![Figure 8-18 1996–2002 Passport with RWAL system](image)

1— Data Link Connector (DLC)
2— Pins 4 and 12

8.2.4 Code Clearing for 1996–2002 Passport with 4-Wheel ABS

To clear ABS DTCs from a 1996–2002 Passport with 4WAL:

1. With the ignition off, jump pins 4 and 12 of the 16-pin DLC (Figure 8-19).
2. Switch the ignition on and allow the ABS lamp to flash at least once before proceeding.
3. Depress the brake pedal by hand until you hear the solenoid click, then release the pedal. Repeat eight times within three seconds.

   After the eighth pedal cycle the ABS lamp stops flashing, lights for one second, then begins flashing code 12 (no codes). Memory is erased once code 12 flashes 4 times.

![Figure 8-19 1996–2002 Passport with 4WAL system](image)

1— DLC
2— Jump wire
8.3 Testing Supplemental Restraint Systems (SRS)

Testing Honda SRS includes:

- “SRS Main Menu” on page 66
- “Manual Code Reading” on page 67
- “Code Clearing” on page 71

8.3.1 SRS Main Menu

After selecting SRS from the System Selection menu, the Main Menu (SRS) displays. Selections vary by model and year.

The following main menu selections are discussed:

- “Codes and Data Menu”
- Movies, Custom Setup, and Troubleshooter are discussed in detail in the user’s manual for your diagnostic tool.

Codes and Data Menu

When Codes and Data Menu is selected, a menu with the following options displays:

- **Data (No Codes)**—begins communication with the SRS module and displays data parameters.
- **Codes Only**—gathers and displays SRS trouble codes.
- **Clear Codes**—clears SRS memory codes from the SRS ECM memory.
- **Review Codes**—allows you to view codes. (This menu item appears only after code gathering.)
- **Print Codes**—allows you to print codes. (This menu item appears only after code gathering.)

Data (No Codes)

This section has information on viewing SRS data using the scan tool.

To enter and exit SRS data:
1. Enter in the vehicle ID.
2. Turn the ignition on.
3. Select **Data (No Codes)**
4. Turn the ignition off after completing the SRS data tests.

Codes Only

This section has information on retrieving SRS codes using the scan tool.
To gather codes:
1. Select **Codes Only**.
   
   A “key on” verification screen displays. Make sure the ignition is switched on.
2. Select to continue and the “initializing communication” screen displays.

**NOTE:**
The “initializing communication” screen means the scan tool is attempting to start the test, however it does not mean the vehicle has responded. If the message stays on the screen more than a few minutes, the test did not start.

3. The Code List, which shows all codes in memory displays if codes are present.

**Clear Codes**
This section has information on clearing SRS codes using the scan tool.

To clear codes:
1. Select **Clear Codes**.

   A “key on” verification screen displays. Make sure the ignition is switched on.
2. Select to continue and a code clearing confirmation screen displays.
3. Select to clear ABS codes.

   The DTCs Cleared screen displays.
4. Select to exit.

**8.3.2 Manual Code Reading**
There are several types of Honda SRS codes:
- Type 03, see Figure 8-20 and Table 8-11 on page 68
- Type 06, see Figure 8-21 and Table 8-12 on page 68
- Type 06 with a continuous failure, see Figure 8-22 and Table 8-13 on page 69
- Type 06 with an intermittent failure, see Figure 8-23 and Table 8-14 on page 69
- Type 06 with no failure, see Figure 8-24 and Table 8-15 on page 70
- Type 07, see Figure 8-25 and Table 8-16 on page 70
### Table 8-11 Honda SRS Code Type 03

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>10s and 1s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>SRS warning lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>With key switch off, connect terminals 13 and 4 on the OBD-II 16-pin DLC (Figure 8-26). Turn ignition switch to the ON position.</td>
</tr>
<tr>
<td>Clearing codes:</td>
<td>Clearing codes can only be done using the factory scan tool.</td>
</tr>
<tr>
<td>When done:</td>
<td>Turn the ignition off, disconnect the connectors, then clear codes.</td>
</tr>
</tbody>
</table>

The trouble codes are displayed by flashing the warning lamp. Each code displayed consists of a number of flashes that represent the tens digit, a 1.2 second pause, then a number of flashes that represent the ones digit. Each code displays once.

Code 12 always flashes first, followed by any current codes. After the current codes, code 13 may flash to indicate the presence of history codes, which then follow. If only history codes are present, code 12 flashes first, followed by code 13, followed by the historical codes. The code cycle repeats as long as the system is in the diagnostic state.

### Table 8-12 Honda SRS Code Type 06

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Main code and sub-code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>SRS warning lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Short the SCS and turn key on; SRS warning light will turn on then off after 3.0 seconds; if code is greater than 10, four quick flashes (0.1 seconds each) = 10; main code will flash and pause 2.0 seconds and flash again if code is greater than 1; after a 2.0 second pause, sub-code will flash 0.3 second pulses, followed by more flashes if code is greater than 1.</td>
</tr>
<tr>
<td>When done:</td>
<td>Clear codes.</td>
</tr>
</tbody>
</table>

If the SCS connector is shorted and SRS has no stored DTC, the SRS light remains on continuously.
Table 8-13 Honda SRS Code Type 06 - Continuous Failure

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Main code and sub-code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>SRS warning lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Short the SCS and turn key on; SRS warning light will turn on then off after 3.0 seconds; Code will then flash for the most recent problem, followed by the second most recent problem, followed by the third most recent problem. Indications are repeated in case of continuous failure.</td>
</tr>
<tr>
<td>Clearing codes:</td>
<td>See “Code Clearing” on page 71.</td>
</tr>
<tr>
<td>When done:</td>
<td>Clear codes.</td>
</tr>
</tbody>
</table>

Table 8-14 Honda SRS Code Type 06 - Intermittent Failure

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Main code, sub-code, stays on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>SRS warning lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Short the SCS and turn key on; SRS warning light will turn on then off after 3.0 seconds; Code will then flash, then indicator stays on representing intermittent failure</td>
</tr>
<tr>
<td>Clearing codes:</td>
<td>See “Code Clearing” on page 71.</td>
</tr>
<tr>
<td>When done:</td>
<td>Clear codes.</td>
</tr>
</tbody>
</table>
**Table 8-15  Honda SRS Code Type 06 - Normal (no failure)**

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>No code, stays on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>SRS warning lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Short the SCS and turn key on; SRS warning light will turn on then off after 3.0 seconds; The indicator will then stay on indicating that the system is normal.</td>
</tr>
<tr>
<td>Clearing codes:</td>
<td>See “Code Clearing” on page 71.</td>
</tr>
<tr>
<td>When done:</td>
<td>Clear codes.</td>
</tr>
</tbody>
</table>


---

**Table 8-16  Honda SRS Code Type 07**

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Main code and sub-code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>SRS warning lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Short the SCS and turn key on; SRS warning light will turn on then turn off after 2.0 seconds; main code will flash and pause 1.2 seconds and flash again if code is greater than 1; add the flashes together for main code; after a 2.0 second pause, sub-code will flash in 0.3 second pulses, and flash again if code is greater than 1; add the flashes together for sub-code.</td>
</tr>
<tr>
<td>Clearing codes:</td>
<td>See “Code Clearing” on page 71.</td>
</tr>
<tr>
<td>When done:</td>
<td>Clear codes. If the SCS connector is shorted and SRS has no stored DTC, it’s normal to see the SRS light remain on continuously. Some models will flash SRS lamp continuously without pausing.</td>
</tr>
</tbody>
</table>

Computer can store up to three most recent codes.
8.3.3 Code Clearing

To clear SRS DTCs on all models except Passport:

1. Switch the ignition off.
2. Connect the SCS service connector (Honda 07PAZ-001100) to the yellow 2-pin MES connector. A common jumper wire can also be used, as long as you maintain good contact between the terminals.
3. Switch the ignition on.
   The SRS indicator lamp lights for about 6 seconds, then goes off.
4. Remove the SCS service connector from the MES connector within 4 seconds of the lamp switching off.
5. When the SRS indicator lamp lights again, connect the SCS service connector to the MES connector within 4 seconds of the lamp switching on.
6. When the SRS indicator lamp shuts off, remove the SCS service connector from the MES connector within 4 seconds.
   The SRS lamp flashes twice to indicate memory has been erased.
7. Switch the ignition off and wait ten seconds.
1—Memory Erase Signal (MES) connector
2—SCS service connector (Honda 07PAZ-0010100)

*Figure 8-28* 1994–2000 Civic, 1992–1997 del Sol SRS code clearing

*Figure 8-29* SCS Service Connector Honda tool 07PAZ-0010100 (or use jumper wire equivalent)

1—MES connector
2—SCS service connector (Honda 07PAZ-0010100)

*Figure 8-30* 1997–2001 Prelude SRS code clearing
Honda Testing Supplemental Restraint Systems (SRS)

1—MES connector
2—SCS service connector (Honda 07PAZ-0010100)

Figure 8-31 1996–98 Odyssey, 1995–97 Accord SRS code clearing

1—MES connector
2—SCS service connector (Honda 07PAZ-0010100)

Figure 8-32 1994–96 Prelude SRS code clearing

1—SCS service connector (Honda 07PAZ-0010100)
2—MES connector

Figure 8-33 1999–2002 Odyssey SRS code clearing (left side of dash)
1— MES connector
2— SCS service connector (Honda 07PAZ-0010100)

**Figure 8-34** 1998–2003 Accord, 2000–03 S2000 SRS code clearing (left side of dash)

1— MES connector
2— SCS service connector (Honda 07PAZ-0010100)

**Figure 8-35** 2004 S2000 SRS code clearing (left side of dash)

1— MES connector
2— SCS service connector (Honda 07PAZ-0010100)

**Figure 8-36** 2004 Accord SRS code clearing (left side of dash)
1— SCS service connector (Honda 07PAZ-0010100)
2— MES connector

Figure 8-37 1997–2001 CR-V SRS code clearing (left side of dash)

1— MES connector
2— SCS service connector (Honda 07PAZ-0010100)

Figure 8-38 2002–04 CR-V SRS code clearing (left side of dash)

1— MES connector
2— SCS service connector (Honda 07PAZ-0010100)

Figure 8-39 2001–04 Civic, 2003–04 Element SRS code clearing
1—MES connector
2—SCS service connector (Honda 07PAZ-0010100)

**Figure 8-40** 2000–04 Insight SRS code clearing (left side of dash)

1—MES connector
2—SCS service connector (Honda 07PAZ-0010100)

**Figure 8-41** 2003–04 Pilot SRS code clearing
This chapter contains information for testing Hyundai vehicles with the Asian Import Vehicle Communication Software (VCS). The following Hyundai systems may be available for testing:

- Engine
- Transmission
- Antilock Brake System (ABS)
- Airbag (SRS)

### 9.1 Testing Engine, Transmission, ABS, and SRS

Hyundai engine, transmission, and airbag (SRS) testing includes:

- “Code Reading Connectors and Locations” on page 77
- “Clearing Codes” on page 79
- “Actuator Tests” on page 79

#### 9.1.1 Code Reading Connectors and Locations

Refer to Figure 9-1 below and Table 9-1 on page 78 Hyundai diagnostic connector locations and adapter usage information.

![Figure 9-1 Common connector locations](image-url)
Table 9-1 Common connector locations

<table>
<thead>
<tr>
<th>VEHICLE</th>
<th>YEAR</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accent</td>
<td>1995–99</td>
<td>2 Above coin holder</td>
</tr>
<tr>
<td></td>
<td>2001–06</td>
<td>3 Near hood release</td>
</tr>
<tr>
<td>Azera</td>
<td>2006</td>
<td>3</td>
</tr>
<tr>
<td>Elantra</td>
<td>1992–95</td>
<td>1 In fuse box</td>
</tr>
<tr>
<td></td>
<td>1996–06</td>
<td>3 Under dash near steering column</td>
</tr>
<tr>
<td>Excel</td>
<td>1990–94</td>
<td>1 In fuse box</td>
</tr>
<tr>
<td>Santa Fe</td>
<td>2001–06</td>
<td>1 Behind fuse panel</td>
</tr>
<tr>
<td>Scoupe</td>
<td>1991–95</td>
<td>1 In fuse box</td>
</tr>
<tr>
<td>Sonata</td>
<td>1989–95</td>
<td>1 In fuse box</td>
</tr>
<tr>
<td></td>
<td>1996–06</td>
<td>3 Under dash near steering column</td>
</tr>
<tr>
<td>Tiburon</td>
<td>1997–01</td>
<td>3 Under dash near steering column</td>
</tr>
<tr>
<td></td>
<td>2003–06</td>
<td>1 Behind fuse panel</td>
</tr>
<tr>
<td>Tucson</td>
<td>2005–06</td>
<td>3</td>
</tr>
<tr>
<td>XG300/XG350</td>
<td>2001–05</td>
<td>3 Under dash near steering column</td>
</tr>
</tbody>
</table>

To read codes from 1995 and earlier vehicles:
- Use the HYUN-2 adapter (Figure 9-2).

Figure 9-2 Connector and adapter for most OBD-I vehicles

To read codes from most 1996 and later vehicles:
- Use the OBD-II adapter with the specified Personality Key™ device (Figure 9-3).

Figure 9-3 OBD-II DLC and adapter
NOTE:
Always use the Personality Key™ device specified in the on-screen instructions.

9.1.2 Clearing Codes

Most 1988 and later Hyundai models let you clear codes from PCM memory using the Scanner.

When codes are cleared, the scan tool returns to the previous test mode, and the “No Codes Present” message displays to indicate codes are cleared.

If code clearing fails for any reason, the previous codes display at the top of the data list when you return to Codes and Data. If this happens, repeat code clearing.

9.1.3 Actuator Tests

The Actuator Tests selection is available from the Main Menu for most pre-OBD-II models and most 2001–2006 OBD-II models. All actuator tests are key-on, engine-off tests, except for the injector and timing tests. See also in “Injector Tests (Engine Running Only)”.

Selecting Actuator Tests for these vehicles displays a list of available tests. The available tests vary by year and model.

During testing, monitor the selected actuator with a voltmeter, ammeter, or by listening for actuator activation. A completed test does not mean that the actuator was activated. The scan tool only monitors the engine control module (ECM) commands to the actuator.

When an actuator test is selected, the scan tool commands the ECM to activate it. About 5 seconds later, the ECM deactivates the actuator and a test completed message displays.

NOTE:
All actuator tests except for injector tests must be performed with the key on and engine off (KOEO). If you select a KOEO test with the engine running, a warning screen displays.

Injector Tests (Engine Running Only)

The injector tests available from the actuator test menu are performed with the key on and engine running (KOER) and are available on most pre-OBD-II vehicles.

The number of injector tests available varies by the number of cylinders and type of fuel-injection system (a 4-cylinder MPI system has four tests; a six cylinder system has six).

When you select an injector test, the scan tool commands the ECM to disable the selected injector. About 5 seconds later, the ECM stops the test and the injector is returned to operational.
Chapter 10  Isuzu

This chapter contains information for testing Isuzu vehicles with the Asian Import Vehicle Communication Software (VCS). The following Isuzu systems may be available for testing:

- Engine
- Transmission
- Antilock Brake System (ABS)
- Supplemental Restraint System (SRS)
- Transfer Case
- Body Control Module (BCM)
- Instrument Panel Cluster (IPC)

10.1 Testing Engine and Transmission Systems

Isuzu engine and transmission system testing includes:

- “Engine And Transmission Code Reading Connectors and Locations” on page 80
- “Manual Code reading (Engine)” on page 86
- “Clearing Codes” on page 87
- “Road Test (No C&D)” on page 87
- “Field Service Functional Tests” on page 88

10.1.1 Engine And Transmission Code Reading Connectors and Locations

Figure 10-1 and Table 10-1 show common engine diagnostic connector locations for Isuzu vehicles. Figure 10-2 and Table 10-2 show common transmission diagnostic connector locations.

The following engine and transmission code reading procedures are included:

- “To read codes from 1986–87 Trooper:” on page 82
- “To read codes from 1984–95 Pickup 1988–95 Amigo, and 1991–95 Rodeo:” on page 84
- “To read codes from vehicles with a 12-pin connector:” on page 85
- “To read codes from 1988–89 Impulse:” on page 85
- “To read codes from 1985½–89 I-Mark and 1990 and later Impulse:” on page 85
- “To read codes from 1988–89 Impulse (optional):” on page 86
- “To read codes from 1985½–89 I-Mark and 1990 and later Impulse (optional):” on page 86
### Table 10-1  Common engine connector locations

<table>
<thead>
<tr>
<th>VEHICLE</th>
<th>YEAR</th>
<th>CONNECTOR LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amigo</td>
<td>1990–94</td>
<td>1 (ECM)</td>
</tr>
<tr>
<td>Ascender</td>
<td>2003–04</td>
<td>1</td>
</tr>
<tr>
<td>Axiom</td>
<td>2002–04</td>
<td>1</td>
</tr>
<tr>
<td>I-Mark</td>
<td>1984–89</td>
<td>5</td>
</tr>
<tr>
<td>Impulse</td>
<td>1984–89</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1990–92</td>
<td>1 (ECM)</td>
</tr>
<tr>
<td>Pickup</td>
<td>1990–95</td>
<td>1 (ECM)</td>
</tr>
<tr>
<td>Rodeo</td>
<td>1990–95</td>
<td>1 (ECM)</td>
</tr>
<tr>
<td></td>
<td>1996–2004</td>
<td>1</td>
</tr>
<tr>
<td>Stylus</td>
<td>1990–93</td>
<td>1 (ECM)</td>
</tr>
<tr>
<td>Trooper</td>
<td>1990–91</td>
<td>1 (ECM)</td>
</tr>
<tr>
<td></td>
<td>1992–94</td>
<td>6 (ECM)</td>
</tr>
<tr>
<td></td>
<td>1996–2002</td>
<td>1</td>
</tr>
<tr>
<td>Trooper 2.3L</td>
<td>1986–87</td>
<td>2</td>
</tr>
<tr>
<td>Trooper 2.6L</td>
<td>1988–91</td>
<td>4</td>
</tr>
<tr>
<td>Trooper 2.8L</td>
<td>1989–91</td>
<td>3</td>
</tr>
<tr>
<td>Vehicross</td>
<td>1999–2001</td>
<td>1</td>
</tr>
</tbody>
</table>

*Figure 10-1  Isuzu common engine connector location*
Isuzu Testing Engine and Transmission Systems

Figure 10-2 Common transmission connector locations

Table 10-2 Common transmission connector locations

<table>
<thead>
<tr>
<th>VEHICLE</th>
<th>YEAR</th>
<th>CONNECTOR LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amigo</td>
<td>1990–94</td>
<td>1</td>
</tr>
<tr>
<td>Impulse</td>
<td>1990–92</td>
<td>1</td>
</tr>
<tr>
<td>Pickup</td>
<td>1990–95</td>
<td>1</td>
</tr>
<tr>
<td>Rodeo</td>
<td>1990–95</td>
<td>1</td>
</tr>
<tr>
<td>Stylus</td>
<td>1990–93</td>
<td>1</td>
</tr>
<tr>
<td>Trooper</td>
<td>1990–91</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1992–94</td>
<td>2</td>
</tr>
</tbody>
</table>

NOTE:
The 1984–85 Trooper connector is hard to find (Figure 10-3).

Figure 10-3 1984–1985 Isuzu Trooper diagnostic connector

To read codes from 1986–87 Trooper:
- Connect the MULTI-1 adapter to the ALDL or diagnostic connector (Figure 10-4 on page 83).
Diagnostic connector locations for the 1988–91 Trooper are shown in Figure 10-5.

1— ALDL connector
2— Distributor set timing connector
3— ECM
4— Diagnostic lead terminal

Figure 10-5 1988–91 Trooper connectors

Diagnostic connector locations for the 1984–95 Pickup, 1988–95 Amigo, and 1991–95 Rodeo are shown in Figure 10-6 on page 84.
1— 1984–87 Impulse (leads and ALDL not shown)
2— RWAL 1-pin connector
3— ALDL (3-pin connector)
4— Timing set connector
5— Diagnostic leads (connect together for flash codes)

Figure 10-6 1984–95 Pickup, 1988–95 Amigo, and 1991–95 Rodeo connectors

To read codes from 1984–95 Pickup 1988–95 Amigo, and 1991–95 Rodeo:
• Connect the MULTI-1 adapter with the white terminal converters (Figure 10-7 and Figure 10-8).

Figure 10-7 1984–95 Pickup 1988–95 Amigo, and 1991–95 Rodeo connector and adapter

1— Hood release
2— ECM
3— Diagnostic connector
4— MULTI-1 adapter

Figure 10-8 1988–91 Trooper with automatic transmission connector location
To read codes from vehicles with a 12-pin connector:
- Connect the MULTI-1 adapter to the connector (Figure 10-9) or use the GM-1 adapter.

![Diagram of 12-pin connector and adapters]

1 — Diagnostic connector
2 — MULTI-1 adapter
3 — GM-1 adapter
4 — Green MULTI-1 wire
5 — White MULTI-1 wire
6 — Black MULTI-1 wire

Figure 10-9 12-pin connector and adapters

To read codes from 1988–89 Impulse:
- Connect the MULTI-1 adapter with the white terminal converters (Figure 10-10).

![Diagram of 1988–89 Impulse connector and adapter]

1 — Diagnostic connector
2 — Black MULTI-1 wire
3 — Green MULTI-1 wire
4 — White MULTI-1 wire
5 — MULTI-1 adapter

Figure 10-10 1988–89 Impulse connector and adapter

To read codes from 1985½–89 I-Mark and 1990 and later Impulse:
- Connect the MULTI-2-D adapter to the white 3-pin connector (Figure 10-11 on page 86).
10.1.2 Manual Code reading (Engine)

Use one of the following procedures to manually read codes on I-mark and Impulse models. Isuzu engine and transmission systems flash Type 05 codes, refer to Figure 10-14 and Table 10-3 on page 87 for Type 05 code information.

To read codes from 1988–89 Impulse (optional):
- Jump pins 2 and 3 as shown in Figure 10-12.

To read codes from 1985½–89 I-Mark and 1990 and later Impulse (optional):
- Jump pins as shown in Figure 10-13.
10.1.3 Clearing Codes

Some 1987 and later models allow clearing trouble codes using the Scanner.

If the code-clearing operation fails for any reason, the previous codes will reappear at the top of the data list when you return to Codes and Data. If this happens, repeat code clearing.

Table 10-3  Engine Code Type 05

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>10s and 1s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>Check Engine lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Connect two diagnostic connector terminals or jumper two terminals in a connector and turn the ignition on.</td>
</tr>
<tr>
<td>When done:</td>
<td>Turn the ignition off, disconnect the connectors, and clear codes.</td>
</tr>
</tbody>
</table>

Code 12 always appears first. Each code repeats three times, including code 12. Code display cycle repeats as long as system is in diagnostic state.

10.1.4 Road Test (No C&D)

Many Isuzu models offer a Road Test (No C&D) mode. This option removes the scan tool resistive load applied to the vehicle ECM in Codes and Data, so you can safely drive the vehicle with the scan tool connected.

**NOTE:**

No codes or data are transmitted when operating in this mode.

Some Isuzu vehicles, particularly with carbureted engines, provide a Road Test mode of ECM operation but do not transmit data. For these vehicles, a Road Test (No C&D) selection is available on the menu.
10.1.5 Field Service Functional Tests

NOTE:
Operations described in this section are not available on all tool platforms.

The Field Service functional test is available for some 1980½–95 Isuzu models with General Motors control systems.

Selecting Field Service opens a confirmation screen, accepting the confirmation begins the test.

IMPORTANT:
Do not enter Field Service mode while driving a vehicle on a road test. ECM changes to ignition timing, fuel delivery, and other engine functions may affect engine operation and vehicle control.

In Field Service mode, the scan tool grounds the diagnostic pin B in the ALDL connector. The ECM does not transmit data in this mode, and new trouble codes cannot be set. On some models, Field Service can be selected to check or adjust ignition timing or the idle minimum air rate.

With the key on and the engine off, the instrument panel Check Engine lamp flashes stored trouble codes if any are present or code 12 if no codes are present. The ECM also energizes all solenoids, so you can use Field Service mode to test solenoid operation.

Field Service mode works differently depending on the engine:

• With a carbureted engine running, the Check Engine lamp stops flashing code 12 and new trouble codes cannot be set. The ECM also sets ignition timing to a fixed degree of advance, which lets you check and adjust timing for some models. You also can use the Field Service mode for a system performance check on a carbureted engine. Refer to a vehicle service manual for details.

• For some fuel-injected engines, the instrument panel Check Engine lamp flashes rapidly when the engine is running in open loop and slowly when in closed loop. Additionally, in closed loop, the length of the lamp flash indicates whether the exhaust is rich or lean. The lamp flash is longer if the exhaust is rich.

10.2 Testing Antilock Brake System (ABS)

Isuzu ABS testing includes:

• “ABS Code Reading Connectors and Locations” on page 88
• “Manual Code Reading (ABS)” on page 90
• “Clearing ABS Codes” on page 93

10.2.1 ABS Code Reading Connectors and Locations

Refer to Figure 10-15 and Table 10-4 for common Isuzu ABS diagnostic connector locations.
To read ABS codes from 2003–06 Ascender, 2006 I-280 and I-350:

- Connect the OBD-II adapter to the 16-pin connector (Figure 10-16).

<table>
<thead>
<tr>
<th>VEHICLE</th>
<th>YEAR</th>
<th>CONNECTOR LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amigo</td>
<td>1990–94</td>
<td>1</td>
</tr>
<tr>
<td>Impulse</td>
<td>1990–92</td>
<td>1</td>
</tr>
<tr>
<td>Pickup</td>
<td>1990–95</td>
<td>1</td>
</tr>
<tr>
<td>Rodeo</td>
<td>1990–95</td>
<td>1</td>
</tr>
<tr>
<td>Stylus</td>
<td>1990–93</td>
<td>1</td>
</tr>
</tbody>
</table>
10.2.2 Manual Code Reading (ABS)

There are 3 types of manual ABS codes for Isuzu vehicles:

- Rear wheel antilock (RWAL), see Figure 10-18 and Table 10-5 on page 90
- Type 02, see Figure 10-20 and Table 10-6 on page 91
- Type 05a, see Figure 10-22 and Table 10-7 on page 92

RWAL ABS Code Type

The RWAL diagnostic connector location is shown in (Figure 10-17).

![Figure 10-17](image)

1.4 Sec. 0.2 Sec. 0.2 Sec.

1 2 3 Code 3 Code Repeats

Figure 10-18 Isuzu RWAL ABS Code Type

Straight Count—Flashes the lamp or LED the number of times equal to the trouble code with a noticeable pause between multiple codes. The first flash may be long or short depending on when diagnostics were entered. Include long or short first flash as part of count. For example: a long first flash and seven equal flashes or eight equal flashes is code 8.

Table 10-5 Isuzu RWAL ABS Code Type

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Straight Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>Rr Antilock or ABS indicator lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>With ignition switch on and indicator illuminated, jumper ABS diagnostic connector terminal to ground. First flash may be long or short. Include the long or short first flash as part of code number count. (Figure 10-17)</td>
</tr>
<tr>
<td>Clear codes by:</td>
<td>Codes are cleared every time the ignition key is turned off.</td>
</tr>
<tr>
<td>When done:</td>
<td>Disconnect jumper &amp; turn ignition off.</td>
</tr>
</tbody>
</table>

Only the first fault that occurred during the current ignition cycle will set a code. Vehicle may need to be driven to cause some codes to set & turn on the indicator.
Code Type 02

The diagnostic connector and warning lamp locations are shown in (Figure 10-19).

**Long/Short**—Indicator flashes a 2-digit trouble code with the 10s digit pulses staying on longer than the 1s digit pulses.

For example: Long–Long–pause–Short–Short–Short is code 23.

1—2-Pin Service Check connector
2—Special tool (O7PAZ-0010100) or equivalent
3—SRS indicator lamp

*Figure 10-19* 1996-1999 Isuzu Oasis ABS service check connector location

*Figure 10-20* Isuzu ABS Code Type 02

<table>
<thead>
<tr>
<th>Table 10-6 Isuzu ABS Code Type 02</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pattern:</strong></td>
</tr>
<tr>
<td><strong>Read codes on:</strong></td>
</tr>
<tr>
<td><strong>Start codes by:</strong></td>
</tr>
<tr>
<td><strong>Clear codes by:</strong></td>
</tr>
<tr>
<td><strong>When done:</strong></td>
</tr>
</tbody>
</table>
Isuzu Testing Antilock Brake System (ABS)

Code Type 05a


- Jump pins 4 and 12 as shown in Figure 10-21.

![Figure 10-21 16-pin connector jump wire](image)

Table 10-7 Isuzu ABS Code Type 05a

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>10s and 1s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>ABS warning lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>After bringing the vehicle to a complete stop, and making sure the brake pedal is not depressed, turn the ignition switch to the off position. Connect terminals 12 and 4 on the OBD-II 16-pin diagnostic link connector (Figure 10-16). Turn the ignition switch to the on position.</td>
</tr>
<tr>
<td>Clear codes by:</td>
<td>Within three seconds after entering the diagnostic mode, pulsate the brake switch on and off at least six times.</td>
</tr>
<tr>
<td>When done:</td>
<td>Turn the ignition off, disconnect the connectors, and clear codes.</td>
</tr>
</tbody>
</table>

All codes repeat 3 times and are followed by a 1.2 second pause. Code 12 always flashes first to confirm the system is in the diagnostic mode. Any current codes follow code 12. After the current codes have flashed, code 13 may flash. Code 13 indicates the presence of history codes which then follow. If only historical codes are present, the diagnostic sequence first flashes code 12, then code 13, followed by the historical codes. The code display cycle repeats as long as the system is in the diagnostic state.
10.2.3 Clearing ABS Codes

Use this procedure to clear ABS codes on the 1996–99 Isuzu Oasis.

The following conditions must be met before DTC erasure mode will complete:

- The SCS check connector or jumper wire must be connected to the 2 pin service connector before the ignition switch is turned on. See Figure 10-19 on page 91 for connector location.
- The brake pedal must be depressed before the ignition switch is turned on.
- Vehicle speed must be 6 mph (10kph) or less.

To clear ABS codes:

1. Connect the SCS service connector to the 2-pin service connector located under the glove box. (See Figure 10-19 on page 91)
2. Depress the brake pedal.
3. Turn the ignition switch On while keeping the brake depressed.
4. After the indicator comes on, depress the brake pedal again.
5. After the indicator goes off, release the brake pedal again.
6. After a few second, the ABS indicator blinks twice and the DTC is erased. If the indicator does not blink twice, repeat steps 1 through 6. If the indicator stays on after the indicator blinks twice, check the DTC because a problem was detected during the initial diagnosis before shifting to DTC erasure mode.
7. Turn the ignition switch off and remove the SCS service connector.

10.3 Testing Supplemental Restraint Systems (SRS)

Isuzu SRS, or airbag testing includes:

- “Manual Code Reading (SRS)” on page 94
- “Clearing SRS Codes” on page 97
10.3.1 Manual Code Reading (SRS)

Isuzu models use 2 types of SRS codes:

- Type 02a, see Figure 10-25, Figure 10-26 and Figure 10-27 and Table 10-8 on page 95
- Type 03, see Figure 10-28 and Figure 10-29 and Table 10-9 on page 96

**Code Type 02a**

Long/Short - Flashes a 2 digit trouble code with the 10s digit pulses staying on longer than the 1s digit pulses.


---

1— SRS indicator lamp
2— 2-Pin Service Check connector
3— Special tool (O7PAZ-0010100) or equivalent

*Figure 10-24 Isuzu 1996–99 Oasis 2-pin service check connector location*

---

*Figure 10-25 Isuzu SRS Code Type 02a: Continuous Failure, SRS indicator flashes like this*
Figure 10-26 Isuzu SRS Code Type 02a: Intermittent Failure, SRS indicator flashes like this

Figure 10-27 Isuzu SRS Code Type 02a: Normal (no failure), SRS indicator flashes like this

Table 10-8 Isuzu SRS Code Type 02a

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Long/Short (Main code/sub-code)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>SRS indicator lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>With ignition switch off, connect SCS service connector (OEM# 07PAZ-0010100) or jumper wire to the 2-pin service check connector. Turn ignition switch on.</td>
</tr>
<tr>
<td>Clear codes by:</td>
<td>Following the procedure in the “Clearing SRS Codes” section of this manual. Procedure includes connecting and disconnecting the SCS service connector or jumper wire to the MES (Memory Erase Signal) connector several times while monitoring the SRS indicator flashes.</td>
</tr>
<tr>
<td>When done:</td>
<td>Switch the ignition off and wait two to three seconds. Turn the ignition switch on again. The SRS indicator light should come on and go out after about six seconds. Continue to monitor the SRS indicator and confirm that it does not come on again for another 30 seconds. Turn ignition switch off.</td>
</tr>
</tbody>
</table>

Turn the ignition switch on. The SRS indicator light comes on for about six to thirty seconds and goes off. Shortly after (the time depends on which DTC is confirmed by the self-diagnosis system), it will indicate the DTC.

- In case of continuous failure(s), the DTC(s) will be indicated repeatedly (see Figure 10-25).
- In case of intermittent failure(s), the SRS indicator light will indicate (each of) the DTC(s) one time, then it will stay on (see Figure 10-26).
- In case of both continuous and intermittent failures, the DTC of the continuous failure only is indicated repeatedly. After troubleshooting it, first recheck to make sure that the problem has disappeared and that there are no other codes. Then, erase the codes from memory.
- In case the system is normal (no DTC), the SRS indicator light blinks (see Figure 10-27).
Code Type 03

Tens/Ones - Flashes a 2 digit trouble code with a noticeable pause between each digit. The first set of flashes is the 10s digit; the second set of flashes is the 1s digit.

For example: Flash–Flash–pause–Flash–Flash–Flash is Code 23.

Figure 10-28 Isuzu vehicles with orange SRS diagnostic connector and jumper pins

Figure 10-29 1996 and newer Isuzu vehicles with 16-pin OBDII style connector and jumper wire

Table 10-9 Isuzu SRS Code Type 03

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>10s and 1s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>INFL REST or SRS indicator lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>With ignition switch on, jumper two terminals in a diagnostic connector together. Only current codes will be flashed. (Figure 10-28, Figure 10-29)</td>
</tr>
<tr>
<td>Clear codes by:</td>
<td>Codes cannot be cleared manually on these vehicles. A factory scan tool must be used to clear SRS codes.</td>
</tr>
<tr>
<td>When done:</td>
<td>Disconnect jumper &amp; turn ignition off.</td>
</tr>
</tbody>
</table>

Each code is displayed one time before moving on to the next code. After all of the codes have been displayed, the entire code sequence will repeat until the jumper wire is removed from the diagnostic connector.

Flash code 12 should always be the first code to flash, which indicates that flash code mode has been enabled. If there are no current or history codes, flash code 12 will be flashed until the jumper is removed from the diagnostic connector.

Flash code 13 indicates that History codes are stored in memory. A factory scan tool is needed to read history codes.
10.3.2 Clearing SRS Codes

To clear SRS Codes on 1996–99 Isuzu Oasis models:
1. Switch the ignition off and disconnect the SCS connector from the service check connector.
2. Connect the SCS service connector (part number 07PAZ-0010100) to the yellow 2-pin MES (Memory Erase Signal) connector. A common jumper wire can be used, as long as you maintain good contact between the terminals.
3. Switch the ignition on. The SRS indicator lamp lights for about 6 seconds and then goes off.
4. Within 4 seconds of the lamp switching off, remove the SCS service connector from the MES connector.
5. When the SRS indicator lamp lights again, connect the SCS service connector to the MES connector within 4 seconds of the lamp switching on.
6. Within 4 seconds of the lamp switching off, remove the SCS service connector from the MES connector. The SRS lamp flashes twice to indicate memory has been erased.
7. Switch the ignition off and wait two to three seconds.
8. Turn the ignition switch on again. The SRS indicator light should come on and go out after about 6 seconds. Continue to monitor the SRS indicator and confirm that it does not come on again after 30 seconds.
9. Turn ignition switch off.

10.4 Testing Transfer Case, Body Control Module (BCM), and Instrument Panel Cluster (IPC) Control Systems

The OBD-II data link connector (DLC) is used for testing the transfer case, BCM, and IPC.
This chapter contains information for testing Kia vehicles with the Asian Import Vehicle Communication Software (VCS). The following Kia systems may be available for testing:

- Engine
- Transmission
- Antilock Brake System (ABS)
- Airbag

11.1 Testing Engine, Transmission, and Antilock Brake Systems

Kia engine, transmission, ABS, and airbag testing includes:

- “Code Reading” on page 98
- “Manual ABS Code Reading” on page 101

11.1.1 Code Reading

To read engine codes with a 20-pin connector:

- Connect the MULTI-1 adapter with red terminal converters as shown in Figure 11-1 (red lead to terminal 19, blue lead to terminal 11, and black lead to terminal 4 or 12).

![Figure 11-1 20-pin DLC and MULTI-1 adapter—engine codes](image-url)
NOTE:
Count long pulses as tens and short pulses as ones.

To read transmission codes with a 20-pin connector:
• Connect the MULTI-1 adapter with red terminal converters as shown in Figure 11-2 (red lead to terminal 18, blue lead to terminal 11, and black lead to terminal 4 or 12).

1— 20-pin connector
2— MULTI-1 adapter
3— Red MULTI-1 wire
4— Blue MULTI-1 wire
5— Black MULTI-1 wire

Figure 11-2 20-pin DLC and MULTI-1 adapter—transmission codes

To read engine, transmission, ABS, and airbag codes, data, and functional tests (where applicable) from vehicles with a 16-pin connector:
• Use the OBD-II adapter with the specified Personality Key™ device (Figure 11-3).

1— 16-pin DLC
2— OBD-II adapter

Figure 11-3 16-pin DLC and OBD-II adapter

To read 1994–2001 Sportage ABS codes:
• Ground terminal 1 as shown in Figure 11-4 on page 100.
To read 2001–2002 Rio and 1995–97 Sephia ABS codes:
• Connect pin 8 to ground (pins 4 or 12) as shown in Figure 11-5.

To read 2000–01 Spectra and Sephia ABS codes:
• Connect pin 16 to ground (pins 4 or 12) as shown in Figure 11-6.
11.1.2 Manual ABS Code Reading

Kia ABS transmits Type 13 manual codes, see Figure 11-7 and Table 11-1.

![Figure 11-7 Kia ABS Code Type 13](image)

**Table 11-1 Kia ABS Code Type 13**

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Straight count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>Flashes ABS lamp</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Jumper the ABS and ground terminals in the 20-pin connector or jumper Terminal 1 to ground in the 3-pin ABS connector.</td>
</tr>
<tr>
<td>When done:</td>
<td>Turn the ignition off and clear codes.</td>
</tr>
<tr>
<td>After fixing problem, clear codes and drive car; then check for other codes.</td>
<td></td>
</tr>
</tbody>
</table>
This chapter contains information for testing Mazda vehicles with the Asian Import Vehicle Communication Software (VCS). The following Mazda systems may be available for testing:

- Engine
- Transmission
- Antilock Brake System (ABS)
- Airbag
- Electric Automatic Temperature Control (EATC)
- Electronic Power Steering (EPS)
- Generic Electronic Module (GEM)
- Instrument Cluster Module (ICM)
- Parking Aid Module (PAM)
- Tire Pressure Monitor (TPM)
- Transfer Case (4x4M)

12.1 Testing Engine and Transmission Systems

Mazda engine and transmission system testing includes:

- “Code Reading” on page 102
- “Manual Code Reading” on page 103
- “Functional Tests—1983–95 models” on page 104
- “Functional Tests—All models with EEC-IV and EEC-V systems” on page 105
- “Transmission Code Retrieval—1987 626” on page 110

12.1.1 Code Reading

To read codes from vehicles with a 16-pin connector:

- Use the OBD-II adapter with the specified Personality Key™ device (Figure 12-1).
To read engine and transmission codes from a 17-pin underhood connector:

- Connect the MAZDA-1 adapter to the 17-pin connector (Figure 12-2). For reading codes manually, ground one of the following pins:
  - TEN = Engine codes
  - TAT = Transmission codes (most cars)

**IMPORTANT:**
Grounding the incorrect pin may result in vehicle damage.

To read codes from vehicles with 6-pin and 1-pin connectors:

- Use the MULTI-2 adapter (Figure 12-3).

**IMPORTANT:**
When connecting to a vehicle with the above configuration, make sure the 1-pin connector is properly identified. Failure to identify the right connector may result in scan tool damage.

**NOTE:**
Some vehicles retrieve transmission codes from the engine control module (ECM).

### 12.1.2 Manual Code Reading

Refer to Figure 12-4 for reading manual codes.
12.1.3 Functional Tests—1983–95 models

These functional tests apply to all models except:

- 1991–94 Navajo
- 1994 B-Series
- 1994–95 626 with 2.0L engine and automatic transmission

NOTE:
Operations described in this section are not available on all tool platforms.

The following Functional Tests may be available for 1983–95 Mazda vehicles.

- **Oxygen Sensor Test**—monitors the feedback signal from the oxygen sensor (O2S).
- **Switch Test**—checks certain switch circuits.
- **Base Timing Check**—commands the ECM to place the engine in the base timing mode for ignition timing checks and adjustments.

To perform an oxygen sensor test:
1. From the Functional Tests menu, select **Oxygen Sensor Test**.
2. Start and run the engine to warm it to normal operating temperature.
3. Select to initiate the test.
4. As instructed, accelerate the engine and hold it at 2000 RPM.
   Lean and Rich indicate the condition of the exhaust. LED 3 flashes to indicate that the scan tool is receiving a signal from the exhaust gas oxygen sensor.

To perform a switch test:
1. From the Functional Tests menu, select **Switch Test**.
2. Select to initiate the test.

NOTE:
Not all switches displayed apply to every vehicle. Refer to Mazda service procedures and specifications for availability of specific switch tests.

As you test each switch, the Switch State parameter should alternately display High or Low each time a switch status changes. Also, LED 4 turns on when this parameter displays Low, and off when High. See Table 12-1 for individual switch test instructions.
To perform a Base Timing Check:
• From the Functional Tests menu, select **Base Timing Check**.

The ECM enters base timing mode to allow ignition timing checks and adjustments.

### 12.1.4 Functional Tests—All models with EEC-IV and EEC-V systems

**NOTE:**
Operations described in this section are not available on all tool platforms.

Functional Tests are available for Mazda vehicles with EEC-IV and EEC-V control systems, but menu items are completely different for each system. See "EEC-IV Functional Tests" on page 106 and "EEC-V Functional Tests" on page 109 for details.

**NOTE:**
The ignition key should be switched off when selecting Functional Tests from the Main Menu - PCM on EEC-IV and EEC-V vehicles.
EEC-IV Functional Tests

NOTE:
Operations described in this section are not available on all tool platforms.

EEC-IV systems typically offer several functional tests, the following EEC-IV functional tests are described in this section:

- “Computed Timing Test” on page 106
- “Wiggle (Engine Off) Test” on page 106
- “Wiggle (Engine Running) Test” on page 107
- “Output State Check” on page 107
- “Idle Speed Adjustment Test” on page 108

**Computed Timing Test**

This test checks ignition timing with the engine running at a controlled idle speed. It also verifies the ability of the PCM to advance and retard timing. Connect either a timing light or a magnetic timing meter to the engine before testing.

On most EEC-IV engines, the PCM advances timing 20° above the base timing setting. So if the base timing specification is 10° BTDC, expect to read 30° BTDC with a timing light or meter. Refer to Mazda service manuals for timing specifications and test procedures.

**To conduct a Computed Timing test:**

1. Select **Computed Timing**.
   
   The “timing check” screen displays.

   **NOTE:**
   
   A “warning” message displays if the timing check test is selected with the engine running or with the ignition switch on. This means the PCM self-test output (STO) circuit is still energized from a previous test. On some vehicles, this message can be ignored. If uncertain, turn the key off, wait 10 seconds, restart the engine, then enter the test.

2. With the engine warm and running at idle, select to start the test.
3. Check the timing with a timing light or timing meter within 2 minutes.

**Wiggle (Engine Off) Test**

This test puts the EEC-IV system into a program that records intermittent service codes that occur as you wiggle or tap on various engine sensors, actuators, and wiring connectors with the ignition on and the engine off.

**To conduct a Wiggle (Engine Off) test:**

1. Select **Wiggle (Engine Off)**.
   
   The test initiation screen displays.

2. Switch the key on and select to continue.
   
   After a brief startup message, the test displays.
3. Wiggle or tap the engine sensors, actuators, and wiring connectors. The bottom line of the screen is blank until a fault occurs and a code sets. If a code sets, the bottom line displays a “memory code stored—run KOEO test” message. Always check for memory DTCs after a wiggle test.

NOTE:
Do not wiggle the test adapter loose from the self-test connector during this test or a false code may set. Always exit the test before turning off the ignition or a false code may result.

To read the service codes from a wiggle test:
- Select Codes Menu > KOEO Self-Test.

Wiggle (Engine Running) Test
This test places the EEC-IV system into a mode that records intermittent service codes as you wiggle or tap on engine sensors, actuators, and wiring connectors with the engine running.

To conduct a Wiggle (Engine Running) test:
2. If the engine is running, a warning message displays. Switch the engine off, wait 10 seconds, then restart the test. Otherwise, start and run the engine at idle speed.
3. Once the engine is fully warm, select to enter the test. The screen momentarily displays a test initiated message, then switches to the test screen.
4. Wiggle or tap on sensors, actuators, and wiring connectors. The bottom line of the screen is blank until a fault occurs and a code sets. When a code sets, the bottom line reads “memory code stored—run KOEO test,” but this message only appears during a fault. Always check for memory DTCs after a wiggle test.

NOTE:
Do not wiggle the test adapter loose from the self-test connector during this test, or a false code may set. Always exit the test before turning off the ignition.

To read the service codes from a wiggle test:
- Select Codes Menu > KOEO Self-Test.

Output State Check
This test allows you to switch the PCM signals to the engine actuators on and off to take voltmeter readings. If the engine is running, turn it off before selecting the output state test.

NOTE:
The EEC-V Output State Test is the same as the EEC-IV Output State Check, the test name is the only difference; the function is the same.
To conduct an output state test:
1. Select **Output State Check**.
   The test initiation screen displays.
2. Select to imitate the test, then switch the ignition on without starting the engine.

**IMPORTANT:**
When the test begins, all actuators (except IAC and fuel injectors) should be off and the PCM circuits from the should be high (above 10 V). Use the DVOM or lab scope to check actuators.

A “self-test initiated” screen displays, followed by the test screen.
3. Press the accelerator to wide open throttle (WOT) to switch all engine actuators from off to on, or from on to off.
   All of the actuators stay on or off until the throttle is pressed again. As the actuators change state, the bottom line of the display shows if they are on or off.

**Idle Speed Adjustment Test**
This test allows you to adjust the idle speed for certain 1991 and later engines. Before adjusting idle speed, make sure the throttle body and idle speed control (ISC) device are clean, and the throttle linkage is not sticking or binding.

Also, switch all accessories off and make sure the O2S is working properly, ignition timing is correct, and there are no vacuum leaks. Place the transmission in park or neutral before selecting the test.

A command from the scan tool starts the engine-running test, and a signal from the EEC-IV PCM indicates when the test is complete. During this waiting period, the cylinder identification displays along with instructions to press the brake pedal, turn the steering wheel, or snap the throttle. These actions are not necessary, however, doing them speeds the self-test.

**IMPORTANT:**
If any service codes other than “11–no faults present” are displayed after the engine-running test, correct any code problems before proceeding with the idle adjustment.

To conduct an idle speed adjustment test:
1. Select **Idle Speed Adjust**.
   The test initiation screen displays. If another test was performed before this one, a “warning” screen may display because the self-test output (STO) circuit is still energized from the previous test. For some vehicles, it is safe to ignore this message and enter the test. If you are uncertain, turn the key off, wait 10 seconds, and restart the engine before entering the test.
2. Start the engine and run at 2000 RPM for two minutes.
   A timer displays in the lower right corner of the screen. Skip this warm-up if the engine is already warm.
3. Select and the “test initiated” screen displays.
   Once the test is complete, the scan tool sends a start-idle-test signal to the PCM. The screen changes as the scan tool waits for a response from the PCM.
   After the PCM response is received, the throttle stop screw adjustment screen displays. The display indicates if idle speed is too high, too low, or correct. If the display reads “TPS out of
adjustment—fix first,” the throttle position sensor must be fixed to proceed. If idle speed is correct, skip to the last step.

Ten minutes after the idle speed test signal is received, the PCM stops communicating. Normally, this is enough time to complete the adjustment. If not, return to the Functional Tests menu, select, and repeat the test.

4. Turn the throttle stop until “idle RPM correct” displays.
5. Select to accept when the idle RPM is correct.
   An instruction and verification screen displays.
6. Run the engine at 1500 RPM for 10 seconds, return to idle, and press Y.
7. An idle RPM correct message should display. If not, repeat the idle speed adjustment.
8. When the idle is properly adjusted, exit the test.

**EEC-V Functional Tests**

**NOTE:**
Operations described in this section are not available on all tool platforms.

The following EEC-V functional tests are described:

- “Output State Test” on page 109
- “Module Identification Test” on page 110

**NOTE:**
The ignition key should be switched off when selecting Functional Tests from the Main Menu - PCM on EEC-V vehicles.

**Output State Test**

This test lets you switch PCM signals to the engine actuators on and off for testing with a DVOM or lab scope. The engine must be off before the test is selected.

During a test, actuators stay on or off until you switch them. Actuators default to their normal state after 10 minutes, if the vehicle is started, or if the ignition switch cycles off and on.

**IMPORTANT:**
Make sure the fuel system is intact before proceeding. Selecting All Outputs On causes the electric fuel pump to briefly energize. Also, make sure fan blades are clear of obstruction before selecting low or high speed fan on.

**To conduct an output state test:**

1. Select **Output State Test**.
   A test activation screen displays.
2. Select to activate and the test list displays.
3. Select the desired test.
   - If the vehicle performs the test, “activated” or “fan requested” displays to the right of the selected test.
– If the vehicle does not perform the test, “error” displays to the right of the selected test.
– Take circuit readings while the test is activated.

**Module Identification Test**

This test displays the PCM software file, part number, and sometimes the vehicle VIN. Select the test and an information screen displays.

### 12.1.5 Transmission Code Retrieval—1987 626

Gathering codes from a 1987 626 transmission requires taking a reading from two wires on the test connector. This can be performed with a dual trace graphing meter connected as shown in Figure 12-5.

**Figure 12-5 Connecting a Dual Trace Graphic Meter to a 1987 626 transmission connection**

**IMPORTANT:**
Be aware that the negative meter lead is connected to a 12 V source on the Y/B (yellow/black) wire; the transmission control module (TCM) grounds the other wires to create the signal. Therefore, the displayed reading is inverted and the ones are the negative transitions.

This test may also be performed with a test lamp. Connect the ground lead of the test lamp to the yellow/black wire and probe the other two wires of the test connector one at a time:

- The blue/white wire displays the tens digit of the code as a 0.4-second flash followed by a 2-second pause. The pattern then repeats. If there is no flash, no tens digit is present.
- The blue/black wire displays the ones digit as either a 2.0-second flash, which is counted as five, or a 0.4-second flash, which is counted as a one.

Combine the two readings, tens and ones, to get a two-digit code (Figure 12-6 on page 111).
12.2 Testing Antilock Brake Systems

When a ABS malfunction occurs, the ABS electronic control module (ECM) illuminates the ABS lamp on the instrument panel. On some systems, the ABS ECM stores codes for most malfunctions, and provides data stream information for some models. Codes transmit to a scan tool through either the OBD-II diagnostic link connector (DLC) or the ABS test connector. Data stream information displays when the ABS control system provides it.

NOTE:
The following sections apply to ABS systems on vehicles with or without traction control.

To read ABS codes from vehicles with a 17-pin underhood connector:
- Connect the MAZDA-1 adapter to the 17-pin connector (Figure 12-7). For reading codes manually, ground the TBS pin.

IMPORTANT:
Grounding the incorrect pin may result in vehicle damage.
To read 1988–92 626/MX6 ABS codes:
- Connect an analog voltmeter to FBS (G/R) (Figure 12-8).
- Read malfunction code(s) by observing meter needle swings.

1 — FBS (Green/Red)
2 — TBS (Green Black)
3 — GND (Black)
4 — Jump wire

To read 1993–94 Navajo 4-Wheel Antilock (4WAL) brakes codes:
1. With the key off, jump the white, light blue, and black wires (Figure 12-9).
2. Turn the key on and remove the jumper within 5 seconds.
3. Count flashes. Code 16 is a system pass.

1 — Black/Light Blue
2 — Dark Green
3 — Black
4 — White/Light Blue
To read 1990–93 B-Series and MPV ABS codes:
1. Attach a jumper wire to Terminal C (yellow wire, Figure 12-10).
   Ground the jumper wire to the chassis for one second and release it.

   ![Figure 12-10 Terminal C on 1990–93 B-Series and MPV](image)

2. Count flashes.
   A flashing pattern consists of a number of short flashes and ends with a long flash. Count flashes and include the long flash in the count.

**IMPORTANT:**
Always use a fused jumper wire when connecting to ground.

### 12.2.1 ABS Main Menu

After selecting ABS from the System Selection menu, the Main Menu - ABS displays. Selections vary by model and year. The following main menu selections are discussed here:

- “Service Codes” on page 113
- “ABS Data Communication Guidelines” on page 116

Refer to the manual for your diagnostic tool for information on other menu options.

### Service Codes

During a KOEO self-test, the ABS ECM transmits on-demand codes. On most systems, continuous codes are gathered by selecting MEMORY CODES from the SERVICE CODE Menu. Some systems gather continuous codes automatically after the KOEO self-test.

Select SERVICE CODES and the following choices are available on the SERVICE CODE Menu:

- **KOEO SELF-TEST**—displays on-demand codes present with the ignition on, but the engine not running. These are usually electrical open and short circuits and must be serviced first, before any continuous codes. On some systems, the KOEO test displays continuous codes and the MEMORY CODES selection does not appear on the menu.
- **MEMORY CODES**—displays continuous codes of intermittent faults from the ABS module, when available. Memory codes should be serviced last.
- **Clear Codes**—clears continuous memory codes from the ABS ECM memory.
- **How To Get Codes**—displays how to manually gather and clear RABS codes.
- **Review Codes**—lets you view codes.
- **Print Codes**—lets you print codes.
Any time a self-test is selected, a self-test initiated message displays. This message means the scan tool attempted to start the test, it does not mean the vehicle responded. If the message stays on the screen more than a few minutes, the test probably did not start. Should this happen, exit the test, cycle the ignition key, then retest.

**KOEO Self-Test**

This selection initiates a self-test for ABS that is similar to that for the engine.

- **To conduct a KOEO Self-Test:**
  1. Select KOEO Self-Test.
     - A "key on" verification screen displays.
  2. Make sure the ignition is switched on, then select to continue.
     - The self-test initiated screen displays.

- **NOTE:**
  Some systems require the ignition to be cycled on after the test is selected. Follow on-screen screen instructions.

  3. At the end of the test, the service code list displays.

**Memory Codes**

This selection displays the continuous codes of intermittent faults from the ABS ECM. Some models automatically gather memory codes at the end of the KOEO self-test. Continuous codes should be serviced last.

- **To gather memory codes:**
  1. Select Memory Codes.
     - A "key on" verification screen displays. Make sure the ignition is switched on.
  2. Select to continue.
     - The self-test initiated screen displays.
     - When the ABS ECM finishes the test, the service code list displays. If no codes are detected during the test a "P0000 no faults present" message displays.

**Clear Codes**

This selection erases any continuous codes from the ABS ECM memory.

On some systems, the KOEO test repeats and the scan tool then interrupts the self-test input to clear memory. Some systems require the vehicle to be driven above 25 mph to clear codes.

Note the following when clearing codes:

- Some systems prioritize DTCs. After repairing and clearing a DTC, always recheck for additional faults that may be present.
• Only continuous codes can be cleared. Codes from a KOEO self-test are on-demand codes that must be serviced. Certain codes, such as those for the wheel speed sensors and the pump motor, only set while the vehicle is being driven.

To clear the codes:
1. Select Clear Codes.
   A “key on” verification screen displays. Make sure the ignition is switched on.
2. Select to continue.
   The self-test initiated screen displays.
3. When the test finishes a codes cleared screen displays.

Clearing Code Memory
The scan tool retains codes in its memory. The scan tool memory, not vehicle memory, can be cleared using any of the following methods:

• Repeat the test, which overwrites the previous code.
• Select a different system for testing.
• Enter a new vehicle ID.

Review Codes
Return to the service code menu from the KOEO self-test or memory code test and Review Codes displays as a selection. When this selection is available, it indicates recorded codes are in scan tool memory from either, or both tests.

To review codes:
1. Select Review Codes.
   A code list, similar to the lists displayed at the end of the self-tests, displays.
2. Fix the problems in the order listed. Also, remember these important points about the review codes list:
   – Review all codes until “end of list” appears.
   – The scan tool saves codes from the most recent test for display under review codes. On a re-test, codes from the previous test are replaced with a new list.
   – Always write down continuous memory codes after any test.
   – If MEMORY CODES was selected, the scan tool saves the codes in memory, but the Clear Codes selection must be used to clear the ABS module memory.

Print Codes
This selection is available on the Service Code menu following either a KOEO self-test or a memory code test. All printouts of the code list include the vehicle ID.

To print the service code list from memory:
1. Connect the scan tool to a compatible printer.
2. Select Print Codes.
ABS Data Communication Guidelines

NOTE:
ABS functions are disabled during data communication. If the vehicle is driven, ABS will not function. The ABS lamp may flash rapidly during data transmission.

Follow these steps to enter and exit ABS data:

1. Verify that the ignition is off when entering the vehicle ID.
2. Turn the ignition on.
3. Select Data Display.
4. Turn the ignition off after completing ABS data tests.

12.3 Testing Airbag, Transfer Case, and Body Module Systems through the 16 Pin Connector

For applicable 1996–2008 models, Airbag, Body Module, or Transfer Case systems may be selected. In Body Modules, the applicable modules may be selected, including:

- Body Control Module (BCM)
- Electronic Automatic Temperature Control (EATC)
- Electronic Power Steering (EPS)
- Generic Electronic Module (GEM)
- Instrument Cluster Module (ICM)
- Parking Aid Module (PAM)
- Passenger Junction Box (PJB)
- Tire Pressure Module (TPM)

The Codes Menu selection from the Main Menu for the specific system offers the choices available for the test vehicle.

The Data Display selection is available on most 1996 and later vehicles. It operates similarly to Data (No Codes) for engine testing.
This chapter contains information for testing Mitsubishi vehicles with the Asian Import Vehicle Communication Software (VCS). The following Mitsubishi systems may be available for testing:

- Engine
- Transmission
- Antilock Brake System (ABS)
- Airbag (SRS)

13.1 Testing Engine, Transmission, ABS, and SRS

Mitsubishi engine, transmission, and SRS (airbag) testing includes:

- “Code Reading Connectors and Locations” on page 117
- “Transmission Manual Code Reading” on page 121
- “ABS Manual Code Reading” on page 121
- “Codes and Data (Slow)” on page 122
- “Clearing Codes” on page 122
- “Actuator Tests” on page 122

13.1.1 Code Reading Connectors and Locations

Refer to Figure 13-1 and Table 13-1 on page 118 for diagnostic connector locations.
Table 13-1 Common connector locations

<table>
<thead>
<tr>
<th>VEHICLE</th>
<th>YEAR</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>3000 GT</td>
<td>1991–93</td>
<td>4 Next to fuse panel</td>
</tr>
<tr>
<td></td>
<td>1994–99</td>
<td>2 Next to console</td>
</tr>
<tr>
<td>Cordia/Tredia</td>
<td>1984–88</td>
<td>8 Near firewall</td>
</tr>
<tr>
<td>Diamante</td>
<td>1992–96</td>
<td>4 Next to fuse panel</td>
</tr>
<tr>
<td></td>
<td>1997–04</td>
<td>2 Next to console</td>
</tr>
<tr>
<td>Eclipse</td>
<td>1990–94</td>
<td>4 Next to fuse panel</td>
</tr>
<tr>
<td></td>
<td>1995–05</td>
<td>2 Next to console</td>
</tr>
<tr>
<td>Endeavor</td>
<td>2004–05</td>
<td>2 Next to console</td>
</tr>
<tr>
<td>Expo/LRV</td>
<td>1992–96</td>
<td>4 Next to fuse panel</td>
</tr>
<tr>
<td>Galant</td>
<td>1985–87</td>
<td>6 Next to glovebox striker</td>
</tr>
<tr>
<td></td>
<td>1989–93</td>
<td>4 Next to fuse panel</td>
</tr>
<tr>
<td></td>
<td>1994–05</td>
<td>2 Next to console</td>
</tr>
<tr>
<td>Lancer</td>
<td>2002–05</td>
<td>2 Next to console</td>
</tr>
<tr>
<td>Lancer Sport Back</td>
<td>2004</td>
<td>2 Next to console</td>
</tr>
<tr>
<td>Mirage</td>
<td>1989–96</td>
<td>4 Next to fuse panel</td>
</tr>
<tr>
<td></td>
<td>1997–2002</td>
<td>2 Next to console</td>
</tr>
<tr>
<td>Mirage Turbo</td>
<td>1985–88</td>
<td>1 Near firewall</td>
</tr>
<tr>
<td>Montero</td>
<td>1989</td>
<td>7 Behind glovebox</td>
</tr>
<tr>
<td></td>
<td>1990–91</td>
<td>5 Next to ECM</td>
</tr>
<tr>
<td></td>
<td>1992–2000</td>
<td>4 Near hood release</td>
</tr>
<tr>
<td></td>
<td>2001–05</td>
<td>2 Next to console</td>
</tr>
<tr>
<td>Montero Sport</td>
<td>1997–2004</td>
<td>4 Near hood release</td>
</tr>
<tr>
<td>Outlander</td>
<td>2003–05</td>
<td>2 Next to console</td>
</tr>
<tr>
<td>Precis</td>
<td>1990–94</td>
<td>4 In fusebox</td>
</tr>
<tr>
<td>Sigma</td>
<td>1988–90</td>
<td>6 Next to glovebox striker</td>
</tr>
<tr>
<td>Starion</td>
<td>1984–86</td>
<td>3 In engine compartment</td>
</tr>
<tr>
<td></td>
<td>1987–89</td>
<td>6 Next to glovebox striker</td>
</tr>
<tr>
<td>Truck</td>
<td>1990–96</td>
<td>4 Next to fuse panel</td>
</tr>
<tr>
<td>Van/Wagon</td>
<td>1987–90</td>
<td>4 Next to fuse panel</td>
</tr>
</tbody>
</table>
Connecting to 1987 and Earlier Vehicles

To read codes from most 1987 and earlier vehicles:

- All models use the MULTI-1 adapter to connect the scan tool to the vehicle.
- Use Figure 13-2 to locate and connect to the diagnostic connector for most 1987 and earlier models.

1— 3-pin connector—located on the inner right front fender
2— 9-pin connector—located in glovebox, next to the latch
3— 2-pin connector—located under the dash or in engine compartment
4— Green (preferable) or Yellow
5— Black
6— Engine: Green (preferable) or Yellow
7— Transmission: Green or Yellow

Figure 13-2 Diagnostic connectors for most 1987 and earlier vehicles

Connecting to 1988 and Later OBD-I Vehicles

To read engine and transmission codes from most 1988 and later OBD-I vehicles:

- Use the HYUN-2 adapter (Figure 13-3).

1— HYUN-2 adapter
2— Connector

Figure 13-3 Connector and adapter for SRS system on most 1994 and earlier vehicles
Connecting to OBD-II Vehicles

To read codes from OBD-II vehicles with 12 and 16-pin connectors:

- Use the MITSU-1 adapter with the OBD-II adapter attached (Figure 13-4 on page 120).

![Diagram of connectors and adapters for OBD-II vehicles]

1— 16 pin connector
2— 12-pin connector
3— Mitsu-1 adapter
4— OBD-II adapter

Figure 13-4 Connectors and adapters for most OBD-II vehicles

NOTE:
Most OBD-II vehicles have 16-pin and 12-pin connectors and use the MITSU-1 adapter connected through the OBD-II adapter. The MITSU-1 lead with the 12-pin connector is not connected on all vehicles. Follow instructions on the scan tool for correct hookup.

13.1.2 Supplemental Restraint System (SRS) Code Reading

To read SRS codes from most 1994 and earlier vehicles:

- Use the HYUN-2 adapter and red terminal converters (Figure 13-5).

![Diagram of Connector and adapter for SRS]

1— HYUN-2 adapter
2— 12-pin connector

Figure 13-5 Connector and adapter for most 1994 and earlier SRS
13.1.3 Transmission Manual Code Reading

Mitsubishi models transmit Type 11 manual transmission codes, see Figure 13-6 and Table 13-2.

![Figure 13-6 Mitsubishi transmission Code Type 11](image)

Table 13-2 Mitsubishi transmission Code Type 11

| Pattern: | For code output: long and short  
| Read codes on: | A/T oil temp lamp or neutral indicator lamp  
| Start codes by: | 16-pin OBD-II data link connector: jump pin 1 to ground  
| When done: | Remove the jumper wire and clear codes  
| Code display cycle repeats as long as system is in a diagnostic state.

13.1.4 ABS Manual Code Reading

Mitsubishi models transmit Type 11 ABS codes, see Figure 13-7 below and Table 13-3.

![Figure 13-7 Mitsubishi ABS Code Type 11](image)
Table 13-3  Mitsubishi ABS Code Type 11

| Pattern:          | For code output: long and short  
|                  | For no code output: repeating straight count  
| Read codes on:   | ABS warning lamp  
| Start codes by:  | 16-pin OBD-II DLC: jump pin 1 to ground; or connect an analog meter across pins 4 or 5 to pin 8.  
|                  | 12-pin diagnostic connector: connect an analog meter across pins 4 and 12.  
| When done:       | Remove the jumper wire and clear codes.  

Code display cycle repeats as long as system is in a diagnostic state. A battery surge that causes the ABS system to fail may cause Code 16 to set.

13.1.5 Codes and Data (Slow)

Some 1988 and later models with the 3.0L SOHC V6 engine transmit data at a 63 baud rate. The Main Menu for these vehicles displays a Codes and Data (Slow) option.

13.1.6 Clearing Codes

Most 1988 and later Mitsubishi models let you clear trouble codes from PCM memory through the scan tool. Select Clear ECM Codes from the Scanner menu.

When codes are cleared, the scan tool returns to the previous test mode, and “No Codes Present” displays to indicate that codes are cleared.

If code clearing fails for any reason, the previous codes reappear at the top of the data list. If this happens, repeat the code clearing procedure.

13.1.7 Actuator Tests

Most pre-OBD-II and all 2002–03 OBD-II models have the Actuator Tests selection on the Main Menu. All actuator tests, except injector and timing tests are key-on, engine-off (KOEO) tests.

A list of available tests displays when Actuator Tests is selected from the menu. The available tests vary by year and model.

During testing, monitor the selected actuator with a multimeter or by listening for actuator activation. A completed test does not mean that the actuator was activated. The scan tool only monitors the engine control module (ECM) commands to the actuator.

When you select an actuator test:

- The scan tool commands the ECM to activate the selected actuator.
- Approximately 5 seconds later, the ECM deactivates the actuator.

All actuator tests except for injector tests must be performed with the key on and engine off (KOEO). Select a KOEO test with the engine running and a test rejected screen displays.
Injector Tests (Engine Running Only)

Injector tests are available from the actuator test menu on most pre-OBD-II vehicles. These tests are performed with the key on and engine running (KOER). The number of injector tests available varies, a 4-cylinder MPI system has four tests; a six cylinder system has six.

When you select an injector test:

- The scan tool commands the ECM to disable the selected injector.
- Approximately 5 seconds later, the ECM reactivates the injector.
This chapter contains information for testing Nissan and Infiniti vehicles with the Asian Import Vehicle Communication Software (VCS). The following Nissan and Infiniti systems may be available for testing:

- Engine
- Transmission
- Antilock Brake Systems (ABS)
- Supplemental Restraint System (SRS)
- Controller Area Network Systems (CAN)

### 14.1 Testing Engine Systems

Nissan and Infiniti engine system testing includes:

- “Code Reading Connectors and Locations” on page 124
- “Code Types 07” on page 125
- “Functional Tests” on page 129

#### 14.1.1 Code Reading Connectors and Locations

Figure 14-1 and Figure 14-2 on page 125 show Nissan and Infiniti diagnostic connector locations and adapter information for reading engine codes.

**To read codes:**

1. Connect the molded adapter to the connector shown in Figure 14-1 and Figure 14-2 on page 125, which may be in the following locations:
   - Driver-side kick panel
   - Passenger-side kick panel
   - Left side of dash
   - Under passenger seat
   - Behind driver-side trim panel
2. The scan tool will indicate the connector location.
3. Select “codes” from the “codes and data” menu or select “how to get codes” from the code functions menu and follow the on-screen instructions.
1— Diagnostic connector
2— NISSAN-1 adapter

**Figure 14-1 Vehicle diagnostic connector**

**NOTE:**
Some models have a similar-looking 16-terminal connector under the instrument panel that is not a scan tool connector.

Pre-1995 vehicles that do not have this 12-pin diagnostic connector may have an ECM with one or two fault-indicating LEDs. Refer to “Code Types 07” for information on reading codes from these vehicles.

1— 16-pin DLC
   Use OBD-II adapter.
2— 14-pin connector
   Use the NISSAN-2 adapter.

**Figure 14-2 Nissan diagnostic connectors**

### 14.1.2 Code Types 07

**NOTE:**
For transmission codes on models with the 4EAT transmission, see “Testing Transmission Systems” on page 132.

If the test vehicle has a diagnostic connector for code gathering, the scan tool displays vehicle connection instructions at the end of the vehicle ID sequence (See “To read codes:” on page 124.

If the vehicle does not have a diagnostic connector for code gathering, select How To Get Codes from the Code Functions menu and manual code gathering instructions display (see “How to Get Codes” on page 15). You can also gather codes manually on some vehicles with a diagnostic connector.
The scan tool displays the control system name and code type. Nissan uses three basic types of control system:

- Two mode system that outputs Code Type 07a
- Five mode system that outputs Code Type 07a
- Two mode system that outputs Code Type 07b

Both code types flash 2-digit (10s and 1s) codes.

**Code Type 07a—Two Mode System**

On models that use Code Type 07a (two mode system), the ECM is placed in the diagnostic mode by activating a rotary or slide switch on the ECM as follows (Figure 14-3):

**Table 14-1 Rotary and slide switch functions**

<table>
<thead>
<tr>
<th>SWITCH</th>
<th>MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotary Switch</td>
<td>Clockwise = diagnostic mode</td>
</tr>
<tr>
<td></td>
<td>Counterclockwise = normal vehicle operation</td>
</tr>
<tr>
<td>Slide Switch</td>
<td>On = diagnostic mode</td>
</tr>
<tr>
<td></td>
<td>Off = normal vehicle operation</td>
</tr>
</tbody>
</table>

Pathfinder, Pickup, and Van

- Sight Window for LED Monitor Lamps
- Top View
- Side View

All Others

- 1—Diagnostic mode switch
- 2—ECM
- 3—Mode selector
- 4—LED monitor lamps

*Figure 14-3 ECM switch locations*

With the diagnostic switch in the “normal vehicle operation” position, the LEDs can be used to check oxygen sensor operation and air-fuel ratio control. Refer to Nissan service procedures.

When the ECM is first placed in the diagnostic mode, the LEDs flash several codes. These codes indicate that the ECM has not yet received input signals from several switches. The codes may be valid or false. For accurate diagnosis, verify the code status by operating the appropriate switches to send input signals to the ECM.
To read codes for two-mode control systems with Code Type 07a:

1. Verify that the diagnostic switch is in the normal vehicle operation position: slide the switch to the OFF position and the rotary switch fully counterclockwise.
2. Turn the ignition on.
3. Verify that the LEDs light for a bulb check.
   If the LEDs do not light, refer to Nissan test procedures for diagnosis. Codes cannot be displayed if the LEDs do not light for a bulb check.
4. Turn the rotary diagnostic switch fully clockwise or move the slide switch to ON.
5. Observe the LEDs.
   At this point, the LEDs flash several codes for switch inputs or other signals that the ECM has not received. These may include codes 23, 24, and 31 or others. Operate switches as explained in steps 6 and 7 to verify code status.
6. For most models:
   a. Depress and release the accelerator.
   b. Move the gear selector from neutral through the drive ranges and back to neutral (automatic transmission), or from neutral to the highest gear position and back to neutral (manual transmission).
   c. Turn the air conditioner switch or heater blower switch from OFF to ON to OFF.
   d. Proceed to step 8.
7. For 1985–89 300ZX:
   a. Start the engine.
   b. With an automatic transmission, apply the service brakes and shift the transmission from neutral to drive and back to neutral.
   c. For turbo models, drive at a speed above 6 mph.
   d. For all models, turn the A/C switch or heater blower switch from OFF to ON to OFF with the engine running.
   e. For models without A/C, turn the headlamp and rear demister switches from OFF to ON to OFF.
8. Observe the LEDs on the ECM for flashing codes.
   If no faults are present, the LEDs should flash code 31 for vehicles without A/C or code 44 for vehicles with A/C. Any other codes flashed at this point are valid trouble codes that should be diagnosed.
9. Turn the rotary diagnostic switch fully counterclockwise or move the slide switch to OFF.
10. Turn the ignition off.

Code Type 07a—Five Mode System

Gather codes manually from these systems by placing the ECM in the diagnostic mode and observing two flashing LEDs (Figure 14-4 on page 128). These systems flash the first digit on the red LED (10s digit). The second digit flashes on the green LED (1s digit).

To read codes for five-mode control systems with Code Type 07a:

1. Locate the ECM below the passenger seat (Table 14-2).
2. Turn the ignition on; do not start the engine.
3. Verify that the LEDs light briefly for a bulb check.
   If the LEDs do not light, correct the problem before proceeding.
4. While observing the two LEDs on the ECM, turn the diagnostic selector switch on the ECM fully clockwise.
5. After the LEDs flash three times, turn the diagnostic selector switch on the ECM fully counterclockwise.

**IMPORTANT:**
Do not allow the LEDs to flash four times with the selector switch fully clockwise or the trouble codes will be erased.

   The ECM is now in the diagnostic mode (see Table 14-2).
6. Write down any codes present.
   Code 55 is a pass code. All codes flash only once. Repeat steps 3 through 6 to observe any missed codes.
7. Clear codes:
   a. Turn the diagnostic selector switch on the ECM fully clockwise.
   b. After the LEDs flash four times, turn the diagnostic selector switch on the ECM fully counterclockwise.
8. Repeat steps 3 through 6 to verify that no more codes are present.

---

**Table 14-2 Nissan Code Type 07a**

<table>
<thead>
<tr>
<th>Used on:</th>
<th>Nissan (1990 and earlier models)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern:</td>
<td>10s and 1s</td>
</tr>
<tr>
<td>Read codes on:</td>
<td>Red LED (10s) and green LED (1s) on ECM</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Follow the appropriate diagnostic code reading procedure.</td>
</tr>
<tr>
<td>When done:</td>
<td>Turn the ignition off, turn the diagnostic switch off or counterclockwise, and clear codes.</td>
</tr>
<tr>
<td>Code 44 or 55 are pass code (system OK) for models with A/C. Code 31 may be a pass code for models without A/C.</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 14-4 Nissan Code Type 07a—five mode system**

Code 21 Followed by Code 32

Red LED Green LED

Red LED Green LED
Code Type 07b—Two Mode System

The system that outputs Code Type 07b is also placed in diagnostic mode by activating a switch on the ECM. Codes then simultaneously flash on the check engine lamp and a single LED on the ECM. These models flash codes as a series of long-and-short pulses (10s and 1s) on the LED and on the CHECK engine lamp on the dash (Figure 14-5 and Table 14-3).


![Figure 14-5 Nissan Code Type 07b](image)

Table 14-3 Nissan Code Type 7b

<table>
<thead>
<tr>
<th>Used on:</th>
<th>Nissan (1990 and later models without a connector for hook-up)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern:</td>
<td>10s and 1s—Long and short</td>
</tr>
<tr>
<td>Read codes on:</td>
<td>Check Engine lamp (or LED on ECM)</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Follow the appropriate diagnostic code reading procedure.</td>
</tr>
</tbody>
</table>

This procedure is for vehicles that do not have a connector for hook-up. To display codes, the ECM must be in the diagnostic mode.

To read codes for two-mode control systems with Code Type 07b:

1. Locate the ECM below the glove box on the toe board.
2. Turn the ignition on with the engine off.
3. Verify that the LED and the Check Engine lamp light briefly for a bulb check. If either does not light, correct the problem before proceeding.
4. Turn the diagnostic selector switch on the ECM fully clockwise.
5. Wait at least two seconds.
6. Turn the ECM diagnostic selector switch fully counterclockwise.
7. Count the long-and-short flashes either on the LED in the ECM or on the Check Engine lamp in the dash. Any codes present flash one time each.
8. Write down any codes present.
9. Clear codes by turning the diagnostic selector switch on the ECM fully clockwise. Wait two seconds then repeat steps 5 and 6 to verify that no more codes are present.
10. Turn the ignition off.

14.1.3 Functional Tests

NOTE:
Operations described in this section are not available on all tool platforms.
The Functional Tests selection is available for most 1987–96 models with electronic concentrated control systems (ECCS).

**IMPORTANT:**
Read trouble codes before selecting a functional test, otherwise codes may be lost.

There are five diagnostic modes built into vehicles with ECCS:

- Mode 1—Exhaust monitor
- Mode 2—Air/Fuel Check
- Mode 3—Self-Diagnosis
- Mode 4—Switch Test
- Mode 5—Real Time Monitor

A Base Idle Test is also available on the menu. However, this “special” test is not a standard ECCS mode test. The sections that follow describe each of these functional tests.

The self-diagnosis mode (mode 3) is not available on the Functional Tests menu. This mode is entered when you select Auto Code Read from the Code Functions menu.

Once you select a functional test, the scan tool automatically switches the ECM to the correct mode and tells you how to begin the testing. As the ECM changes modes, LEDs 3 and 4 on the scan tool flash the corresponding mode number.

**Exhaust Monitor Test (Mode 1)**

The Exhaust Monitor test lets you monitor the mixture ratio feedback signal from the oxygen sensor (O2S).

**To perform an Exhaust Monitor test:**
1. Select **Exhaust Monitor** from the Functional Tests menu.
   A test initialization screen displays.
2. Start the engine and warm it to normal operating temperature.
3. Select to begin the test.
4. When prompted, raise and hold engine speed at 2000 RPM.
   The display shows Lean when the exhaust is lean, and Rich when rich. LED 3 on the scan tool flashes to indicate that the scan tool is receiving a signal from the O2S.

**Air/Fuel Check (Mode 2)**

The Air/Fuel Check lets you monitor the air-to-fuel ratio by comparing the oxygen sensor (O2S) signal to the fuel injector control signal.

**To perform an Air/Fuel check:**
1. Select **Air/Fuel Check** from the Functional Tests menu.
   A test initialization screen displays.
2. Start the engine and warm it to normal operating temperature, then select to continue.
3. As instructed, increase and hold engine speed at 2000 RPM.
   The Exhaust parameter displays Lean when the O2S detects a lean exhaust, and Rich when
   the exhaust is rich. The Compensation parameter displays the response sent to the fuel
   injection system.
   Typically, when the O2S feedback signal (Exhaust) is Lean, the fuel injection system is
   commanded to go rich, and the Compensation parameter displays Rich.
   Similarly, when the O2S feedback signal (Exhaust) is Rich, the fuel injection system is
   commanded to go lean, and the Compensation parameter displays Lean.
   LED 3 on the scan tool flashes as it receives a signal from the O2S, and LED 4 flashes as it
   receives the signal from the Compensation circuit.
   When both readings are the same and the LEDs flash simultaneously, the O2S signal and the
   fuel injection command are in balance.

Self-Diagnosis (Mode 3)
Nissan mode 3 is the Auto Code Read selection from the Code Functions menu on the scan tool
display (see “Automatic Code Reading” on page 10).

Switch Test (Mode 4)
The Switch test lets you check the following on-off switch circuits:
- Vehicle speed sensor (VSS)
- Start signal
- Idle switch

To perform a Switch test:
1. Select Switch Test from the Functional Tests menu.
   A test initialization screen displays.
2. Start the engine and warm it to normal operating temperature.
3. Select to begin the test.
   The VSS parameter displays Above when speed exceeds 12 mph (20 kph), and Below when
   speed is 12 mph or lower. Also, LED 3 turns on when the vehicle speed is above 12 mph and
   off when below.
   The IGNITION SW OR IDLE SW parameter alternately displays High or Low each time the
   ignition switch or idle switch status changes. Also, LED 4 turns on when this parameter
   displays Low and off when High.

Real-Time Monitor (Mode 5)
This function lets you check the following vehicle sensor circuits:
- Airflow meter
- Fuel pump
- Crank angle sensor
- Ignition coil primary
To perform a Real Time Monitor test:
1. Select Real Time Monitor.
   A test initialization screen displays.
2. As instructed, start the engine and press Y.
3. Drive the vehicle to fully test these parameters.
   If a problem is detected in a sensor circuit, the displayed parameter changes from Normal to Faulty. The LED 3 or 4 flashes, and the scan tool beeps.

Base Idle Test
The Base Idle test lets you check and adjust the vehicle base idle speed.

To perform a Base Idle test:
1. Select Base Idle Test from the Functional Tests menu.
   A test initialization screen displays.
2. Start the engine and warm it to normal operating temperature.
3. Select to begin the test.
4. Follow the on-screen instructions. A countdown timer also displays for your convenience.
5. Select to continue the test.
   The scan tool has now instructed the vehicle ECM to close the auxiliary air control (AAC) valve. You can now adjust the vehicle base idle.

Idle Air Volume Relearn
The Idle Air Volume Relearn is an operation that allows the ECM to quickly learn the idle air volume adaptive value after certain system components are replaced.

Once selected, the test runs by itself without any operator input. The test takes about 30 to 60 seconds and a “test completed” message displays at the conclusion of the procedure. If the test complete message does not display, switch the ignition off, verify that all electrical loads are off, start the engine and repeat the test.

14.2 Testing Transmission Systems
Transmission system tests are available on models with the 4EAT transmission.
14.2.1 Nissan 4EAT Transmission Testing

If you select Transmission from the System Selection menu at the end of the vehicle ID sequence, the scan tool gives you instructions for applying power.

Automatic code gathering is not available on older Nissan 4-speed Electronic Automatic Transmissions (4EAT), but is available on most 1990 and later models. For transmission codes, select How To Get Codes from the Code Functions menu and the scan tool either displays manual code gathering instructions or gathers the codes for you.

For 4EAT transmissions that require manual code gathering, Nissan uses Type 7c transmission codes (Figure 14-6 and Table 14-4 on page 133).

![Figure 14-6 Nissan Code Type 07c](image)

Table 14-4 Nissan Code Type 7c

<table>
<thead>
<tr>
<th>Used on:</th>
<th>Nissan 4EAT transmissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern:</td>
<td>Long flash</td>
</tr>
<tr>
<td>Read codes on:</td>
<td>Power, A/T Check, or O/D lamp (depending on vehicle)</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Follow the appropriate Nissan procedure.</td>
</tr>
<tr>
<td>When done:</td>
<td>Codes clear automatically when the problem is fixed.</td>
</tr>
</tbody>
</table>

Code Type 7c consists of a 2-second flash, followed by a 1-second pause, then a series of ten short (0.1-second) flashes. Short flashes represent code numbers 1 through 10. A long (0.6-second) flash indicates a fault at the indicated position.

For example, Short–Short–Short–Short–Long–Short–Short–Short–Short–Short indicates Code 5 because the fifth flash is long. If no codes are present, the ten flashes are all short (0.1-second). The code sequence is followed by a 2.5-second pause, a 2-second flash, then the pattern repeats.

To read Nissan 4EAT transmission codes manually, you must follow a specific diagnostic procedure. Failure to do so may result in misreading codes or inaccurate diagnosis.

To manually place the Nissan 4EAT control system in diagnostic mode:

1. Start and warm the engine to operating temperature.
2. Switch the ignition off, move the gear selector to Park, set the A/T Mode switch (optional) to Auto, and the O/D switch to On.
3. Turn the key on (engine off).
   - Depending on the vehicle, either the Power lamp, the A/T Check lamp, or the O/D lamp illuminates for approximately 2 seconds. This is the lamp that flashes codes.
4. Turn the ignition off, place the gear selector in Drive, and set the O/D switch to Off.
5. Turn the key on (engine off), wait 2 seconds and move the gear selector to 2nd.
6. Set the O/D switch to On, move the gear selector to 1st, and set the O/D switch to Off.
7. Fully depress and release the throttle to begin gathering manual codes.
   The lamp flashes Code Type 7c (Figure 14-6). If no codes are present, the lamp flashes evenly 10 times after a long start flash.

14.3 Testing Antilock Brake Systems (ABS)

Nissan and Infiniti ABS system testing includes:

- “Code Reading Connectors and Locations” on page 134
- “Manual Codes” on page 135
- “Actuator Tests” on page 135

14.3.1 Code Reading Connectors and Locations

Nissan and Infiniti ABS systems use several types of connectors for code reading and functional tests. Most 2000 and later Nissan and Infiniti ABS codes can be read and cleared using the OBD-II connector in Figure 14-8. Other systems require a jumping pins on a test connector.

1— 1-pin check connector—jumper terminal L to ground
2— 6-pin check connector—jumper terminal 3 to ground

1— 16-pin DLC—jumper terminal 9 to ground
2— 14-pin DLC—jumper terminal 9 to ground

Figure 14-7 Nissan diagnostic connectors

Figure 14-8 Nissan diagnostic connectors

These connectors may be found either under dash near the steering column, or behind the driver-side kick panel.
14.3.2 Manual Codes

To read manual codes:
1. Select Codes from the Codes and Data menu, or select How to get codes from the Codes Functions menu.
   The scan tool will indicate the connector location and connector type. Please refer to section 14.3.1 for more information.
2. Locate the connector and follow the on-screen instructions.
   Codes will flash on the ABS warning lamp as a series of long and short pulses (10s and 1s). Multiple codes, if present, will be separated by a long pause.

For repair instructions or if no codes flash, refer to the service manual.

14.3.3 Actuator Tests

Nissan and Infiniti ABS actuator tests selection is available for 2000 and later vehicles that require the use of the K-2A key.

NOTE:
Not all platforms may support tests.

To activate an actuator test:
1. Select Actuator Tests from the main menu.
2. Select the test you wish to activate, and follow the on-screen instructions, if any.

14.4 Testing Supplemental Restraint Systems (SRS)

Most 2000 and later Nissan and Infiniti SRS, or airbag, codes can be read and cleared using the scan tool. Manual codes are available on other models.

14.4.1 Manual Code Reading

Nissan and Infiniti vehicles transmit Type 07b SRS codes (Figure 14-10 and Table 14-5 on page 136).
2000 and Earlier Vehicles

NOTE:
Diagnosis mode activates only when a malfunction is detected.

To read SRS codes for 2000 and earlier vehicles:
1. Turn the ignition on.
2. Press the driver-side door switch at least 5 times within 7 seconds.

To clear codes for 2000 and earlier vehicles:
1. Repair the malfunction.
2. Switch the ignition off for at least 1 second, then switch it back on.

2001 Vehicles

NOTE:
If SRS does not enter diagnosis mode even though malfunction is detected in user mode, check the vehicle battery voltage. If the battery voltage is less than 9 V, charge the battery.

To read SRS codes for 2001 vehicles:
1. Turn ignition switch on.
2. After the Airbag warning lamp lights for 7 seconds, turn ignition switch off within 1 second.
3. Wait more than 3 seconds.
4. Repeat the previous steps 1 to 3 times.
5. Turn ignition switch on.
   SRS is now in diagnosis mode.
To clear codes for 2001 vehicles:
1. Open driver-side door.
2. Turn ignition switch on.

14.5 Testing Body Control Module (BCM) Systems

The BCM monitors various electrical components, such as door locks, windshield wipers, keyless entry, Intelligent Key, headlamps, and accessories, located on the body interior and exterior. Codes and data are available from BCM, and are accessed through the DLC.

14.6 Testing Controller Area Network (CAN) Systems

The CAN is a multiplex communication system that transfers data between the various electronic control modules (ECMs) on the vehicle. Two data lines, CAN-H and CAN-L, connect the ECMs together to form the main line of the network. A termination circuit is used for the ECM on either end of the CAN network, additional ECMs are on branch lines that splice into the main lines. Twisted-pair data line style is used to reduce interference on the circuits.

Based on the current applied, the termination circuit produces an electrical potential difference between the data lines. This potential difference is what the ECMs on the CAN system use to transmit and receive data.
Refer to the vehicle equipment identification decal on the vehicle to determine which type of CAN system is used on the test vehicle. Also verify that the specified equipment is actually installed on the vehicle.

A specific ECM either transmits a signal to or receives a signal from the CAN network for each data parameter. Use the following tables to determine if a signal is transmitted or received by an ECM.

**Table 14-6 Acronym and abbreviation identification**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS</td>
<td>Antilock brake, traction control, and/or vehicle dynamic control module</td>
</tr>
<tr>
<td>BCM</td>
<td>Body control module</td>
</tr>
<tr>
<td>DLC</td>
<td>Data link connector</td>
</tr>
<tr>
<td>ECM</td>
<td>Engine control module</td>
</tr>
<tr>
<td>IPDM-E</td>
<td>Intelligent power distribution module-engine room</td>
</tr>
<tr>
<td>M&amp;A</td>
<td>Unified meter and A/C amplifier module</td>
</tr>
<tr>
<td>R</td>
<td>Receives signal from the CAN network</td>
</tr>
<tr>
<td>STRG</td>
<td>Steering angle sensor module</td>
</tr>
<tr>
<td>T</td>
<td>Transmits signal to the CAN network</td>
</tr>
<tr>
<td>TCM</td>
<td>Transmission control module</td>
</tr>
</tbody>
</table>

**Table 14-7 CAN Type 1 communication signal identification (part 1 of 2)**

<table>
<thead>
<tr>
<th>Signal</th>
<th>ECM</th>
<th>BCM</th>
<th>M&amp;A</th>
<th>ABS</th>
<th>IPDM-E</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/C Compressor feedback</td>
<td>T</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A/C Compressor request</td>
<td>T</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accelerator pedal position</td>
<td>T</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASCD CRUISE lamp</td>
<td>T</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASCD SET lamp</td>
<td>T</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling fan speed request</td>
<td>T</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine coolant temperature</td>
<td>T</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine speed</td>
<td>T</td>
<td>R</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel consumption monitor</td>
<td>T</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malfunction indicator lamp</td>
<td>T</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A/C switch</td>
<td>R</td>
<td>T</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blower fan motor switch</td>
<td>R</td>
<td>T</td>
<td></td>
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</tr>
<tr>
<td>Buzzer output</td>
<td>T</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day time running light request</td>
<td>T</td>
<td></td>
<td></td>
<td></td>
<td>R</td>
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<tr>
<td>Door switch</td>
<td>T</td>
<td>R</td>
<td>R</td>
<td></td>
<td></td>
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<tr>
<td>Front wiper request</td>
<td>T</td>
<td></td>
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<td></td>
<td>R</td>
</tr>
<tr>
<td>High beam request</td>
<td>T</td>
<td>R</td>
<td>R</td>
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</tr>
<tr>
<td>Horn chirp</td>
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Table 14-7 CAN Type 1 communication signal identification (part 2 of 2)

<table>
<thead>
<tr>
<th>Signal</th>
<th>ECM</th>
<th>BCM</th>
<th>M&amp;A</th>
<th>ABS</th>
<th>IPDM-E</th>
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<tbody>
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<td>Ignition switch</td>
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<td>R</td>
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<tr>
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<td></td>
<td>R</td>
<td></td>
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<tr>
<td>Position lights request</td>
<td>T</td>
<td>R</td>
<td></td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Rear window defogger switch</td>
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<td></td>
<td></td>
<td>R</td>
<td></td>
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<tr>
<td>Sleep request 1</td>
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<td></td>
<td></td>
<td>R</td>
<td></td>
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<tr>
<td>Sleep request 2</td>
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<td></td>
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<td>R</td>
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<tr>
<td>Theft warning horn request</td>
<td>T</td>
<td></td>
<td></td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Tire pressure</td>
<td>T</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn indicator</td>
<td>T</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
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<td>Wake up request 1</td>
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<td>R</td>
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<td></td>
</tr>
<tr>
<td>Fuel level sensor</td>
<td>R</td>
<td></td>
<td>T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seat belt buckle switch</td>
<td>R</td>
<td>R</td>
<td>T</td>
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</tr>
<tr>
<td>Vehicle speed sensor</td>
<td></td>
<td></td>
<td>R</td>
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<td></td>
</tr>
<tr>
<td>ABS warning lamp</td>
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<td>T</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brake warning lamp</td>
<td>R</td>
<td>T</td>
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<tr>
<td>Front wiper stop position</td>
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<td>High beam status</td>
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<tr>
<td>Low beam status</td>
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</tr>
<tr>
<td>Rear window defogger control switch</td>
<td>R</td>
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Table 14-8 CAN Type 2 and 3 communication signal identification (part 1 of 3)

<table>
<thead>
<tr>
<th>Signal</th>
<th>ECM</th>
<th>TCM</th>
<th>BCM</th>
<th>M&amp;A</th>
<th>ABS</th>
<th>IPDM-E</th>
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</thead>
<tbody>
<tr>
<td>A/C Compressor feedback</td>
<td>T</td>
<td></td>
<td></td>
<td>R</td>
<td></td>
<td></td>
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<tr>
<td>A/C Compressor request</td>
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<td>R</td>
<td></td>
</tr>
<tr>
<td>Accelerator pedal position</td>
<td>T</td>
<td>R</td>
<td></td>
<td></td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>ASCD CRUISE lamp</td>
<td>T</td>
<td></td>
<td></td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASCD OD cancel request</td>
<td>T</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASCD operation</td>
<td>T</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>ASCD SET lamp</td>
<td>T</td>
<td></td>
<td></td>
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<td>R</td>
<td></td>
</tr>
<tr>
<td>Battery voltage</td>
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<td>R</td>
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<td>Closed throttle position</td>
<td>T</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling fan speed request</td>
<td>T</td>
<td></td>
<td></td>
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<td>Engine coolant temperature</td>
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<tr>
<td>Engine speed</td>
<td>T</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
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</tr>
<tr>
<td>Fuel consumption monitor</td>
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<td></td>
<td>R</td>
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### Table 14-8 CAN Type 2 and 3 communication signal identification (part 2 of 3)

<table>
<thead>
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<th>Signal</th>
<th>Control Unit</th>
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<tbody>
<tr>
<td></td>
<td>ECM</td>
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<tr>
<td>Malfunction indicator lamp</td>
<td>T</td>
</tr>
<tr>
<td>Wide open throttle position</td>
<td>T</td>
</tr>
<tr>
<td>A/T CHECK indicator lamp</td>
<td>T</td>
</tr>
<tr>
<td>A/T position indicator</td>
<td>T</td>
</tr>
<tr>
<td>A/T self-diagnosis</td>
<td></td>
</tr>
<tr>
<td>Manual mode gear position</td>
<td>T</td>
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<tr>
<td>Manual mode indicator</td>
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<tr>
<td>Output shaft speed</td>
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<td>Turbine speed</td>
<td>T</td>
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<tr>
<td>A/C switch</td>
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<tr>
<td>Blower fan motor switch</td>
<td>R</td>
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<tr>
<td>Buzzer output</td>
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<tr>
<td>Day time running light request</td>
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<tr>
<td>Door switch</td>
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<tr>
<td>Front wiper request</td>
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<td>High beam request</td>
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<td>Horn chirp</td>
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<td>Ignition switch</td>
<td>T</td>
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<td>Low beam request</td>
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<tr>
<td>Position lights request</td>
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<td>Rear window defogger switch</td>
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<tr>
<td>Sleep request 1</td>
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<tr>
<td>Sleep request 2</td>
<td>T</td>
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<tr>
<td>Theft warning horn request</td>
<td>T</td>
</tr>
<tr>
<td>Tire pressure</td>
<td>T</td>
</tr>
<tr>
<td>Turn indicator</td>
<td>T</td>
</tr>
<tr>
<td>Wake up request 1</td>
<td>T</td>
</tr>
<tr>
<td>Fuel level sensor</td>
<td>R</td>
</tr>
<tr>
<td>Manual mode shift down</td>
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</tr>
<tr>
<td>Manual mode shift up</td>
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</tr>
<tr>
<td>Manual mode</td>
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<tr>
<td>Stop lamp switch</td>
<td>R</td>
</tr>
<tr>
<td>Vehicle speed sensor</td>
<td>R</td>
</tr>
<tr>
<td>A/T shift schedule change demand</td>
<td>R</td>
</tr>
<tr>
<td>ABS operation</td>
<td>R</td>
</tr>
<tr>
<td>ABS warning lamp</td>
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</table>
### Table 14-9 CAN Type 2 and 3 communication signal identification (part 1 of 3)

<table>
<thead>
<tr>
<th>Signal</th>
<th>Control Unit</th>
</tr>
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<tbody>
<tr>
<td>ECM</td>
<td>TCM</td>
</tr>
<tr>
<td>Brake warning lamp</td>
<td>R</td>
</tr>
<tr>
<td>SLIP indicator lamp</td>
<td>R</td>
</tr>
<tr>
<td>TSC OFF indicator lamp</td>
<td>R</td>
</tr>
<tr>
<td>Front wiper stop position</td>
<td>R</td>
</tr>
<tr>
<td>High beam status</td>
<td>R</td>
</tr>
<tr>
<td>Hood switch</td>
<td>R</td>
</tr>
<tr>
<td>Low beam status</td>
<td>R</td>
</tr>
<tr>
<td>Rear window defogger control switch</td>
<td>R</td>
</tr>
</tbody>
</table>

### Table 14-10 CAN Type 4 and 5 communication signal identification (part 1 of 2)

<table>
<thead>
<tr>
<th>Signal</th>
<th>Control Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECM</td>
<td>ABS</td>
</tr>
<tr>
<td>A/C Compressor feedback</td>
<td>T</td>
</tr>
<tr>
<td>A/C Compressor request</td>
<td>T</td>
</tr>
<tr>
<td>Accelerator pedal position</td>
<td>T</td>
</tr>
<tr>
<td>ASCD CRUISE lamp</td>
<td>T</td>
</tr>
<tr>
<td>ASCD OD cancel request</td>
<td>T</td>
</tr>
<tr>
<td>ASCD operation</td>
<td>T</td>
</tr>
<tr>
<td>ASCD SET lamp</td>
<td>T</td>
</tr>
<tr>
<td>Battery voltage</td>
<td>T</td>
</tr>
<tr>
<td>Closed throttle position</td>
<td>T</td>
</tr>
<tr>
<td>Cooling fan speed request</td>
<td>T</td>
</tr>
<tr>
<td>Engine coolant temperature</td>
<td>T</td>
</tr>
<tr>
<td>Engine speed</td>
<td>T</td>
</tr>
<tr>
<td>Fuel consumption monitor</td>
<td>T</td>
</tr>
<tr>
<td>Malfunction indicator lamp</td>
<td>T</td>
</tr>
<tr>
<td>Wide open throttle position</td>
<td>T</td>
</tr>
<tr>
<td>A/T shift schedule change demand</td>
<td>T</td>
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<tr>
<td>ABS operation</td>
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<td>ABS warning lamp</td>
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<td>Brake warning lamp</td>
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<td>SLIP indicator lamp</td>
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<td>VCD OFF indicator lamp</td>
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<td>Vehicle speed sensor</td>
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</tr>
<tr>
<td>A/T CHECK indicator lamp</td>
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</tr>
<tr>
<td>A/T position indicator</td>
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### Table 14-9 CAN Type 4 and 5 communication signal identification (part 2 of 2)

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<th>TCM</th>
<th>BCM</th>
<th>M&amp;A</th>
<th>STRG</th>
<th>IPDM-E</th>
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<tbody>
<tr>
<td>A/T self-diagnosis</td>
<td>R</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Manual mode gear position</td>
<td>T</td>
<td></td>
<td>R</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manual mode indicator</td>
<td>T</td>
<td>R</td>
<td></td>
<td></td>
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<tr>
<td>Output shaft speed</td>
<td>R</td>
<td></td>
<td>T</td>
<td></td>
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<tr>
<td>Turbine speed</td>
<td>R</td>
<td></td>
<td>T</td>
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</tr>
<tr>
<td>A/C switch</td>
<td>R</td>
<td></td>
<td>T</td>
<td></td>
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<tr>
<td>Blower fan motor switch</td>
<td>R</td>
<td></td>
<td>T</td>
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<td>Buzzer output</td>
<td>T</td>
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<td>R</td>
<td></td>
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<td>Day time running light request</td>
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<td>R</td>
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<td>Door switch</td>
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<td>R</td>
<td>R</td>
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</tr>
<tr>
<td>Front wiper request</td>
<td>T</td>
<td></td>
<td>R</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>High beam request</td>
<td>T</td>
<td>R</td>
<td>R</td>
<td></td>
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<td>Horn chirp</td>
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<td>R</td>
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<td>R</td>
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<td></td>
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<td>Low beam request</td>
<td>T</td>
<td></td>
<td>R</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Rear window defogger switch</td>
<td>T</td>
<td></td>
<td>R</td>
<td></td>
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</tr>
<tr>
<td>Sleep request 1</td>
<td>T</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Sleep request 2</td>
<td>T</td>
<td></td>
<td>R</td>
<td></td>
<td></td>
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</tr>
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<td>Theft warning horn request</td>
<td>T</td>
<td></td>
<td>R</td>
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<tr>
<td>Tire pressure</td>
<td>T</td>
<td></td>
<td>R</td>
<td></td>
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<td></td>
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<tr>
<td>Turn indicator</td>
<td>T</td>
<td></td>
<td>R</td>
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<td>Wake up request 1</td>
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<td></td>
<td>R</td>
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<td></td>
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<tr>
<td>Fuel level sensor</td>
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<td>T</td>
<td></td>
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<tr>
<td>Manual mode shift down</td>
<td>R</td>
<td></td>
<td>T</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manual mode shift up</td>
<td>R</td>
<td></td>
<td>T</td>
<td></td>
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</tr>
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<td>Manual mode</td>
<td>R</td>
<td></td>
<td>T</td>
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<td>Not manual mode</td>
<td>R</td>
<td></td>
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<td>Seat belt buckle switch</td>
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<td>Stop lamp switch</td>
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<td></td>
<td>T</td>
<td></td>
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<tr>
<td>Steering angle sensor</td>
<td>R</td>
<td></td>
<td>T</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Front wiper stop position</td>
<td>R</td>
<td></td>
<td>T</td>
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<td></td>
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<tr>
<td>High beam status</td>
<td>R</td>
<td></td>
<td></td>
<td>T</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hood switch</td>
<td>R</td>
<td></td>
<td></td>
<td>T</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low beam status</td>
<td>R</td>
<td></td>
<td></td>
<td>T</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rear window defogger control switch</td>
<td>R</td>
<td></td>
<td></td>
<td>T</td>
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<td></td>
</tr>
</tbody>
</table>
Chapter 15 Subaru

This chapter contains information for testing Subaru vehicles with the Asian Import Vehicle Communication Software (VCS). The following Subaru systems may be available for testing or troubleshooting:

- Engine
- Transmission
- Antilock Brake System (ABS)
- Airbag (SRS - Supplemental Restraint System)

15.1 Testing Engine Systems

The following sections include information for testing Subaru engine systems. Subaru engine testing includes:

- “Code Reading Connector Locations” on page 143
- “Connecting the Scan Tool to the Vehicle”
- “Reading Engine Codes” on page 150
- “D-Check and Read Memory Connector Locations”
- “Automatic Code Reading” on page 172
- “Code Type 08” on page 176

15.1.1 Code Reading Connector Locations

This section contains locations for diagnostic connectors for the following Subaru vehicles:

- “Carbureted engine common connector locations” on page 144 (Table 15-1, Figure 15-1)
- “1983–84 Turbo common connector locations” on page 144 (Table 15-2, Figure 15-2)
- “Justy common connector locations” on page 145 (Table 15-3, Figure 15-3)
- “Loyale common connector locations” on page 145 (Table 15-4, Figure 15-4)
- “1990–94 Legacy and 1993–95 Impreza 1.8L common connector locations” on page 146 (Table 15-5, Figure 15-5)
- “SVX common connector locations” on page 147 (Table 15-6, Figure 15-6)
- “XT and XT6 common connector locations” on page 147 (Table 15-7, Figure 15-7)
- “1995 Legacy, 1995 Impreza 2.2L and 1996-06 Subaru common connector locations” on page 148 (Table 15-8, Figure 15-8)

See also “D-Check and Read Memory Connector Locations” on page 166
Table 15-1 Carbureted engine connector locations

<table>
<thead>
<tr>
<th>CONNECTOR</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-Check connectors</td>
<td>1 (next to ECM)</td>
</tr>
<tr>
<td>Check connectors 2 and 3</td>
<td>2 (next to ECM)</td>
</tr>
<tr>
<td>Check connector 4</td>
<td>3 (next to ECM)</td>
</tr>
<tr>
<td>Check connector 1</td>
<td>4 (R/F strut area)</td>
</tr>
<tr>
<td>ECM</td>
<td>5 (under steering column)</td>
</tr>
</tbody>
</table>

Table 15-2 1983–84 Turbo connector locations

<table>
<thead>
<tr>
<th>CONNECTOR</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECM</td>
<td>1 (under steering column)</td>
</tr>
<tr>
<td>D-Check connectors</td>
<td>2 (next to ECM)</td>
</tr>
<tr>
<td>Check connectors 1, 2, and 3</td>
<td>3 (next to ECM)</td>
</tr>
<tr>
<td>Check connector 4</td>
<td>4 (front of R/F strut tower)</td>
</tr>
</tbody>
</table>
### Table 15-3  Justy connector locations

<table>
<thead>
<tr>
<th>CONNECTOR</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECVT D-Check and Read Memory connectors</td>
<td>1 (by ECVT module)</td>
</tr>
<tr>
<td>ECM D-Check and Read Memory connectors</td>
<td>2 (by ECM module)</td>
</tr>
<tr>
<td>ECVT control module</td>
<td>3 (left of ECM)</td>
</tr>
<tr>
<td>ECM control module</td>
<td>4 (left of steering column)</td>
</tr>
<tr>
<td>9-pin diagnostic connector</td>
<td>5 (left of fire wall area)</td>
</tr>
<tr>
<td>6-pin and 9-pin diagnostic connectors</td>
<td>6 (left of fire wall area)</td>
</tr>
</tbody>
</table>

### Table 15-4  Loyale connector locations* (part 1 of 2)

<table>
<thead>
<tr>
<th>CONNECTOR</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECM</td>
<td>1 (under steering column)</td>
</tr>
<tr>
<td>D-Check &amp; Read Memory connectors—carbureted, some MPFI and SPI</td>
<td>2 (next to ECM connector)</td>
</tr>
<tr>
<td>17-pin or 13-pin Check connector</td>
<td>3 (next to ECM connector)</td>
</tr>
</tbody>
</table>

*Transmission control module (TCM) is located inside the left quarter panel (4EAT only).
Table 15-4 Loyale connector locations* (part 2 of 2)

<table>
<thead>
<tr>
<th>CONNECTOR</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-pin or 13-pin Check connector (alternate location) &amp; D-Check connectors</td>
<td>4 (left side of fire wall area)</td>
</tr>
<tr>
<td>9-pin Check connector (some models)</td>
<td>5 (left side of fire wall area)</td>
</tr>
</tbody>
</table>

*Transmission control module (TCM) is located inside the left quarter panel (4EAT only).

Table 15-5 Legacy and Impreza 1.8L connector locations

<table>
<thead>
<tr>
<th>VEHICLE</th>
<th>YEAR</th>
<th>CONNECTOR</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impreza 1.8L</td>
<td>1993–94</td>
<td>ECM</td>
<td>5 (left side of steering column)</td>
</tr>
<tr>
<td></td>
<td>1993–95</td>
<td>22-pin</td>
<td>1 (left side of heater box)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9-pin</td>
<td>2 (left side of heater box)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D-Check and Read Memory for engine and transmission</td>
<td>3 (under left side of dash)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TCM</td>
<td>4 (left side of steering column)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABS controller</td>
<td>7 (under R/F seat carpet)</td>
</tr>
<tr>
<td></td>
<td>1995</td>
<td>ECM</td>
<td>8 (under right side of passenger carpet)</td>
</tr>
<tr>
<td>Legacy</td>
<td>1990–94</td>
<td>22-pin</td>
<td>2 (left side of heater box)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D-Check and Read Memory for engine and transmission</td>
<td>3 (under left side of dash)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TCM</td>
<td>4 (left side of steering column)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ECM</td>
<td>5 (left side of steering column)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9-pin</td>
<td>2 (left side of heater box)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABS controller</td>
<td>7 (under R/F seat carpet)</td>
</tr>
</tbody>
</table>
Table 15-6 SVX connector locations

<table>
<thead>
<tr>
<th>CONNECTOR</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCM</td>
<td>1 (under left side of dash)</td>
</tr>
<tr>
<td>ECM</td>
<td>2 (under left side of dash)</td>
</tr>
<tr>
<td>10-pin and 20-pin connectors</td>
<td>3 (left side of kickpanel)</td>
</tr>
<tr>
<td>ABS control unit</td>
<td>4 (under RF seat)</td>
</tr>
<tr>
<td>9-pin Check connector and diagnostic connector</td>
<td>5 (left side of kick panel)</td>
</tr>
</tbody>
</table>

Table 15-7 XT and XT6 connector locations

<table>
<thead>
<tr>
<th>CONNECTOR</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-Check connector; 9-pin Check connector</td>
<td>1</td>
</tr>
<tr>
<td>Read Memory connector</td>
<td>2 (by ECM)</td>
</tr>
<tr>
<td>MPFI controller</td>
<td>3 (in trunk below rear window)</td>
</tr>
<tr>
<td>TCM and power steering controller connector</td>
<td>4</td>
</tr>
</tbody>
</table>
15.1.2 Connecting the Scan Tool to the Vehicle

This section contains information for connecting the scan tool to the diagnostic connector for testing or troubleshooting. Included in this section are the following:

- “Connections Using the MULTI-1 Adapter” on page 148 (Figure 15-9)
- “Connections Using the MULTI-2 Adapter” on page 149 (Figure 15-13)
- “Connections Using the OBD-II Adapter” on page 150 (Figure 15-14)

### Connections Using the MULTI-1 Adapter

To connect the MULTI-1 adapter (Figure 15-9) to a Subaru vehicle, a 12 volt power cable (Figure 15-11, Figure 15-12) and the ground adapter (Figure 15-10) must be used. Connect the MULTI-1 adapter as shown in (Figure 15-9). Connect the blue wire of the MULTI-1 adapter to the vehicle Check connector and pin designated in (Table 15-9).
Subaru Testing Engine Systems

1— MULTI-1 adapter
2— Ground - black wire (connect the ground adapter here) (Figure 15-10)
3— MULTI-1 blue wire (see Table 15-9 for connection to vehicle connector)
4— 12 volt power jack (connect the power cable here) (Figure 15-11, Figure 15-12)

Connections Using the MULTI-2 Adapter

The MULTI-2 adapter can be used on many Asian import vehicles. The MULTI-2 adapter connector “C” is designed to connect to some Subaru vehicles equipped with a 9-pin Check connector. Connect a 12 volt power cable (Figure 15-11, Figure 15-12) and the ground adapter (Figure 15-10) as shown in Figure 15-13. See Table 15-9 for applicable vehicles.
1— Ground - black wire (connect the ground adapter here) (Figure 15-10)
2— Mazda & Ford (MULTI-2E)
3— Isuzu & Geo with GM system (MULTI-2D)
4— Subaru (MULTI-2C)
5— Mazda & Ford (MULTI-2B)
6— Special applications (MULTI-2A)
7— 12 volt power jack (connect the power cable here) (Figure 15-11, Figure 15-12)

Figure 15-13 MULTI-2 Asian adapter

Connections Using the OBD-II Adapter

The 16-pin OBD-II adapter is used on some Subaru models beginning in 1995 and all 1996 and later OBD-II equipped vehicles. Use the OBD-II adapter with the specified Personality Key™ device to read engine and transmission codes as shown in “OBD-II adapter and Personality Key™”. See Table 15-9 for applicable vehicles.

Figure 15-14 OBD-II adapter and Personality Key™

1— 16-pin DLC
2— OBD-II adapter
3— Personality Key™

15.1.3 Reading Engine Codes

The following contains information for connecting the scan tool to the vehicle for reading engine codes. Included in this section are the following:

- “Subaru Vehicle Connection Table” on page 151 (Table 15-9)
- “Subaru Vehicle Connection Diagrams” on page 159 (Figure 15-15 to Figure 15-31)
### Subaru Vehicle Connection Table

Find the vehicle being tested in Table 15-9 “Subaru Vehicle Connections Table” and then go to the correct “Reading Codes Connector” figure number shown for the vehicle.

<table>
<thead>
<tr>
<th>Year</th>
<th>Model</th>
<th>Engine</th>
<th>Fuel System</th>
<th>Adapter</th>
<th>User's Manual Section and Figure Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Vehicle Identification Number</strong></td>
</tr>
<tr>
<td>1983</td>
<td>Brat</td>
<td>1.8L H4</td>
<td>2BBL X</td>
<td>Figure 15-19 Figure 15-33</td>
<td>Table 15-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.8L H4T</td>
<td>MFI X</td>
<td>Figure 15-15 Figure 15-35</td>
<td>Table 15-2</td>
</tr>
<tr>
<td></td>
<td>Hardtop</td>
<td>All</td>
<td>All X</td>
<td>Figure 15-19 Figure 15-33</td>
<td>Table 15-1</td>
</tr>
<tr>
<td></td>
<td>Hatchback</td>
<td>All</td>
<td>All X</td>
<td>Figure 15-19 Figure 15-33</td>
<td>Table 15-1</td>
</tr>
<tr>
<td></td>
<td>Sedan</td>
<td>All</td>
<td>All X</td>
<td>Figure 15-19 Figure 15-33</td>
<td>Table 15-1</td>
</tr>
<tr>
<td></td>
<td>Wagon</td>
<td>1.8L H4</td>
<td>1BBL X</td>
<td>Figure 15-19 Figure 15-33</td>
<td>Table 15-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.8L H4</td>
<td>2BBL X</td>
<td>Figure 15-19 Figure 15-33</td>
<td>Table 15-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.8L H4T</td>
<td>MFI X</td>
<td>Figure 15-19 Figure 15-35</td>
<td>Table 15-2</td>
</tr>
<tr>
<td>1984</td>
<td>Brat</td>
<td>1.8L H4</td>
<td>2BBL X</td>
<td>Figure 15-28 Figure 15-34</td>
<td>Table 15-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.8L H4-T</td>
<td>MFI X</td>
<td>Figure 15-28 Figure 15-34</td>
<td>Table 15-2</td>
</tr>
<tr>
<td></td>
<td>Hardtop</td>
<td>1.6L H4</td>
<td>2BBL X</td>
<td>Figure 15-28 Figure 15-34</td>
<td>Table 15-1</td>
</tr>
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<td>1.8L H4</td>
<td>1BBL X</td>
<td>Figure 15-28 Figure 15-34</td>
<td>Table 15-1</td>
</tr>
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<td></td>
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<td>2BBL X</td>
<td>Figure 15-28 Figure 15-34</td>
<td>Table 15-1</td>
</tr>
<tr>
<td></td>
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<td>MFI X</td>
<td>Figure 15-16 Figure 15-35</td>
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</tr>
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<td>Hatchback</td>
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<td>All X</td>
<td>Figure 15-28 Figure 15-34</td>
<td>Table 15-1</td>
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<tr>
<td></td>
<td>Sedan</td>
<td>All</td>
<td>All X</td>
<td>Figure 15-28 Figure 15-34</td>
<td>Table 15-1</td>
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<tr>
<td></td>
<td>Wagon</td>
<td>1.8L H4</td>
<td>1BBL X</td>
<td>Figure 15-28 Figure 15-34</td>
<td>Table 15-1</td>
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<td></td>
<td>1.8L H4</td>
<td>2BBL X</td>
<td>Figure 15-28 Figure 15-34</td>
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</tr>
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<td></td>
<td></td>
<td>1.8L H4-T</td>
<td>MFI X</td>
<td>Figure 15-16 Figure 15-35</td>
<td>Table 15-2</td>
</tr>
<tr>
<td>1985</td>
<td>Brat</td>
<td>All</td>
<td>All X</td>
<td>Figure 15-21 Figure 15-36</td>
<td>Table 15-4</td>
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<td>All X</td>
<td>Figure 15-21 Figure 15-36</td>
<td>Table 15-1</td>
</tr>
<tr>
<td></td>
<td>Sedan</td>
<td>1.8L H4</td>
<td>2BBL X</td>
<td>Figure 15-21 Figure 15-36</td>
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<td>1.8L H4</td>
<td>MFI X</td>
<td>Figure 15-29 Figure 15-35</td>
<td>Table 15-4</td>
</tr>
<tr>
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Subaru Vehicle Connection Diagrams

The following procedures contain directions and diagrams for connecting various Subaru Check connectors to the scan tool.

NOTE:
Procedures are specific to each type of connector. Some procedures are specific down to the pin number and color of the Check connector. Be sure that the connector you are using matches the description before you proceed. See Table 15-9 for a guide to the correct vehicle application.

To read codes on vehicles with a 7-pin Check connector:
- Connect the blue wire of the MULTI-1 adapter to Check connector pin 3 (Figure 15-15). Use the ground extension on the MULTI-1 black wire.

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<tr>
<th>Year</th>
<th>Model</th>
<th>Engine</th>
<th>Fuel System</th>
<th>Adapter</th>
<th>User’s Manual Section and Figure Numbers</th>
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<th>D-Check Connectors</th>
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</table>
1— 7-pin Check connector (color: brown)
2— Pin 3 (connect the MULTI-1 blue wire here)
3— MULTI-1 adapter

Figure 15-15 7-pin Check connector

To read codes on vehicles with a 9-pin Check connector:
• Connect the blue wire of the MULTI-1 adapter to Check connector pin 4 (Figure 15-16).

1— 9-pin Check connector (color: yellow)
2— Pin 4 (connect the MULTI-1 blue wire here)
3— MULTI-1 adapter

Figure 15-16 Yellow 9-pin Check connector

To read codes on vehicles with a 9-pin Check connector:
• Codes can be read using a MULTI-2C or a MULTI-1 adapter. To read codes, connect the MULTI-2C adapter to the Check connector (Figure 15-17) or connect the blue wire of the MULTI-1 adapter to pin 8 of the Check connector (Figure 15-18).

1— 9-pin Check connector (color: varies)
2— MULTI-2 adapter

Figure 15-17 9-pin Check connector and MULTI-2C
To read codes on vehicles with an 11-pin Check connector:

- Connect the blue wire of the MULTI-1 adapter to Check connector pin 13 (Figure 15-19).

To read codes on vehicles with an 11-pin Check connector:

- Connect the blue wire of the MULTI-1 adapter to Check connector pin 15 (Figure 15-20).
To read codes on vehicles with a 13-pin Check connector:

- Connect the MULTI-1 adapter blue wire to Check connector pin 10 (Figure 15-21).

![Figure 15-21 13-pin Check connector](image)

1—13-pin Check connector (color: yellow)
2—Pin 10 (connect the MULTI-1 blue wire here)
3—MULTI-1 adapter

To read codes on vehicles with a 13-pin Check connector:

- Connection depends on the color of the 13-pin Check connector:
  a. If natural, connect the MULTI-1 blue wire to Check connector pin 11 (Figure 15-22).
  b. If yellow, connect the MULTI-1 blue wire to Check connector pin 6 (Figure 15-23).

![Figure 15-22 13-pin Check connector](image)

1—13-pin Check connector (color: natural)
2—Pin 11 (connect the MULTI-1 blue wire here)
3—MULTI-1 adapter

![Figure 15-23 13-pin Check connector](image)

1—13-pin Check connector (Color: yellow)
2—Pin 6 (connect the MULTI-1 blue wire here)
3—MULTI-1 adapter
To read codes on vehicles with a 13-pin Check connector:
- Connection depends on the color and/or location of the 13-pin Check connector:
  a. If your Check connector is under the hood and black, connect the blue wire of the MULTI-1 adapter to pin 5 of the Check connector (Figure 15-24).
  b. If your Check connector is located under the dash or inside the trunk, connect the blue wire of the MULTI-1 adapter to pin 6 of the Check connector (Figure 15-25).

![Figure 15-24 13-pin Check connector](image)

![Figure 15-25 13-pin Check connector](image)

To read codes on vehicles with a 13-pin or 17-pin Check connector:
- Determine if your Check connector is a 13-pin or a 17-pin Check connector:
  a. If 13-pin, connect the MULTI-1 blue wire to Check connector pin 11 of the (Figure 15-26).
  b. If 17-pin, connect the MULTI-1 blue wire to Check connector pin 7 (Figure 15-27).
1—13-pin Check connector (color: varies)
2—Pin 11 (connect the MULTI-1 blue wire here)
3—MULTI-1 adapter

Figure 15-26 13-pin Check connector

1—17-pin Check connector (color: varies)
2—Pin 7 (connect the MULTI-1 blue wire here)
3—MULTI-1 adapter

Figure 15-27 17-pin Check connector

To read codes on vehicles with a 17-pin Check connector:
• Connect the MULTI-1 adapter blue wire to Check connector pin 4 (Figure 15-28).

1—17-pin Check connector (color: varies)
2—Pin 4 (connect the MULTI-1 blue wire here)
3—MULTI-1 adapter

Figure 15-28 17-pin Check connector

To read codes on vehicles with a 17-pin Check connector:
• Connect the blue wire of the MULTI-1 adapter to pin 7 (Figure 15-28).
To read codes on vehicles with a 17-pin Check connector:
- Connect the blue wire of the MULTI-1 adapter to Check connector pin 11 (Figure 15-28).

To read codes from vehicles with a 16-pin OBD-II connector:
- Use the OBD-II adapter with the specified Personality Key™ device (Figure 15-31).

1— 17-pin Check connector (color: yellow)
2— Pin 7 (connect the MULTI-1 blue wire here)
3— MULTI-1 adapter

Figure 15-29 17-pin Check connector

To read codes on vehicles with a 17-pin Check connector:
- Connect the blue wire of the MULTI-1 adapter to Check connector pin 11 (Figure 15-28).

To read codes from vehicles with a 16-pin OBD-II connector:
- Use the OBD-II adapter with the specified Personality Key™ device (Figure 15-31).

1— 17-pin Check connector (color: black)
2— Pin 11 (connect the MULTI-1 blue wire here)
3— MULTI-1 adapter

Figure 15-30 17-pin Check connector

1— 16-pin DLC
2— OBD-II adapter with Personality Key™

Figure 15-31 16-pin OBD-II connector with adapter and Personality Key™ device
15.1.4 D-Check and Read Memory Connector Locations

D-Check connectors are used on some 1995 models and most 1994 and earlier models. D-Check connectors can be identified easily as a mating pair and are green in color.

Read Memory connectors are used on some 1995 models, most 1986-94 models with fuel injection and some carbureted engines. Read Memory connectors are similar to the D-Check connectors, but are typically black in color.

Connector locations vary by model and may be difficult to locate and identify. Figure 15-32 shows some typical locations where connectors may be found.

![Diagram of D-Check and Read Memory Connectors](image)

Figure 15-32 Common locations for D-Check and Read Memory connectors

Included in this section are the following connector location diagrams:

- Vehicles without ECM memory (D-Check only)
  - “1983 ECC carbureted” on page 167 (Figure 15-33)
  - “1984 ECC carbureted” on page 167 (Figure 15-34)
  - “1983–84 EGI-MGI (Turbo), 1985–87 all except XT” on page 168 (Figure 15-35)
  - “1985–89 ECC overhead cam” on page 168 (Figure 15-36)
  - “1986–87 XT” on page 169 (Figure 15-37)
- Vehicles with ECM memory (D-Check & Read Memory)
  - “1986 SPI connectors” on page 169 (Figure 15-38)
  - “1987 Justy” on page 170 (Figure 15-39)
Vehicles without ECM Memory (D-Check Only)

1—Check connector 2
2—Check connector 1
3—Check connector 4
4—Check connector 3
5—D-Check connectors
6—ECU
7—ECU LED

Figure 15-33 1983 ECC carbureted

1—Check connector 1
2—Check connector 2
3—Check connector 3
4—Check connector 4
5—D-Check connectors
6—ECU LED
7—ECU

Figure 15-34 1984 ECC carbureted
1— ECM
2— D-Check connectors
3— Check connectors 1, 2, and 3
4— Check connector 4

Figure 15-35 1983–84 EGI-MGI (Turbo), 1985–87 all except XT

Under Hood Connector Location
1— Check connector 1
2— Check connector 2
3— Check connector 3
4— Check connector 4
5— Check connector 5
6— Check connector 6
7— D-Check connectors
8— ECU
9— ECU LED

Figure 15-36 1985–89 ECC overhead cam
Vehicles with ECM Memory (D-Check and Read Memory)

Figure 15-37 1986–87 XT

Figure 15-38 1986 SPI connectors
1— Fuel pump relay
2— Read Memory connectors
3— D-Check connectors
4— Ignition relay

Figure 15-39 1987 Justy

1— ECM and Check connector (under dash)
2— Read Memory connectors (under hood)
3— D-Check connectors (under hood)
4— Check connectors (under dash and under hood)

Figure 15-40 1987–94 SPI connectors
1—Read Memory connectors
2—D-Check connectors
3—ECM
4—Fuel pump

*Figure 15-41* 1987-91 XT models (connector in the trunk)

1—Fuel pump relay
2—Read Memory connectors
3—D-Check connectors
4—Ignition relay

15.1.5 Automatic Code Reading

During Subaru automatic code reading, you must perform two diagnostic checks:

- U-Check, or Electronic Control System (ECS) check
- D-Check

The specific procedure for each depends on the model and year of the test vehicle:

- **ECS Check (U-Check)**—All models (do this only if the ECS lamp on the dash is lit)
- **ECC D-Check**—All 1983–89 models except Justy with an electronically controlled carburetor (ECC)
- **Pre-1987 MPI D-Check**—1983–86 vehicles with Multipoint Injection (MPI)
- **1987 Justy EFC D-Check**—1987 Justy with an electronic feedback carburetor (EFC)
- **Justy EFC or MPI D-Check**—1988–90 Justy with an electronic feedback carburetor (EFC) and 1990–91 Justy vehicles with multipoint injection (MPI)
- **SPI or MPI D-Check**—All 1986–94 Single Point Injection (SPI) vehicles and 1987–92 MPI vehicles

Failure to follow the right procedure may result in misreading codes or inaccurate diagnosis.

**NOTE:**
For transmission codes, see “Transmission Code Reading” on page 180.

**ECS Check (U-Check)**

The ECM does not have memory capability on most pre-1987 vehicles. The ECM on 1986 models with single-point injection (SPI) and 1983–89 models with an electronically controlled carburetor (ECC) has memory.
IMPORTANT:
Do not turn off the ignition if the ECS lamp is lit because the trouble codes can be lost.

If the ECS lamp is not lit, proceed to the D-Check procedure. If the ECS lamp is lit, perform the U-Check procedure.

To perform a U-Check:
1. If a hard code is present the LED on the ECM will be flashing the code. Gather these codes before proceeding.
2. On vehicles with ECM memory capability, continue with step 3. On vehicles without ECM memory capability, leave the engine running and skip to step 4.
3. On vehicles with ECM memory, turn the key off and connect the vehicle Read Memory connectors together (see "D-Check and Read Memory Connector Locations" on page 166). Some cars have black connectors, and some have clear connectors.
4. Identify the vehicle, connect the data cable, and confirm the identification. On vehicles with ECM memory capability, turn the key on and leave the engine off.
5. Select Code Functions > Auto Code Read from the Main Menu and follow the connection instructions earlier in this chapter.
6. At this point, the scan tool reads and displays any codes stored in the ECM memory.
7. Separate the Read Memory connectors.
8. Proceed to the D-Check procedure for the test vehicle.

1983–89 ECC D-Check
Use this D-Check procedure for all 1983–89 vehicles with an electronically controlled carburetor (ECC), except Justy. If the ECS lamp is lit, perform the ECS check (U-Check) before doing this D-Check.

To perform a D-Check:
1. Connect the scan tool data cable to the vehicle.
2. Start the engine and warm it to normal operating temperature.
3. Stop the engine and connect the green D-Check connectors (see "D-Check and Read Memory Connector Locations" on page 166) together.
4. Turn the ignition on, but do not start the engine.
   The ECS lamp should light, and the ECM transmits a specific vehicle identification code. The scan tool recognizes these codes.
5. Start the engine.
   The ECS lamp should go off.
6. Drive the vehicle at least 60 feet and let the engine idle for at least 20 seconds. (This may be done carefully on a service rack, if necessary.)
7. Snap the throttle fully open two times.
8. Run the engine at 2500 RPM until the ECS lamp lights.
   A flashing lamp indicates the system is OK. A continuously lit lamp indicates trouble codes are present. The scan tool reads these codes.
9. Select **Code Functions > Auto Code Read** from the Main Menu and follow the connection instructions earlier in this chapter.

10. Separate the D-Check connectors.

### Pre-1987 MPI D-Check

Use this D-Check procedure for 1983–86 vehicles with multipoint injection (MPI). If the ECS lamp is lit, perform the ECS check (U-Check) first.

**To perform a D-Check:**

1. Connect the scan tool data cable to the vehicle.
2. Connect the two green D-Check connectors (see “D-Check and Read Memory Connector Locations” on page 166) together.
3. Turn the ignition on but do not start the engine.
   The ECS lamp on the instrument panel should light.
4. Start the engine.
   The ECS lamp should go off.
5. Run the engine at idle for 1 minute; then snap the throttle fully open 5 times.
6. Briefly race the engine to activate the pressure switch test; then drive at a speed above 6 mph. (This may be done carefully on a service rack, if necessary.)
7. Run the engine at 2500 RPM until the ECS lamp lights.
   A flashing lamp means the system is OK. A continuously lit lamp means trouble codes are present. The scan tool reads the codes.
8. Select **Code Functions > Auto Code Read** from the Main Menu and follow the connection instructions earlier in this chapter.
9. Repeat this procedure until no trouble codes are found.
10. Separate the D-Check connectors.

### 1987 Justy EFC D-Check

Use this D-Check procedure for 1987 Justy vehicles with an electronic feedback carburetor (EFC). If the ECS lamp is lit, perform the ECS check (U-Check) before doing this D-Check.

**To perform a D-Check:**

1. Connect the scan tool data cable to the vehicle.
2. Start the engine and warm it to normal operating temperature.
3. Stop the engine and connect the green D-Check connectors (see “D-Check and Read Memory Connector Locations” on page 166) together.
4. Turn the ignition on but do not start the engine.
   The ECS lamp should light and the ECM transmits specific vehicle identification codes. The scan tool recognizes these codes.
5. Start the engine and the ECS lamp should go off.
6. Drive the vehicle at least 60 feet and let the engine idle for at least 20 seconds. (This may be done carefully on a service rack, if necessary.)
7. Switch the parking lamps, rear window defogger, and heater fan on and then off.
   A flashing lamp indicates the system is OK. A continuously lit lamp indicates trouble codes are
   present. The scan tool reads these codes.

8. Select **Code Functions > Auto Code Read** from the Main Menu and follow the connection
   instructions earlier in this chapter.

9. Separate the D-Check connectors.

---

**1988–90 Justy EFC or 1990–91 MPI D-Check**

Use this D-Check procedure for 1988–90 Justy models with an electronic feedback carburetor
(EFC), and 1990–91 Justy models with MPI. If the ECS lamp is lit, perform the ECS check
(U-Check) before doing this D-Check.

**To perform a D-Check:**
1. Connect the scan tool data cable to the vehicle.
2. Start the engine and warm it to normal operating temperature.
3. Stop the engine and connect the green D-Check connectors (see “D-Check and Read
   Memory Connector Locations” on page 166) together.
4. Turn the ignition but do not start the engine.
   The ECS lamp should light and the ECM transmits specific vehicle identification codes. The
   scan tool recognizes these codes. (Read codes visually on the ECM LED for 1990 Justy MPI;
   see “Code Type 08a” on page 177.)
5. Depress the accelerator to the floor, then slowly release it.
6. Start the engine.
   The ECS lamp should go off.
7. With a manual transmission, depress the clutch and then release it.
8. Switch the parking lamps, rear window defogger, and heater fan on and then off.
9. Drive the vehicle at 30 mph above 2500 RPM. (This may be done carefully on a service rack,
   if necessary.)
10. Run the engine at 2700 RPM until the ECS lamp turns on.
    A flashing lamp indicates the system is OK. A continuously lit lamp indicates trouble codes are
    present. The scan tool reads these codes. (Read codes visually on ECM LED for 1990 Justy
    MPI; see “Code Type 08a” on page 177.)
11. Select **Code Functions > Auto Code Read** from the Main Menu and follow the connection
    instructions earlier in this chapter.
12. After verifying the repair, repeat the D-Check with the Read Memory connectors connected to
    clear codes from ECM memory.
13. Separate the D-Check and Read Memory connectors.

---

**1986–94 SPI and 1987–92 MPI D-Check (except Justy)**

Use this D-Check procedure for 1986–94 single-point injection (SPI) vehicles except Justy and
1987–92 multipoint injection (MPI) vehicles. If the ECS lamp is lit, perform the ECS check
(U-Check) before doing this D-Check.
To perform a D-Check:
1. Connect the scan tool data cable to the vehicle.
2. Start the engine and warm it to normal operating temperature.
3. Stop the engine and connect the green D-Check connectors (see “D-Check and Read Memory Connector Locations” on page 166) together.
4. Turn the ignition on but do not start the engine.
   The check engine lamp (CEL) lamp should light.
5. Depress the accelerator completely, release it halfway, hold it for two seconds, and then release it completely.
6. Start the engine.
   The CEL lamp should go off.
7. Drive the vehicle at least 7 mph for at least one minute. (This may be done carefully on a service rack, if necessary.)
8. Warm the engine at 2000 RPM until the ECS lamp turns on.
   A flashing lamp indicates the system is OK. A continuously lit lamp indicates codes are present. The scan tool reads these codes.
9. Select Code Functions > Auto Code Read from the Main Menu and follow the connection instructions earlier in this chapter.
10. After verifying the repair, repeat the D-Check with the Read Memory connectors connected to clear codes from ECM memory.
11. Separate the D-Check and Read Memory connectors.

15.1.6 Code Type 08
Subaru uses five types of code patterns:
- “Code Type 08 (Straight Count)” for ABS systems
- “Code Type 08a” for engines, 4EAT (version 2) and ECVT transmissions, and airbags
- “Code Type 08b” for 4EAT (version 1) transmissions
- “Code Type 08c” for All systems
- “Code Type 08d” for ABS systems

Code Type 08 (Straight Count)
Code Type 08 (Straight Count) codes are read from the ABS LED after the ABS instrument panel light has illuminated on 1990 Legacy Touring Wagon, 1990–1992 Sedan and 1992–1997 SVX. Only current or active codes can be read. No memory codes are available. Codes are read by counting flashes on the ABS LED under the right front seat. If the ignition switch is turned off, the codes will be lost. The vehicle must then be driven following the step-by-step procedures to cause them to reset.

Code Type 08 (Straight Count) flashes the LED in a straight forward counting sequence. The code number digits display as 0.4 to 1.0 second pulses with 0.4 to 1.0 seconds between each pulse. A pause of 5.2 to 13 seconds indicates the end of flashes to count and the code will be repeated again. Only one code is displayed at a time. After repairs, perform a test drive and check for any additional codes that need attention.
Type 08a engine codes are read from the check engine light on 1990–94 Legacy and Impreza and on 1992–95 SVX. Two types of codes can be read: memory codes and active codes. Codes are read by hooking test connectors together and following a step-by-step procedure.

Code Type 08a flashes a two-digit (long/short) code on the check engine lamp (Figure 15-45). Each 10s digit displays as 1.2-second pulses with 0.3 seconds between each pulse. Each 1s digit displays as 0.2-second pulses with a 0.3-second pause between each digit. With multiple codes, there is a 1.8-second pause between codes.

Additional information for testing other systems that use this code type can be found in each system’s testing section.
Code Type 08b

Code Type 08b (Figure 15-46 on page 178) consists of a 2-second flash, followed by a 1-second pause, followed by a series of 0.1-second flashes. Front-wheel drive (FWD) vehicles have ten short flashes, and 4-wheel drive (4WD) vehicles have eleven short flashes.

The short flashes represent code numbers 1 through 10 (or 11). A long (0.6-second) flash indicates a fault at that position.

For example, Short–Short–Short–Short–Long–Short–Short–Short–Short–Short indicates Code 5 because the fifth flash is long. If no codes are present, all flashes are short (0.1-second). The code is followed by a 2.5-second pause and a 2-second flash, then the pattern repeats.

Table 15-11 Subaru Code Type 08a

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Long and short</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>Check Engine lamp for engines; panel lamp for transmissions</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Follow the appropriate Subaru procedure.</td>
</tr>
<tr>
<td>When done:</td>
<td>Clear codes according to the Subaru procedure.</td>
</tr>
</tbody>
</table>

Table 15-12 Subaru Code Type 08b

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Long flash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>POWER lamp on instrument panel</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Follow the appropriate Subaru procedure.</td>
</tr>
<tr>
<td>When done:</td>
<td>Clear codes according to the Subaru procedure.</td>
</tr>
<tr>
<td>10 (or 11) short flashes is pass code.</td>
<td></td>
</tr>
</tbody>
</table>
Code Type 08c

The ABS light signals a “Start Code” consisting of a 1.2-second flash and 0.3 flash separated by a 0.3 second pause (Figure 15-47). Then the light flashes any stored codes. Each code consists of long and short flashes separated by a 0.3 second pause.

The total number of long flashes represent the 10s or tenth-place digit and the total number of short flashes represents the 1s or first-place digit. A 1.0 second pause follows each code. After all codes flash, the Start Code repeats. This sequence repeats for up to five minutes.

Additional information for testing other systems that use this code type can be found in each system’s testing section.

![Figure 15-47 Subaru Code Type 08c](image)

Table 15-13 Subaru Code Type 08c

<table>
<thead>
<tr>
<th>Pattern:</th>
<th>Long and short</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read codes on:</td>
<td>ABS, airbag (SRS) Warning Light on instrument panel</td>
</tr>
<tr>
<td>Start codes by:</td>
<td>Follow the appropriate Subaru procedure.</td>
</tr>
<tr>
<td>When done:</td>
<td>Clear codes according to the Subaru procedure.</td>
</tr>
</tbody>
</table>

Code Type 08d

The ABS or TCS light signals a “Start Code” consisting of a 1.5 second flash, a 2.0 second pause, a 1.2 second flash, a 0.6 second pause and a 0.3 second flash. After another 1.2 second pause, the light then flashes any stored codes. Each code consists of long (1.2 second) flashes and short (0.3 second) flashes separated by a 0.3 second pause.

The total number of long flashes represent the 10s or tenth-place digit and the total number of short flashes represents the 1s or first-place digit. A 0.6 second pause separates the 10s digit(s) from the 1s digit(s). A 1.2 second pause follows each code. After all codes flash, the Start Code repeats. This sequence repeats for up to five minutes.

Additional information for testing other systems that use this code type can be found in each system’s section.
15.2 Testing Transmission Systems

The following sections include information for testing Subaru transmission systems. Subaru transmission testing includes the following:

- “Transmission Code Reading” on page 180
- “1987–92 4EAT Transmission (Version 1)” on page 181
- “1990–96 4EAT Transmission (Version 2)” on page 181
- “1990-96 4EAT Transmission (Version 2) History Codes” on page 182
- “1989-94 Justy ECVT Transmission” on page 183
- “1996-06 Subaru Models with an OBD-II 16-pin Connector” on page 184

15.2.1 Transmission Code Reading

If you select Transmission from the System Selection menu after identifying a vehicle, the scan tool gives you instructions for applying power or connecting to the OBD-II 16-pin connector where applicable. Automatic code gathering is not available on Subaru transmissions before 1984 or on Subaru models with an OBD-II 16-pin connector with no other specified Check connectors used to gather transmission codes. The How To Get Codes selection from the Code Functions menu displays manual code gathering instructions (see "How to Get Codes" on page 11).

Subaru uses two different code types for transmission codes. Detailed information for these code types can be found in the section “Code Type 08” on page 176:

- “Code Type 08a” for 1990–94 4EAT (version 2) and all Justy ECVT transmissions.
- “Code Type 08b” for 1987–91 4EAT (version 1) transmissions.
- Generic Powertrain codes for 1996-2006 models with no other diagnostic routines specified by the manufacturer.
The scan tool displays the code type for the specific vehicle you are testing. The transmission control system is placed in the diagnostic mode by performing vehicle-specific routines. These routines consist of a series of ignition cycles, throttle movements, and gear selections.

### 15.2.2 1987–92 4EAT Transmission (Version 1)

Use this procedure to test the 4EAT transmission in 1987–1991 XT and XT6, and 1987–1992 4WD Loyale Turbo MPFI.

**To determine if any codes are present:**
- Turn the ignition on (engine off).

  Codes are present if the Power lamp flashes four times following the 2 second bulb check. If the lamp remains on, there is a problem in the lamp circuit or with the control module. If the lamp remains off after the 2 second lamp check, no codes are present.

**To place the TCM in diagnostic, or code-display, mode:**
1. Start and warm the engine to operating temperature.
2. Switch the ignition off and set the 1st gear Hold switch to off. The Hold switch is on center console, adjacent to gear selector.
3. Place the gear selector in Park and start the engine.
   - The Power lamp on the instrument panel should light for about 2 seconds.
4. Switch the ignition off, place the gear selector in Drive, and switch the 1st gear Hold switch on.
5. Switch the ignition on without starting the engine, wait at least 2 seconds, and then move the gear selector to 3rd.
6. Switch the 1st gear Hold switch off, move the gear selector to 2nd, and then switch the 1st gear Hold switch on.
7. Fully depress and release the throttle to begin manual code gathering.
   - The Power lamp flashes Code Type 8b (Figure 15-46).

### 15.2.3 1990–96 4EAT Transmission (Version 2)


**To determine if any current codes are present:**
- Turn the ignition on (engine off).

  Current codes are present if the Power lamp flashes four times after the 2 second bulb check. If the lamp remains on, there is a problem in the lamp circuit or with the control module. If the lamp remains off after the 2 second lamp check, no current codes are present; however, history codes may still be in memory (See “1990-96 4EAT Transmission (Version 2) History Codes”).
To place the TCM in diagnostic, code-display, mode:

1. Start and warm the engine to operating temperature.
2. Drive the vehicle at speeds above 12 mph.
3. Switch the ignition off and set the Manual switch to off. The Manual switch is on center console, adjacent to gear selector.
4. Place the gear selector in Park and start the engine.
   The Power lamp on the instrument panel should light for about 2 seconds.
5. Switch the ignition off, place the gear selector in Drive, and turn the Manual switch on.
6. Switch the ignition on without starting the engine, wait at least 2 seconds, and then move the gear selector to 3rd.
7. Switch the Manual switch off, move the gear selector to 2nd, and then switch the Manual switch on.
8. Move the gear selector to 1st and switch the Manual switch off.
9. Fully depress and release the throttle to begin manual codes.
   If no codes are present, the Power lamp flashes evenly 2 times per second. If codes are present, the lamp flashes Code Type 8a (long/short) (Figure 15-45 on page 178). A TCM that flashes the 2 times per second pass code may still have history codes in memory.

15.2.4 1990-96 4EAT Transmission (Version 2) History Codes

Use the following procedure to check the 4EAT transmission for history codes on 1990–95 Legacy, 1992–96 SVX, and 1993–95 Impreza models. Be aware, a vehicle that flashes the Power lamp twice per second (pass code) may still have history codes stored in memory.

To place the TCM in the diagnostic, history code display mode:

1. Start and warm the engine to operating temperature.
2. Drive the vehicle above 12 mph.
3. Switch the ignition off and set the Manual switch to off. The Manual switch is on center console, adjacent to gear selector.
4. Place the gear selector in Park and start the engine.
   The instrument panel Power lamp should light for about 2 seconds.
5. Switch the ignition off, place the gear selector in 1st, and set the Manual switch to on.
6. Place the gear selector in 2nd, and set the Manual switch to off.
7. Place the gear selector in 3rd, and set the Manual switch to on.
8. Place the gear selector in Drive, and set the Manual switch to off.
9. Fully depress and release the throttle to begin manual history codes.
   If no codes are present, the Power lamp flashes evenly 2 times per second. If codes are present, the lamp flashes Code Type 8a (long/short) (Figure 15-45 on page 178).
15.2.5 1989-94 Justy ECVT Transmission

Use this procedure to test the 1989–94 Justy electronic constant velocity transmission (ECVT). On ECVT models you must perform the memory code diagnostic check before checking for current codes (D-Check). Failure to do so results in the loss of memory codes.

To place TCM in diagnostic, memory-code display-mode:
1. With the ignition off, mate the check mode connectors (white, single-pin connector near ECVT ECM).
2. Place the gear selector in neutral and switch the ignition on (engine off).
3. On 2WD models, the ECVT lamp on the instrument panel should light.
4. On 4WD models, the Clutch Temp lamp should light.
5. While holding the throttle fully depressed, move the gear selector from neutral-to-reverse, and then back to neutral.
6. Release the throttle and start the engine. If there are no codes are present, the ECVT (2WD) or Clutch Temp (4WD) lamp flashes evenly twice per second. If codes are present, the lamp flashes Code Type 8a (long/short) (Figure 15-45 on page 178).

IMPORTANT:
Perform the following procedure only in an area where the vehicle can safely coast to a stop from 25 mph, without applying the brakes.

To perform the Justy D-Check for current codes, proceed as follows:
1. With the ignition switched off, mate the check mode connectors (white, single-pin connector near ECVT ECM).
2. Start and warm the engine to operating temperature.
3. Switch the ignition off and place the shift lever in Park.
4. Switch the ignition on (engine off).
5. On 2WD models, the ECVT lamp on the instrument panel should light.
6. On 4WD models, the Clutch Temp lamp should light.
7. Start the engine.
The ECVT or Clutch Temp lamp flashes the ID number of the TCM using a Code Type 8a (long/short) pattern.
8. With the engine running, firmly depress the brake pedal and move the shift lever in this sequence; Park→Reverse→Neutral→Drive→Ds→Drive.
9. Perform full throttle acceleration to 25 mph and then let the vehicle coast to a stop without applying the brakes.
10. Press and release the brake pedal three times.
11. If no codes are present, the ECVT (2WD) or Clutch Temp (4WD) lamp flashes evenly, twice per second.
12. If codes are present, the lamp flashes Code Type 8a (long/short) (“Subaru Code Type 08a” on page 178, Figure 15-45).
15.2.6 1996-06 Subaru Models with an OBD-II 16-pin Connector

1996-2006 Subaru models with an OBD-II 16-pin connector do not support any other specific diagnostic routines. Refer to the section “Testing Engine Systems” on page 143 for OBD-II 16-pin connector locations. Codes displayed are OBD-II Generic Powertrain codes.

15.3 Testing ABS Systems

The following sections include information for testing Subaru antilock brake systems. Subaru ABS testing includes the following:

- ABS Code Information
- ABS Code Types
- ABS Code Reading and Connector Locations

15.3.1 ABS Code Information

If you select ABS from the System Selection menu after identifying a 1990–2004 model year vehicle, the scan tool gives you instructions for applying power. If you select ABS from the System Selection menu after identifying a 2005–2006 model year vehicle, the scan tool gives you instructions for connecting to the OBD-II 16-pin connector.

1990–2004 Subaru ABS systems use manual code gathering only. The How To Get Codes selection from the Code Functions menu displays manual code gathering instructions (see “How to Get Codes” on page 11).

The ABS system is placed in the diagnostic mode by performing vehicle-specific diagnostic routines. These routines consist of driving the vehicle over a specified speed, driving for a specified time or connecting a grounded jumper to a specific pin of the diagnostic connector.

15.3.2 ABS Code Types

Detailed information for reading code types can be found in “Code Type 08” at the end of the “Testing Engine Systems”.

Subaru ABS systems use the following code types:

- “Code Type 08 (Straight Count)” on page 176 for ABS systems without memory
- “Code Type 08c” on page 179 for ABS systems with memory
- “Code Type 08d” on page 179 for ABS systems with TCS
- Manufacturer Specific Codes for 2005–2006 Subaru ABS systems

ABS Code Types by Model

- 1990 Legacy Touring Wagon—Code Type 08 (Straight Count) (Figure 15-44).
- 1990–92 Legacy Wagon—Code Type 08 (Straight Count) (Figure 15-44).
• 1990–92 Sedan 2.2L—Code Type 08 (Straight Count) (Figure 15-44).
• 1992–97 SVX—Code Type 08 (Straight Count) (Figure 15-44).
• 1993–04 All Others—Code Type 08c (Figure 15-47).
• 1995–97 Legacy Sedan with TCS—Code Type 08d (Figure 15-48).
• 1995–97 Legacy Outback with TCS—Code Type 08d (Figure 15-48).
• 1995–97 Legacy Wagon with TCS—Code Type 08d (Figure 15-48).
• 2005–06 All Subaru models display codes and data with the scan tool.

15.3.3 ABS Code Reading and Connector Locations

• 1990–1992 Legacy/Outback, Sedan and Wagon (Figure 15-49)
• 1992–1997 SVX (Figure 15-49)
• 1993–1994 Legacy/Outback, Sedan and Wagon (Figure 15-50)
• 1995–1996 Legacy/Outback, Sedan and Wagon w/o TCS (Figure 15-51)
• 1995–1996 Legacy/Outback, Sedan and Wagon with TCS (Figure 15-51)
• 1993–1996 Impreza Coupe, Sedan and Wagon w/o TCS (Figure 15-51)
• 1997 (early) Legacy/Outback, Sedan and Wagon (Figure 15-53)
• 1997 (late)–1999 Legacy/Outback, Sedan and Wagon (Figure 15-51)
• 1998–2001 Impreza Coupe, Sedan and Wagon (Figure 15-51)
• 2001 Forester (Figure 15-51)
• 2000–2004 Legacy/Outback, Sedan and Wagon (Figure 15-54)
• 2003–2004 Baja (Figure 15-51)
• 2005–2006 All Subaru Models ((Figure 15-55)

1990–92 Legacy/Outback, Sedan and Wagon
1992–97 SVX

To retrieve trouble codes:
1. Drive the vehicle at speeds greater than 19mph (30kph) for at least one minute before attempting to access the self-diagnostic program.
2. Do not switch the ignition off after driving.
3. The ABS lamp on the instrument panel turns on when the self-diagnostic program senses a problem.
4. About 5 to 12 seconds after the instrument panel lamp turns on, the ABS trouble codes display by flashing an LED.
5. The LED is located under the right-front seat (Figure 15-49). See “Subaru Code Type 08 (Straight Count)” on page 177 for reading codes from the flashing LED.

The following condition apply to testing these vehicles:
- Both the instrument panel lamp and LED remain active as long as the ignition is on.
- There is no memory, so trouble codes are lost if the key is switched off.
- Only one code displays at a time, repair and road test until all problems are corrected.
- If the LED does not flash codes and the panel lamp is on, check the power supply circuit.
1993-94 Legacy/Outback, Sedan and Wagon

**To retrieve trouble codes:**
1. Remove the lower trim panel from the driver side front pillar or kick-panel.
2. Next, switch the ignition on.
3. Ground the ABS Check connector terminal L (Figure 15-50).
4. Read the trouble codes on the ABS warning lamp (Code Type 08c Figure 15-47).

The following condition apply to testing these vehicles:
- Code 11 displays first, then other stored codes beginning with the most recent.
- The code display repeats for up to five minutes.
- If there are no codes in memory, only code 11 displays.

**To clear code memory:**
1. Disconnect the ABS Check connector terminal L from ground (Figure 15-50).
2. Connect terminal L to ground for at least 0.05 second and then disconnect it.
3. Repeat step 2 an additional two times (3 times total) within twelve seconds.
To retrieve trouble codes:
1. Locate the ABS diagnostic connector and diagnostic terminals near the heater assembly on the driver side (Figure 15-51).
2. Switch the ignition off.
3. Connect a diagnosis terminal to the diagnosis connector terminal 6.
4. Switch the ignition on.
5. Read the trouble codes on the TCS warning lamp (Code Type 08c – Figure 15-47)
   The following condition apply to testing these vehicles:
   - Code 11 displays first, then the stored codes display in order, beginning with the most recent stored codes.
   - The code display repeats for up to five minutes.
   - If there are no codes in memory, only code 11 displays.

To clear code memory:
1. Disconnect the diagnosis terminal from the diagnosis connector terminal 6 (Figure 15-51).
2. Connect the diagnosis terminal to the diagnosis connector terminal 6 for at least 0.2 second and then disconnect it.
3. Repeat step 2 an additional two times (3 times total) within twelve seconds.

1995–96 Legacy/Outback, Sedan and Wagon with TCS

To retrieve trouble codes:
1. Locate the ABS diagnostic connector and diagnostic terminals near the heater assembly on the driver side (Figure 15-51).
2. Switch the ignition off.
3. Connect a diagnosis terminal to the diagnosis connector terminal 4.
4. Switch the ignition on.
5. Read the trouble codes on the TCS warning lamp (Code Type 08d – Figure 15-48)
   The following condition apply to testing these vehicles:
   - Code 11 displays first, then the stored codes display in order, beginning with the most recent stored codes.
   - If there are no codes in memory, only code 11 displays.

To clear code memory:
1. Disconnect the diagnosis terminal from the diagnosis connector terminal 4 (Figure 15-51).
2. Connect the diagnosis terminal to the diagnosis connector terminal 4 for at least 0.15 second and then disconnect it.
3. Repeat step 2 an additional two times (3 times total) within twelve seconds.
**1993–96 Impreza Coupe, Sedan and Wagon**

**To retrieve trouble codes:**
1. Locate the ABS diagnostic connector under the dash near the steering column (Figure 15-52).
2. Switch the ignition off.
3. Ground the ABS Check connector terminal L.
4. Switch the ignition on.
5. Read the trouble codes on the ABS warning lamp (Code Type 08c - Figure 15-47).

The following condition apply to testing these vehicles:
- Code 11 displays first, then the stored codes display in order, beginning with the most recent stored codes.
- The code display repeats for up to five minutes.
- If there are no codes in memory, only code 11 displays.

**To clear code memory:**
1. Disconnect the ground from the ABS Check connector terminal L.
2. Connect the ground to the ABS Check connector terminal L for at least 0.05 second and then disconnect it.
3. Repeat step 2 an additional two times (3 times total) within twelve seconds.
1997 Impreza Coupe, Sedan and Wagon
1997 (early) Legacy/Outback, Sedan and Wagon

To retrieve trouble codes:
1. Locate the ABS diagnosis connector and diagnosis terminals near the heater assembly on the driver side (Figure 15-53).
2. Switch the ignition off.
3. Connect a diagnosis terminal to the diagnosis connector terminal 2.
4. Switch the ignition on.
5. Read the trouble codes on the ABS warning lamp (Code Type 08c - Figure 15-47).

The following condition apply to testing these vehicles:
- Code 11 displays first, then the stored codes display in order, beginning with the most recent stored codes.
- The code display repeats for up to five minutes.
To clear code memory:
1. Disconnect the diagnosis terminal from diagnosis connector terminal 2.
2. Connect the diagnosis terminal to diagnosis connector terminal 2 for at least 0.05 second and then disconnect it.
3. Repeat step 2 an additional two times (3 times total) within twelve seconds.

2000–04 Legacy/Outback, Sedan and Wagon

To retrieve trouble codes:
1. Locate the ABS diagnosis connector and diagnosis terminals near the heater assembly on the driver side (Figure 15-54).
2. Switch the ignition off.
3. Connect a diagnosis terminal to the diagnosis connector terminal 8.
4. Switch the ignition on.
5. Read the trouble codes on the ABS warning lamp (Code Type 08c - Figure 15-47).

The following condition apply to testing these vehicles:
- Code 11 displays first, then the stored codes display in order, beginning with the most recent stored codes.
- The code display repeats for up to five minutes.

To clear code memory:
1. Disconnect the diagnosis terminal from diagnosis connector terminal 8.
2. Connect the diagnosis terminal to diagnosis connector terminal 8 for at least 0.2 second and then disconnect it.
3. Repeat step 2 an additional two times (3 times total) within twelve seconds.

1— Diagnostic connector
2— Diagnosis terminal
3— 8 terminal
4— 5 terminal

Figure 15-54 2000–04 Legacy ABS diagnosis connector location
2005–06 All Subaru Models

To retrieve trouble codes:
1. Use the OBD-II adapter with the specified Personality Key™ device (Figure 15-55).
2. Select Codes Only from the Codes and Data menu and follow any instructions on the scan tool display.

1—16-pin DLC
2—OBD-II adapter and Personality Key™

Figure 15-55 16-Pin OBD-II connector and common locations

To clear code memory:
- Select Clear Codes from the Codes and Data menu and follow any instructions on the scan tool display.

15.4 Testing Airbag (SRS) Systems

The following sections include information for testing Subaru airbag supplemental restraint systems (SRS) systems. Subaru airbag (SRS) testing includes the following:
- Airbag (SRS) Code Information
- Airbag (SRS) Code Types
- Airbag (SRS) Code Reading and Connector Locations
15.4.1 Airbag (SRS) Code Information

If you select Airbag from the System Selection menu after identifying a 1992–2005 model year vehicle, except the 2005 Legacy/Outback Sedan or Wagon, the scan tool give you instructions for applying power. If you select Airbag from the System Selection menu after identifying a 2005 Legacy/Outback Sedan or Wagon, or any 2006 model except Baja, the scan tool gives you instructions for connecting to the OBD-II 16-pin connector.

All Subaru Airbag systems, except for 2005 Legacy/Outback Sedan or Wagon models, or any 2006 model except Baja, use manual code gathering only. The How To Get Codes selection from the Code Functions menu displays manual code gathering instructions (see “How to Get Codes” on page 11).

The Airbag system is placed in the diagnostic mode by performing vehicle specific diagnostic routines. These routines consist of connecting a grounded jumper or a diagnostic terminal to a specific pin of the diagnostic connector.

15.4.2 Airbag (SRS) Code Types

Detailed information for reading code types can be found in “Code Type 08” on page 176.

Subaru airbag (SRS) systems use the following code types:

- “Code Type 08 (Straight Count)” on page 176
- “Code Type 08c” on page 179 for most 1992–2005 Subaru airbag (SRS) systems
- Manufacturer Specific Codes for 2005 Subaru Legacy Outback Sedan and Wagon airbag (SRS) systems

15.4.3 Airbag (SRS) Code Reading and Connector Locations

- 1992–1997 SVX (Figure 15-56)
- 1995–1999 Legacy/Outback, Sedan and Wagon (Figure 15-57)
- 1998–2004 Impreza Coupe, Sedan and Wagon (Figure 15-57)
- 1998–2004 Forester and Wagon (Figure 15-57)
- 2000–2004 Legacy/Outback Sedan and Wagon (Figure 15-58)
- 2003–2006 Baja (Figure 15-58)
- 2005 Forester (Figure 15-59)
- 2005 Impreza (Figure 15-59)
- 2005 Legacy/Outback Sedan and Wagon (Figure 15-60)
- 2006 All Models except Baja (Figure 15-60)
1992–97 SVX

To retrieve 1992–1997 SVX airbag (SRS) codes:
1. With the key on and the engine off, install either diagnostic terminal into pin 9 of the airbag (SRS) diagnostic connector. The connector is located in the left kick panel area (Figure 15-56).
2. Read trouble codes on the SRS or airbag warning light (Code Type 08c, Figure 15-47).
3. Turn the key off and remove the diagnostic terminal from the diagnostic connector.

To clear code memory:
1. With the key on and the engine off, install either diagnostic terminal into pin 9 of the airbag (SRS) diagnostic connector (Figure 15-56).
2. When the SRS or airbag warning light is flashing trouble codes, install the other diagnostic terminal into pin 3 of the diagnostic connector for at least 3 seconds.
3. Codes are cleared when the SRS or airbag warning light resumes a normal flashing rate of 0.6 seconds On and 0.6 seconds Off.

1995–1999 Legacy/Outback, Sedan and Wagon
1998–2004 Impreza Coupe, Sedan and Wagon
1998–2004 Forester and Wagon

1. With the key on and the engine off, install either diagnostic terminal into pin 1 or the airbag (SRS) diagnostic connector. The connector is located in the left lower dash panel area (Figure 15-57).
2. Read trouble codes on the SRS or airbag warning light (Code Type 08c, Figure 15-47).
3. Turn the key off and remove the diagnostic terminal from the diagnostic connector.
1. With the key on and the engine off, install either diagnostic terminal into pin 1 of the airbag (SRS) diagnostic connector (Figure 15-56).
2. When the SRS or airbag warning light is flashing trouble codes, install the other diagnostic terminal into pin 2 of the diagnostic connector for at least 3 seconds.
3. Codes are cleared when the SRS or airbag warning light resumes a normal flashing rate of 0.6 seconds On and 0.6 seconds Off.

2003–2004 Legacy/Outback, Sedan and Wagon
2003–2006 Baja

To retrieve 2000–2004 Legacy/Outback and 2003–2006 Baja SRS codes:
1. With the key on and the engine off, install either diagnostic terminal into pin 2 or the airbag (SRS) diagnostic connector. The connector is located in the left lower dash panel area (Figure 15-58).
2. Read the trouble codes on the SRS or airbag warning light (Code Type 08c - Figure 15-47).
3. Turn the key off and remove the diagnostic terminal from the diagnostic connector.

To clear 2000–2004 Legacy/Outback and 2003–2006 Baja SRS codes:
1. With the key on and the engine off, install either diagnostic terminal into pin 2 of the airbag (SRS) diagnostic connector (Figure 15-56).
2. When the SRS or airbag warning light is flashing trouble codes, install the other diagnostic terminal into pin 3 of the diagnostic connector for at least 3 seconds.
3. Codes are cleared when the SRS or airbag warning light resumes a normal flashing rate of 0.6 seconds On and 0.6 seconds Off.
To retrieve 2005 Impreza Sedan and Wagon and 2005 Forester SRS codes:
1. With the key on and the engine off, install either diagnostic terminal into pin 2 or the airbag (SRS) diagnostic connector. The connector is located in the left lower dash panel area (Figure 15-59).
2. Read the trouble codes on the SRS or airbag warning light (Code Type 08c - Figure 15-47).
3. Turn the key off and remove the diagnostic terminal from the diagnostic connector.

To clear 2005 Impreza Sedan and Wagon and 2005 Forester airbag (SRS) codes:
1. With the key on and the engine off, install either diagnostic terminal into pin 2 of the airbag (SRS) diagnostic connector (Figure 15-59).
2. When the SRS or airbag warning light is flashing trouble codes, install the other diagnostic terminal into pin 3 of the diagnostic connector for at least 3 seconds.
3. Codes are cleared when the SRS or airbag warning light resumes a normal flashing rate of 0.6 seconds On and 0.6 seconds Off.
1— Airbag (SRS) Diagnostic Connector
2— Diagnostic terminal B
3— Diagnostic terminal A

Figure 15-59 2005 Forester and 2005 Impreza SRS Diagnostic connector (gray)

2005 Legacy/Outback Sedan and Wagon
All 2006 Models except Baja

To retrieve trouble codes:
1. Use the OBD-II adapter with the specified Personality Key™ device (Figure 15-60).
2. Select Codes Only from the Codes and Data menu and follow any instructions on the scan tool display.

To clear code memory:
- Select Clear Codes from the Codes and Data menu and follow any instructions on the scan tool display.

Figure 15-60 16-Pin OBD-II connector and common locations

1— 16-pin DLC
2— OBD-II adapter and Personality Key™
This chapter contains information for testing Toyota, Lexus and Scion vehicles. The following Toyota, Lexus and Scion systems may be available for testing:

- Engine
- Transmission
- Antilock Brake System (ABS)
- Supplemental Restraint System (SRS)

### 16.1 Identifying 1995 and Earlier Vehicles

Available engine types vary depending on the model and year. In most cases, you can find the engine type by locating the Vehicle Emission Control Information (VECI) sticker, or “emissions decal,” inside the engine compartment. If a VECI sticker is not available, engine type is sometimes noted on the vehicle nameplate (Figure 16-1), which may be:

- In the engine compartment on the bulkhead
- In either fender well area
- On a door or a door post

![Figure 16-1 Toyota vehicle nameplate](image)

### 16.2 Testing Engine Systems

Toyota, Lexus, and Scion engine testing includes:

- “Code Reading Connectors and Locations” on page 198
- “Code Sensitivity—OBD-II and some Pre-OBD-II” on page 199
- “Data (No Codes)” on page 199
- “Manual Code Reading” on page 200
- “Actuator Tests” on page 200
16.2.1 Code Reading Connectors and Locations

1—Use TOY-1 adapter
2—Optional: Jump E1 to T, T1, or TE1 to flash codes

Figure 16-2 Toyota/Lexus diagnostic connector requiring TOY-1 adapter

1—Use TOY-2 adapter
2—Optional: Jump E1 to TE1 to flash codes

Figure 16-3 Toyota/Lexus diagnostic connector requiring TOY-2 adapter

1—Jump T to E1 to flash codes
2—CG (Chassis Ground)
3—A/B
4—TS
5—TC

Figure 16-4 Toyota/Lexus diagnostic connectors—other
16.2.2 Code Sensitivity—OBD-II and some Pre-OBD-II

Some Toyota and Lexus vehicles can be placed in a test mode where the ECM is more sensitive to diagnostic trouble codes (DTCs). The ECM stays in this mode until the ignition is turned off. For more details, see Fast-Track® Troubleshooter Reference TA044.

**NOTE:**
This mode will not work for evaporative emissions systems or misfire DTCs.

16.2.3 Data (No Codes)

The Data (No Codes) selection displays for vehicles that transmit PCM operating data to the scan tool. Use of this mode is very similar to the Codes and Data mode except that codes must be read separately using the Code Functions selection.
16.2.4 Manual Code Reading

![Figure 16-6 Code Type 09](image)

Table 16-1 Toyota Code Type 09

| Pattern: | 10s and 1s; continuous flashing means system OK |
| Read codes on: | Check Engine lamp |
| Start codes by: | Connect the vehicle diagnostic connector terminals together and switch on the ignition. |
| When done: | Turn the ignition off, disconnect the connectors, then clear codes. |

![Figure 16-7 Code Type 10](image)

Table 16-2 Toyota Code Type 10

| Pattern: | Straight count |
| Read codes on: | Check Engine lamp |
| Start codes by: | Connect the vehicle diagnostic connector terminals together and switch on the ignition. |
| When done: | Turn the ignition off, disconnect the connectors, then clear codes. |
| Code 1 is pass code (system OK). |

16.2.5 Actuator Tests

Some Toyota, Lexus and Scion models have interactive bidirectional actuator tests. Though most actuator tests are best performed with the key on and engine running, the Fuel Pump and Fuel Pump Relay tests must be performed with the key and the engine off.

Most tests automatically display data parameters to help determine actuator or system performance. Some tests, like the Fuel Pump Test, do not display parameters. For these tests, monitor the selected actuator using a digital multimeter or listen for actuator activation.

For most tests, scrolling up and down switches the actuator on and off. Test completion does not mean that the actuator was activated.
IMPORTANT:
Do not enter any actuator test while driving unless the specific test requires it. Changes to ignition timing, fuel delivery, and other functions may affect operation and vehicle control.

The actuator tests may be grouped into the following test categories:

- EGR, evaporative emissions, secondary air systems
- Turbocharger and supercharger actuators
- Transmission solenoids
- Fuel delivery system
- Intake air delivery system
- Ignition timing
- Air conditioning system

To conduct an EGR system test:
1. Select Actuator Tests > EGR System from the Main Menu.
   A test initiation screen displays.
2. Select to initiate the test.
3. Raise the engine to 2500 RPM.
   Scroll up and down to command the valve that switches vacuum to the EGR valve on and off.
   Use the EGR TEMP and ST TRIM parameters on the screen to determine if exhaust gas is indeed being recirculated.
   When EGR SYS reads Off, expect low EGR TEMP. When EGR SYS reads On, the EGR TEMP should rise and the ST TRIM values should change.
4. When you have completed testing the EGR system, exit.

To conduct a fuel pump test:
1. Select Actuator Tests > Fuel Pump from the Main Menu.
   A test initiation screen displays.
2. Select to initiate the test.
   "In Progress" flashes and an operational pump vibrates and makes noise for 30 seconds, after which time the test automatically shuts off.

16.3 Testing Transmission Systems

Toyota, Lexus and Scion transmission systems provide code information.

16.3.1 Code Reading Connectors

Transmission diagnostic connectors and adapters are shown in Figure 16-8 on page 202.
16.4 Testing ABS Systems

Toyota, Lexus and Scion ABS provides code information.

16.4.1 Code Reading Connectors

ABS diagnostic connectors are shown in Figure 16-9.

1— Use TOY-2 adapter
2— Use TOY-1 adapter
3— Use OBD-II adapter

Figure 16-9 Antilock brake system connectors
Some early systems require disconnecting a service wire or installing a jumper wire in order to initiate a flash code display (Figure 16-8).

1— Disconnect service wire (some models)
2— Disconnect Wa to Wb jumper (some models)

Figure 16-10 Antilock brake system connectors

NOTE:
When reading codes or data using TOY-1 or TOY-2 connectors, use the battery pack or an external power source.

16.5 Testing Supplemental Restraint Systems (SRS)
Toyota, Lexus and Scion SRS provides code information.

16.5.1 Reading SRS Codes
For all models except 2000 and later Celica, Echo, and MR2, use Auto Code Read while connected to the diagnostic link connector.

To read codes for all vehicles except 2000 and later Celica, Echo, and MR2:
1. Turn the key on with the engine off and wait 20 seconds.
2. Select Code Functions > Auto Code Read.

NOTE:
Pay attention to the terminal connecting position to avoid a malfunction.

To read codes for 2000 and later Celica, Echo, and MR2, and most 2001 and later models:
1. Turn the ignition switch on and wait for approximately 20 seconds.
2. Connect DLC3 terminal Tc to terminal CG (Figure 16-11).
To read codes for 2000 and later Celica, Echo, and MR2:
1. Connect a jump wire between terminals Tc and CG of the DLC3 (Figure 16-11).
2. Turn the ignition switch on and wait for approximately 20 seconds.

No Codes Set Confirmation
The following signs indicate that the airbag system functions properly:
- The SRS lamp is unlit prior to connecting the scan tool.
- After selecting Auto Code Read, the SRS lamp flashes continuously and the display reads: "No Codes Present".
- After exiting Auto Code Read, the SRS lamp turns off.

Low Source Voltage
The following signs indicate low source voltage in the airbag system:
- The SRS lamp flashes or is continuously lit before connecting.
- After entering Auto Code Read, the SRS lamp flashes continuously and the display reads: "No Codes Present".
- After exiting Auto Code Read, the SRS lamp resumes flashing or turns on continuously.

NOTE:
A discharged battery or a faulty airbag sensor assembly may cause low source voltage.

16.5.2 Code Clearing

To clear SRS codes from 2000 and later Echo, Celica, and MR2, and most 2001 and later models:
1. Connect two jumper wires to terminals #13 and #6 of DCL3 (16-pin OBD-II) (Figure 16-12).
2. Turn the ignition switch on and wait approximately six seconds.
3. Starting with the Tc terminal, alternately ground terminal Tc then terminal A/B twice each in cycles of 1.0 second (Figure 16-13). Ensure that terminal Tc remains grounded.
Several seconds after the clearing procedure is complete (Step 3), the SRS warming lamp blinks in a 50 ms/second cycle to indicate codes have been cleared (Figure 16-13).

To clear SRS codes on most other vehicles:
1. Switch the ignition on without starting the engine.
2. Connect a jumper wire between terminals #4 and #13 of the DLC3 (16 pin OBD-11) (Figure 16-11).
   Codes should now display.
3. Some vehicles may require this method:
   a. Within 10 seconds after codes begin to display, remove the jumper.
   b. Wait up to 3 seconds for the ABS warning lamp to light up.
c. Reconnect the jumper between terminals #4 and #13 of the DLC3 within 2 to 4 seconds after ABS warning lamp lights.

d. Disconnect the jumper after the ABS warning lamp is on for 2 to 4 seconds.

4. Switch the Ignition off while jumper wire is still in place.
This chapter explains how to test 1994–later OBD-II vehicles. Most vehicles are equipped with two testing modes: Generic OBD-II and Enhanced OBD-II. The EPA requires all 1996–later vehicles sold in the USA to meet OBD-II standards.

Some 1994–95 vehicles may appear to be OBD-II equipped, they may not be fully compliant. Check the VECI label to determine if a 1994–95 vehicle is an OBD-I or OBD-II model.

The following information and procedures are specific testing in Generic OBD-II mode. For general scan tool testing information, see the user’s manual for your diagnostic tool.

### 17.1 OBD-II and What it Means

The term OBD stands for On Board Diagnostics. OBD-II is a system that the Society of Automotive Engineers (SAE) developed in order to standardize automotive electronic diagnosis so technicians could use the same scan tool to test any make and model without special adapters.

The SAE established guidelines that provide the following:

- A universal diagnostic test connector, known as the data link connector (DLC), with dedicated pin assignments.
- A standardized location for the DLC, visible under the dash on the driver’s side.
- A standardized list of diagnostic trouble codes (DTCs).
- The ability of the vehicle system to record a snapshot of operating conditions when an emissions-related fault occurs.
- Expanded diagnostic capabilities that record a code whenever a condition occurs that affects vehicle emissions.
- The ability to clear stored codes from vehicle memory with the scan tool.
- A glossary of standard terms, acronyms, and definitions used for system components.

In addition, SAE has published hundreds of pages defining a standard communications protocol that establishes the hardware, software, and circuit parameters of OBD-II systems. Unfortunately, the vehicle manufacturers have different interpretations of this protocol. As a result, the generic OBD-II communications scheme used varies, depending on the vehicle.

SAE publishes recommendations, not laws, but the Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) made many SAE recommendations legal requirements, which were phased in over a three-year period. Beginning in 1994, vehicles with a new engine management computer were supposed to comply with OBD-II standards. For 1995, OBD-II systems were to appear on about 40% of the new vehicles sold. The government granted waivers for some 1994–95 OBD-II systems to give manufacturers time to fine-tune their systems. Beginning with the 1996 model year, all new vehicles sold in the USA must be fully OBD-II compliant.
17.2 Selecting The Generic Test Mode

The OBDII Generic selection is available from the Manufacturer Selection menu.

17.3 Connecting To The Vehicle

The 16-pin OBD-II adapter is used to connect the scan tool to the DLC (Figure 17-1). The adapter attaches to the end of the data cable with captive screws.

**NOTE:**

A Personality Key must be inserted into the adapter for testing in the generic mode.

The DLC is a 16-pin connector. The female half is on the vehicle, and the male end is on the scan tool cable. The connector is D-shaped and keyed so the two halves mate only one way. Pins are arranged in two rows of eight, numbered 1 to 8 and 9 to 16 (Figure 17-1).

![Figure 17-1 16-pin OBD-II data link connector (DLC), test adapter, and personality key](image)

<table>
<thead>
<tr>
<th>PIN</th>
<th>FUNCTION</th>
<th>PIN</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manufacturer’s discretion</td>
<td>9</td>
<td>Manufacturer’s discretion</td>
</tr>
<tr>
<td>2</td>
<td>Bus+ Line, SAE J1850</td>
<td>10</td>
<td>Bus- Line, SAE J1850</td>
</tr>
<tr>
<td>3</td>
<td>Manufacturer’s discretion</td>
<td>11</td>
<td>Manufacturer’s discretion</td>
</tr>
<tr>
<td>4</td>
<td>Chassis ground</td>
<td>12</td>
<td>Manufacturer’s discretion</td>
</tr>
<tr>
<td>5</td>
<td>Signal ground</td>
<td>13</td>
<td>Manufacturer’s discretion</td>
</tr>
<tr>
<td>7</td>
<td>K-line, ISO 9141</td>
<td>15</td>
<td>L-line, ISO 9141</td>
</tr>
<tr>
<td>8</td>
<td>Manufacturer’s discretion</td>
<td>16</td>
<td>Vehicle battery positive</td>
</tr>
</tbody>
</table>

The DLC cannot be hidden behind panels and must be accessible without the use of tools. (Figure 17-2). Although out of the normal line of sight, the DLC should be clearly visible to a crouching technician.
If the DLC is not visible, you may find a manufacturers sticker on the lower steering column cover, or below the left side of the dash center, indicating the DLC location.

The DLC is designed for scan tool access only. You cannot jumper any of the terminals to display codes on the instrument cluster warning lamp, or malfunction indicator lamp (MIL).

To connect to a vehicle:
- Follow the on-screen connection instructions, and then select to continue. The Main Menu displays.

17.4 Main Menu Selections

There are up to three main menu choices in Generic Testing Mode:

- **Codes and Data Menu**—displays a sub-menu of choices for viewing parameter data, diagnostic trouble codes (DTCs), and various oxygen sensor (O2S) signal characteristics.
- **Custom Setup**—configures scan tool settings, see the manual for your diagnostic tool.
- **Review Movie**—appears on a menu only after a movie is recorded. The Review Movie feature works the same in Generic Testing Mode as with specific manufacturers. See the manual for your diagnostic tool for details.

17.4.1 Codes and Data Menu

This selection is available from the Main Menu in Generic OBD-II mode.

Select Codes and Data Menu and a sub-menu of the following choices displays

- **Codes Only**—displays diagnostic trouble codes (DTCs).
- **O2 Monitors**—displays various signal characteristics of O2S response.
- **Pending Codes**—displays codes whose setting conditions occurred once, but must occur two or more times before a DTC is set.
- **Data (No Codes)**—displays various sensor, switch, and actuator inputs and outputs.
- **Freeze Frame**—displays certain data readings that the vehicle stores when a DTC is set.
Scan Tool Communication

The selections from the Codes and Data Menu require that the scan tool communicate with the powertrain control module (PCM). The ignition must be on to establish communication. After making a selection, the scan tool displays a “waiting for PCM to communicate” message.

If communication with the PCM is not established within 5 seconds, the scan tool displays a “no communication” message. This message stays on the screen until communication is established, or the operation is canceled. When communication is established, the scan tool will go to the selected function.

Interrupted Communication

If communication is interrupted during testing, but power remains connected, a “No Communication” message displays.

This could happen if the connection to the vehicle is loose or the ignition is turned off. This message stays on the screen until communication is reestablished, or the operation is canceled.

Codes Only

This selection displays DTCs in a standard, 5-character alphanumeric format.

The first character, a letter, defines the system where a code was set, or displays “U” if there is a communication fault (Table 17-2).

Table 17-2 First DTC character indications

<table>
<thead>
<tr>
<th>1st DTC Character</th>
<th>System Where a Code Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Powertrain</td>
</tr>
<tr>
<td>B</td>
<td>Body</td>
</tr>
<tr>
<td>C</td>
<td>Chassis</td>
</tr>
<tr>
<td>U</td>
<td>Network</td>
</tr>
</tbody>
</table>

The second character will be a 0, 1, 2, or 3 (Table 17-3). The meaning of a 2 or 3 varies according to the system character (P, B, C, or U).

Table 17-3 Second DTC character indications

<table>
<thead>
<tr>
<th>2nd DTC Character</th>
<th>Type of Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>SAE-defined (generic) code</td>
</tr>
<tr>
<td>1</td>
<td>Manufacturer-defined (enhanced) code</td>
</tr>
<tr>
<td>2 &amp; 3</td>
<td>P2 = SAE-defined (generic) code</td>
</tr>
<tr>
<td></td>
<td>P3000-P3399 = Manufacturer specifications</td>
</tr>
<tr>
<td></td>
<td>P3400-P3899 = Reserved by SAE for future use</td>
</tr>
<tr>
<td></td>
<td>B2 &amp; C2 = Reserved for manufacturers</td>
</tr>
<tr>
<td></td>
<td>B3 &amp; C3 = Reserved by SAE for future use</td>
</tr>
</tbody>
</table>
The third DTC character indicates the system where the fault occurred (Table 17-4):

<table>
<thead>
<tr>
<th>3rd DTC Character</th>
<th>System Where Fault Occurred</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fuel or air metering problem</td>
</tr>
<tr>
<td>2</td>
<td>Ignition malfunction or engine misfire</td>
</tr>
<tr>
<td>3</td>
<td>Auxiliary emission control system problem</td>
</tr>
<tr>
<td>4</td>
<td>Vehicle or idle speed control system problem</td>
</tr>
<tr>
<td>5</td>
<td>Computer or output circuit fault</td>
</tr>
<tr>
<td>6</td>
<td>Transmission control problem</td>
</tr>
</tbody>
</table>

The final characters in the DTC tell you the conditions that triggered the code. Different sensors, actuators and circuits are assigned blocks of numbers; and the lowest number in the block indicates a general malfunction. This is the generic DTC. Higher numbers in the assigned block—called enhanced codes—provide more specific information, such as low or high voltage, slow response, or an out-of-range signal.

**Code Clearing**

The scan tool can clear trouble codes and other saved data from PCM memory.

To clear the codes:
1. Select **(04) Clear Emissions Related Data** from the Select Service menu.
   A confirmation screen displays.
2. Selecting erases all codes, freeze frame data, and test results from PCM memory.
   Follow the on-screen prompts to clear the data and return to the menu.

If the code-clearing operation fails for any reason, the previous codes reappear. If this occurs, repeat the Clear Codes operation.

**O2 Monitors**

This selection lets you view various O2S signal response characteristics.

There are two different monitors: one for pre-converter sensors and one for post-converter sensors. The PCM looks for three main things from the pre-converter oxygen sensor:

- Maximum voltage
- Minimum voltage
- Switching rate

The PCM looks for the sensor signal to rise above 600 millivolts, fall below 300 millivolts, and switch in less than 100 milliseconds to monitor the pre-converter O2S. The PCM performs a fuel control routine and examines the pre-converter sensor readings during known air/fuel mixtures. The PCM looks for specific sensor values, based on the mixture levels it provides.
The post-converter check is significantly different. The PCM sees almost no switching when the converter is functioning properly. To test the sensor, the PCM forces a fuel control routine that the converter cannot compensate for, and then monitors the sensor response.

Both sensors are also monitored continuously for open and short circuits.

To perform an O2S Monitors test:
1. Select ($05, 06, 07) Display Test Param./Results from the Select Service menu.
2. Select ($05) Oxygen Sensor Monitoring from the submenu.
   A test options menu displays.
3. Select a test from the list.

What the sensor response signal tests measure are shown in Figure 17-3.

![Figure 17-3 O2 sensor monitor tests](image)

1— Test 1: Rich to lean sensor threshold voltage
2— Test 2: Lean to rich sensor threshold voltage
3— Test 3: Low sensor voltage for switch time calculation
4— Test 4: High sensor voltage for switch time calculation
5— Test 5: Rich to lean sensor switch time
6— Test 6: Lean to rich sensor switch time
7— Test 7: Minimum sensor voltage for test cycle
8— Test 8: Maximum sensor voltage for test cycle
9— Test 9: Time between sensor transitions

Pending Codes
Pending codes set when operating conditions are out of the normal range, but not all the criteria to set a DTC occur. For example, a failure must occur on two consecutive trips or drive cycles before certain OBD-II codes set. In this case, a pending code is recorded during the first trip when the failure first occurs.
Data (No Codes)
OBD-II vehicles transmit PCM operating data to the scan tool, but do not broadcast DTCs in this mode. The scan tool does not affect PCM operation, and the vehicle can be driven normally for road testing. Use the Codes Only selection to read DTCs.

Freeze Frame
This selection lets you view certain data parameter readings that the vehicle stores the instant that a code (DTC) is set. Parameters displayed will vary, depending on the code.
The following chapter provides definitions and operating ranges for the data stream parameters that display on the scan tool. The scan tool can display all of the operating parameters available from the electronic control module of the vehicle, which provides two basic kinds of parameters:

- Digital (discrete) parameters are those that can be in only one of two states, such as on or off, open or closed, high or low, rich or lean, and yes or no. Switches, relays, and solenoids are examples of devices that provide discrete parameters on the data list.

- Analog parameters are displayed as a measured value in the appropriate units. Voltage, pressure, temperature, time, and speed parameters are examples of analog values. The scan tool displays them as numbers that vary through a range of values in units, such as pounds per square inch (psi), kilopascal (kPa), degrees Celsius (°C), degrees Fahrenheit (°F), kilometers per hour (KPH), or miles per hour (MPH).

Some data parameters display in numbers that range from 0 to 100, 0 to 255, or 0 to 1800. These ranges are used because in each case, it is the maximum number range that the control module transmits for a given parameter. However, many parameter readings never reach the highest possible number. For example, you never see a vehicle speed parameter reading of 255 MPH.

The maximum range of a parameter often varies by year, model, and engine. On these applications, the word “variable” appears in the range heading, but typical sampled values observed under actual test conditions are in the parameter description when available.

Parameters may also be identified as input signals or output commands.

- Input or feedback parameters are signals from various sensors and switches to the electronic control module (ECM). They may display as analog or discrete values, depending on the input device type.

- Output parameters are commands that the ECM transmits to various actuators, such as solenoids and fuel injectors. They are displayed as discrete parameters, analog values, or as a pulse-width modulated (PWM) signal.

Parameters are presented as they appear on the screen. Most parameter descriptions are in alphabetical order, but there are exceptions. Often, the same parameter goes by a different name when used on more than one make, model, engine, or control system. In these instances, all of the applicable parameter names are listed in alphabetical order before the description.

The scan tool may display names for some data parameters that differ from names displayed by a factory tool and other scan tools.

The data parameter descriptions in this manual were created from a combination of sources. For most parameters, some basic information was provided by the respective manufacturers, then expanded through research and field-testing. Parameter definitions and ranges may expand as more test results become available. For some parameters, no information is currently available.

Always use a digital multimeter, power graphing meter, or lab scope, to further validate the displayed values. If data is corrupted on multiple data parameters, do not assume that the control module may be faulty. This corrupt data may be caused by improper communication between the scan tool and the control module. See the troubleshooting sections of the user’s manual for the diagnostic tool you are using for more details on communication problems.
Interpreting Pressure Parameters

Parameters that indicate ambient air pressure (barometric pressure) and high or low pressure inside the intake manifold are major input parameters used by the ECM to control the air-fuel ratio and spark advance in relation to engine load.

The engine control system must measure the atmospheric air pressure and the pressure in the intake manifold to determine engine load and calculate the required fuel metering and spark advance. Three pressure measurements or calculations are necessary:

- Barometric pressure (BARO) is the ambient atmospheric air pressure. The barometric pressure changes with altitude and temperature. At sea level, barometric pressure is 14.7 psi, 101.3 kPa, or 29.9 "Hg.
- Manifold vacuum is pressure in the intake manifold that is below atmospheric pressure on a running engine. The manifold vacuum is measured in relation to atmospheric pressure. High vacuum is low pressure.
- Manifold absolute pressure (MAP) is a combination of atmospheric pressure and vacuum, or the relative difference between the air pressure outside the manifold and the vacuum inside. MAP is measured in relation to zero pressure (high vacuum).

BARO, manifold vacuum, and MAP have the following relationships (Figure 18-1).

- MAP = BARO – vacuum
- Vacuum = BARO – MAP
- BARO = MAP + vacuum

![Figure 18-1 Air pressure relationships](image)

Turbocharger boost operation also affects manifold pressure. When a turbocharger is providing boost pressure, manifold absolute pressure rises above atmospheric pressure.

Depending on the control system and sensors used on an engine, one or more of the MAP, BARO, or vacuum parameters display on the scan tool. It may also display boost pressure on a turbocharged engine.

Parameters display as both a voltage reading from the sensor and as a pressure measurement in either kilopascal (kPa) or inches of mercury ("Hg). The preset measurements for all three values are in kPa.
## Alphabetic List of Parameters

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Com RL-Door Mtr
Com RL-Door
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Com Slide Roof
Com TDS
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Communication FL Seat A/C
Communication RR Seat A/C
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Comps/Def Oper
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COND FAN
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COOLANT TEMP
COOLANT TEMP
COOLANT TEMP COOLANT(*) COOLING FAN SPD
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Antilock Brake System (ABS) Parameters

This section defines data parameters available from the antilock brake systems (ABS). To find the description of a specific parameter, locate the parameter name in the index and then go to the listed page.

1 SYS BRAKE
   Range: ___________________________________________________ BEFORE, DURIN
Indicates the 1 Sys Brake. DURING = During operation.

2 FRAMES
   Range: __________________________________________________________ YES/NO
Indicates when there are two or more frames for freeze frame data.
   • YES when there are two or more frames for freeze frame data

4WD ACTIVE
   Range: __________________________________________________________ YES/NO
Indicates the operating status of the 4WD system on models with a VCM and a 4WAL or RWAL system. It reads:
   • YES when the VCM disables antilock braking
   • NO under normal operating conditions

ABS BATT (V)
ABS IGN (V)
   Range: ______________________________________________________ 0.0 to 13.50 V
Indicates the switched (ABS IGN) and unswitched (ABS BATT) voltages to the ABS ECM.

ABS LAMP
   Range: _____________________________________________________ ON/OFF/FLSH
Indicates the current status of the ANTILOCK/ABS lamp on the instrument panel:
   • OFF means the lamp should be off and ABS is fully operational.
   • FLSH means the lamp is flashing due to a detected fault, ABS remains operational.
   • ON means the lamp is continuously on due to a detected fault, ABS operation is limited. If the fault affects the front ABS, the rear ABS operates with the front brakes in a non-ABS condition. If the fault affects the rear ABS or other critical parts of the system, ABS is completely disabled. Brakes at all four wheels operate in a basic non-ABS mode.

If the reading does not match the condition of the warning lamp on the instrument panel, a lamp circuit fault may exist.

ABS SRI STATUS
   Range: __________________________________________________________ ON/OFF
Indicates the status of the ABS service repair lamp, reads ON when ABS service is needed.

ABS STOP
   Range: __________________________________________________________ YES/NO
Indicates whether the ABS has been activated during the current braking event. It only reads YES when ABS is activated during braking, and reads NO at all other times.

ABS_VOLT
   Range: _______________________________________________________ 0.0 to 16.0 V
Indicates the battery positive voltage.
ABSLAMP
AB WARN LAMP
Range: __________________________________________________ ON/OFF
Indicates the ABS warning light status.
• ON indicates the warning light is on
• OFF indicates the warning light is off

ACC PRESS SENS
ACC PRESS SENS1 (V)
Range: ___________________________________________________ 0.0 to 5.0 V
Indicates the accumulator pressure sensor. Specified value is 3.2 to 4.0 V.

ACC SEN
Range: ______________________________________________________ NORM, OPEN
Indicates the accumulator pressure sensor open status.
NORMAL when in normal condition

ACCELERATOR (%)
Range: ______________________________________________________ 0% to 128%
Indicates the accelerator opening angle.
• 0% when the accelerator pedal is released

ACCEL POS SIG
Range: ______________________________________________________ 0% to 100%
Indicates throttle position. 0% when not pressed, 1 to 100% when pressed.

ASCD SIGNAL
Range: ______________________________________________________ OFF/ON
Indicates ASCD signal status. ON indicates the signal is on, OFF indicates signal is off.

BOO
Range: ______________________________________________________ ON/OFF
Indicates the brake on and off status.

BRAKE LAMP
Range: ______________________________________________________ ON/OFF or CKT OPEN
Indicates the status of the brake lamp circuits, it reads ON when the circuit is closed and the brake lights are on. Compare this parameter to the BRAKE LAMP CMD parameter.

BRAKE LAMP CMD
Range: ______________________________________________________ ON/OFF
Indicates the commanded ABS control module output signal to the brake lamps.

BRAKE SW
Range: ______________________________________________________ ON/OFF, OPEN/CLSD, or ON/OFF/CKT OPEN
Indicates the status of the brake switch on most vehicles, it reads:
• OPEN when the brakes are applied
• CLSD when the brake pedal is released

On some vehicles, the ABS module monitors the condition of the brake switch circuit. A CKT OPEN reading means the module detected an open circuit, which may result in the ABS being fully or partially disabled.
**BRAKE WARN LAMP**
Range: __________________________________________________________ ON/OFF
Indicates the brake warning light status.
- ON when the warning light is on
- OFF when the warning light is off

**BUZZER**
Range: __________________________________________________________ ON/OFF
Indicates the skid control buzzer status.
- ON when the buzzer is on
- OFF when the buzzer is off

**CCNTABS**
Range: __________________________________________________________ 0 to 255
Indicates ABS continuous codes.

**DECELE SEN**
Range: __________________________________________________________ NORM, OPEN
Indicates the decelerator sensor open status.
- NORMAL when in normal condition

**DECELERAT SEN (m/s²)**
**DECELERAT SEN 2 (m/s²)**
Range: __________________________________________________________ –18.52 to 18.39 m/s²
Indicates the decelerator sensor 1. Reading changes when vehicle is bounced.

**DTC_CNT**
Range: __________________________________________________________ 0 to 255
Indicates the number of trouble codes set.

**ECB MTR RELAY**
Range: __________________________________________________________ ON/OFF
Indicates the ABS motor relay status.

**ECB MTR RELAY 2**
Range: __________________________________________________________ ON/OFF
Indicates the ABS motor relay 2 status.

**ECB RELAY**
Range: __________________________________________________________ ON/OFF
Indicates the ABS main relay status.

**ECB RELAY 2**
Range: __________________________________________________________ ON/OFF
Indicates the ABS main relay 2 status.

**ENABLE RELAY**
Range: __________________________________________________________ ON/OFF
Indicates the state of the ABS control module output signal to the enable relay, it reads ON when the relay is powered. This relay provides battery voltage and current to the ABS control module and the electromagnetic brakes (EMBs).
ENG OIL TMP

Range: ___________________________ 0 to 100°C (0 to 212°F)

Indicates temperature of engine oil. More than 70°C (158°F) after warmup.

EX VTC DTY B1

Range: ___________________________ 0 to 70%

Indicates control value of the exhaust valve timing control magnet retarder. Angle becomes larger as value increases. After warmup, shift lever in N, A/C off, and no load, -0 to 2% at idle, approximately 0 to 70% above 1500 RPM.

EX VTC DTY B2

Range: ___________________________ 0 to 70%

Indicates control value of the exhaust valve timing control magnet retarder. Angle becomes larger as value increases. After warmup, shift lever in N, A/C off, and no load, -0 to 2% at idle, approximately 0 to 70% above 1500 RPM.

EXH V/T LEARN

Range: ___________________________ YET/CMPLT

Indicates condition of Exhaust Valve Timing Control Learning. YET indicates learning has not been performed yet, CMPLT indicates learning has already been performed successfully.

EXH/V TIM-B1

Range: ___________________________ –5° to 30°

Indicates angle of exhaust camshaft retarded angle. After warmup, shift lever in N, A/C off, and no load, -5 to 5° at idle, approximately 0 to 30° above 1500 RPM.

EXH/V TIM-B2

Range: ___________________________ –5° to 30°

Indicates angle of exhaust camshaft retarded angle. After warmup, shift lever in N, A/C off, and no load, –5 to 5° at idle, approximately 0 to 30° above 1500 RPM.

FL ABS STATUS

Range: ___________________________ ON/OFF

Indicates the front left wheel ABS control status.

• ON during the control

FL PRS SEN (V)

Range: ___________________________ 0.0 to 5.0 V

Indicates the front left pressure sensor.

• 0.3 to 0.9 V when the brake pedal is released

FL VSC STATUS

Range: ___________________________ ON/OFF

Indicates the front left wheel VSC control status.

• ON during the control

FL W/C SEN

Range: ___________________________ NORM, OPEN

Indicates the front left wheel cylinder pressure sensor open detection.

• NORMAL when in normal condition

FL W/C SENS (V)

Range: ___________________________ 0.0 to 5.0 V

Indicates the front left wheel cylinder pressure sensor.
Data Parameters

Antilock Brake System (ABS) Parameters

- 0.3 to 0.9 V when the brake pedal is released

**FL WHEEL ACCEL (m/s²)**

Range: ____________________________ –200.84 m/s² to 199.27 m/s²

Indicates the front left wheel rate of acceleration.

**FL WHEEL SPD**

Range: ____________________________ 0 mph to 202 mph or 0 km/h to 326 km/h

Indicates the front left wheel speed sensor reading. Actual wheel speed similar speed as indicated on the speedometer.

**FLUID LEV SW**

Range: ____________________________ OFF/ON

Indicates brake fluid level. ON indicates fluid level is low, OFF indicates fluid level is sufficient.

**FORWARD & REAR G (m/s²)**

Range: ____________________________ min: –25.11 m/s² to max: 24.91 m/s²

Indicates the forward and rearward G force.

**FPCM**

Range: ____________________________ LOW/HI

Indicates the control condition of the fuel pump control module. Reads HI when cranking, and reads LOW when running at idle and the engine temperature is above 10°C (50°F).

**FR ABS STATUS**

Range: ____________________________ ON/OFF

Indicates the front right wheel ABS control status.

- ON during the control

**FR OPERATE TORQ**

Range: ____________________________ 0 N-m to 4,080 N-m

Indicates the front regenerative operation torque.

**FR PRS SEN (V)**

Range: ____________________________ 0.0 to 5.0 V

Indicates the front right pressure sensor.

- 0.3 to 0.9 V when the brake pedal is released

**FR RQST TORQ**

Range: ____________________________ 0 N-m to 4,080 N-m

Indicates the front regenerative request torque.

**FR VSC STATUS**

Range: ____________________________ ON/OFF

Indicates the front right wheel VSC control status.

- ON during the control

**FR W/C SEN**

Range: ____________________________ NORM, OPEN

Indicates the front right wheel cylinder pressure sensor open detection.

- NORMAL when in normal condition

**FR W/C SENS (V)**

Range: ____________________________ 0.0 to 5.0 V

Indicates the front right wheel cylinder pressure sensor.
Data Parameters

Antilock Brake System (ABS) Parameters

- 0.3 to 0.9 V when the brake pedal is released

**FR WHEEL ACCEL (m/s²)**

Range: 

-200.84 m/s² to 199.27 m/s²

Indicates the front right wheel rate of acceleration.

**FR WHEEL SPD**

Range: 

0 mph to 202 mph or 0 km/h to 326 km/h

Indicates the front right wheel speed sensor reading. Actual wheel speed similar speed as indicated on the speedometer.

**G-SENSOR (V)**

Range: 

0.0 to 5.0 V

Indicates the output voltage signal from the centrifugal force (G-force) sensor as the vehicle decelerates.

**HV COMM**

Range: 

NORM, OPEN

Indicates the HV communication open detection.

- NORMAL when in normal condition

**IDLE SW**

Range: 

ON/OFF

Indicates the main idle switch.

- ON when the accelerator pedal is released
- OFF when the accelerator pedal is depressed

**IG VOLTAGE**

Range: 

NORM, HIGH, LOW

Indicates the ECU power supply voltage.

- HIGH when 9.5 V or over
- NORM when 9.5 V
- LOW when below 9.5 V

**L-FRONT EMB**

**R-FRONT EMB**

Range: 

ON/OFF

Indicates the present state of the ABS control module output signal to the left and right front electromagnetic brakes (EMBs). Reads ON when the ABS control module activates the EMBs during front wheel ABS operation.

**L-FRONT SOL**

**R-FRONT SOL**

Range: 

ON/OFF

Indicates the present state of the ABS control module output signal to the left and right front solenoids. Reads ON when solenoids are energized during front wheel ABS operation.

**LATERAL G (m/s²)**

Range: 

min: –25.11 m/s² to max: 24.91 m/s²

Indicates the lateral G force.
LF MOTOR AMPS  
RF MOTOR AMPS  
REAR MOTOR AMPS  
Range: \_______________________________ 0 to 20 A

Indicates the output current the ABS control module is applying to the motors as amperes. The reading is a positive value when the motors are driven forward, and negative (–) when the motors are driven in reverse. During motor operation, this value should be higher than the current displayed by the MOTOR FBK parameters.

LF MOTOR FBK  
RF MOTOR FBK  
REAR MOTOR FBK  
Range: \_______________________________ 0 to 20 A

Indicates the feedback current measured by the ABS control module from the drive motors. During motor operation, this value should be lower than the current being displayed by the MOTOR AMPS parameters.

LF WHEEL (MPH)  
RF WHEEL (MPH)  
RR WHEEL (MPH)  
WHEEL SPD FL  
WHEEL SPD FR  
WHEEL SPD RL  
LR WHEEL (MPH)  
WHEEL SPD RR  
Range: \_______________________________ 0 to vehicle max.

Indicates the speed of the individual wheels, which is calculated by the ABS control module from the input voltage signals of the wheel speed sensors.

Wheel speeds should be equal to each other and to vehicle speed as the vehicle is driven in a straight line without braking. Wheel speeds vary when turning, and may vary during braking without antilock operations. During ABS braking, wheel speeds should remain close to equal.

LF_WSPD  
Range: \_______________________________ 0 to vehicle max.

Indicates the left front wheel speed sensor.

LR_WSPD  
Range: \_______________________________ 0 to vehicle max.

Indicates the left rear wheel speed sensor.

M/R OUTPUT  
Range: \_______________________________ OFF/ON

Indicates status of actuator motor and motor relay. ON indicates motor and motor relay are active, OFF indicates motor and motor relay are inactive.

M-MODE SIG  
Range: \_______________________________ OFF/ON

Indicates the automatic transmission (A/T) manual mode status. Reads OFF when not in A/T manual mode, and ON when in A/T manual mode.

MAIN RELAY 1  
Range: \_______________________________ ON/OFF

Indicates the main relay 1 for ECB. Reads ON in operating mode when ECB is active.
MAIN RELAY 2
Range: __________________________________________________________ ON/OFF
Indicates the main relay 2 for ECB. Reads ON in operating mode when ECB is active.

MAS CYL PRESS 1
MAS CYL PRS 1
Range: __________________________________________________________ 0.0 to 5.0 V
Indicates the master cylinder pressure sensor 1 reading. Voltage increases when the brake pedal is depressed. Readings should be from 0.3 to 0.9 V when the brake pedal is released.

MAS CYL PRESS 2
MAS CYL PRS 2
Range: __________________________________________________________ 0.0 to 5.0 V
Indicates the master cylinder pressure sensor 2 reading. Voltage increases when the brake pedal is depressed. Readings should be from 0.3 to 0.9 V when the brake pedal is released.

MC1
Range: __________________________________________________________ ON/OFF
Indicates the MC1 status. Reads ON when in operating mode, reads OFF at all other times.

MC2
Range: __________________________________________________________ ON/OFF
Indicates the MC2 status. Reads ON when in operating mode, reads OFF at all other times.

M/C SEN 1
Range: __________________________________________________________ NORM, OPEN
Indicates whether and open exists on the master cylinder pressure sensor 1 circuit. Reads OPEN only when an open circuit is detected, reads NORM (normal) at all other times.

M/C SEN 2
Range: __________________________________________________________ NORM, OPEN
Indicates whether and open exists on the master cylinder pressure sensor 2 circuit. Reads OPEN only when an open circuit is detected, reads NORM (normal) at all other times.

MTR RELAY 1
Range: __________________________________________________________ ON/OFF
Indicates the motor relay 1 status.

MTR RELAY 2
Range: __________________________________________________________ ON/OFF
Indicates the motor relay 2 status.

PARKING BRAKE SW
PKB SW
Range: __________________________________________________________ ON/OFF
Indicates the parking brake switch status. Reads ON when the parking brake is applied, and OFF when the parking brake is released.

PATTERN DRIVE
Range: __________________________________________________________ ON/OFF
Indicates that a pattern drive is under enforcement. Reads ON only during pattern drive operation, and OFF during normal operating conditions.
PDL STROKE (V)
PEDAL STROKE (V)
Range: ________________________________________________________ 0.0 to 5.0 V
Indicates the signal voltage of the brake pedal stroke sensor. Typical readings range from
0.7 to 1.3 V when the brake pedal is released.

PDL STROKE 2 (V)
PEDAL STROKE 2 (V)
Range: ________________________________________________________ 0.0 to 5.0 V
Indicates the signal voltage of the brake pedal stroke sensor 2. Typical readings range from
3.7 to 4.3 V when the brake pedal is released.

PMP_MTR
PMPSTAT
Range: __________________________________________________________ ON/OFF
Indicates the hydraulic pump motor operating status.

PUMP (V)
Range: __________________________________________________________ 0 to 16 V
Indicates the voltage signal being supplied to drive to the ABS pump.

R_WSPD
Range: __________________________________________________________ 0 to vehicle max.
Indicates the rear wheel speed sensor.

REGEN CO-OPRT
Range: __________________________________________________________ BEFORE, DURING
Indicates the regenerate co-operation. Reads DURING while regenerate is operating.

REGEN COOP
Range: __________________________________________________________ ON/OFF
Indicates the regenerative co-operation status. Reads ON when the system is operating, reads
OFF at all other times.

REGEN TORQ FL (N-m)
Range: __________________________________________________________ 0 to 4080 N*m
Indicates the regenerative request torque (FL). 0 N*m indicates that ECB is not in operation.

REGEN TORQ FR (N-m)
Range: __________________________________________________________ 0 to 4080 N*m
Indicates the regenerative request torque (FR). 0 N*m indicates that ECB is not in operation.

REGEN TORQ RL (N-m)
Range: __________________________________________________________ 0 to 4080 N*m
Indicates the regenerative request torque (RL). 0 N*m indicates that ECB is not in operation.

REGEN TORQ RR (N-m)
Range: __________________________________________________________ 0 to 4080 N*m
Indicates the regenerative request torque (RR). 0 N*m indicates that ECB is not in operation.

RESERVOIR SW
Range: __________________________________________________________ ON/OFF
Indicates the status of brake fluid reservoir level warning switch.
  • ON when the reservoir level is normal
  • OFF when the reservoir level is low
### Antilock Brake System (ABS) Parameters

#### RF_WSPD
- **Range:** 0 to vehicle max.
- Indicates the right front wheel speed sensor signal as vehicle speed.

#### RL ABS STATUS
- **Range:** ON/OFF
- Indicates the rear left wheel ABS control status. Reads ON when ABS is active, reads OFF at all other times.

#### RL PRS SEN (V)
- **Range:** 0.0 to 5.0 V
- Indicates the rear left pressure sensor signal. Typical readings range from 0.3 to 0.9 V when the brake pedal is released.

#### RL VSC STATUS
- **Range:** ON/OFF
- Indicates the rear left wheel VSC control status. Reads ON when VCS is active, reads OFF at all other times.

#### RL W/C SEN
- **Range:** NORM, OPEN
- Indicates the rear left wheel cylinder pressure sensor open circuit detection. Reads NORM (normal) unless an open circuit is detected, reads OPEN when the circuit is open.

#### RL WHEEL ACCEL (m/s²)
- **Range:** –200.84 m/s² to 199.27 m/s²
- Indicates the rear left wheel rate of acceleration.

#### RL WHEEL SPD
- **Range:** 0 mph to 202 mph or 0 km/h to 326 km/h
- Indicates the rear left wheel speed sensor reading. Actual wheel speed similar speed as indicated on the speedometer.

#### RR ABS STATUS
- **Range:** ON/OFF
- Indicates the rear right wheel ABS control status. Reads ON when ABS is active, reads OFF at all other times.

#### RR OPERATE TORQ
- **Range:** 0 N-m to 4,080 N-m
- Indicates the rear regenerative operation torque.

#### RR PRS SEN (V)
- **Range:** 0.0 to 5.0 V
- Indicates the rear right pressure sensor signal. Typical readings range from 0.3 to 0.9 V when the brake pedal is released.

#### RR RQST TORQ
- **Range:** 0 N-m to 4,080 N-m
- Indicates the rear regenerative request torque.
RR VSC STATUS
Range: __________________________________________________________ ON/OFF
Indicates the rear right wheel VSC control status. Reads ON when VCS is active, reads OFF at all other times.

RR W/C SEN
Range: __________________________________________________________ NORM, OPEN
Indicates the rear right wheel cylinder pressure sensor open circuit detection. Reads NORM (normal) unless an open circuit is detected, reads OPEN when the circuit is open.

RR WHEEL ACCEL (m/s²)
Range: __________________________________________________________ –200.84 m/s² to 199.27 m/s²
Indicates the rear right wheel rate of acceleration.

RR WHEEL SPD
Range: __________________________________________________________ 0 mph to 202 mph or 0 km/h to 326 km/h
Indicates the rear right wheel speed sensor reading. Actual wheel speed similar speed as indicated on the speedometer.

RR_WSPD
Range: __________________________________________________________ 0 to vehicle max.
Indicates the right rear wheel speed sensor.

SCSS
Range: __________________________________________________________ ON/OFF
Indicates the stroke simulator solenoid (SCSS) status.
• ON when in operating mode
• OFF when in not operating mode

SIDE G
Range: __________________________________________________________ –24.3 to +24.1 m/s²
Side G forces indicated by side G sensor. Approximately 0 m/s² when vehicle is stopped. When vehicle is moving, 24.3 to 24.1 m/s².

SLAFL CUR
SLAFL CURR (A)
Range: __________________________________________________________ Min.: 0 A, Max.: 3 A
Indicates the SLAFL solenoid current in amps. Should read 0 A when brake pedal is released.

SLAFR CUR
SLAFR CURR (A)
Range: __________________________________________________________ Min.: 0 A, Max.: 3 A
Indicates the SLAFR solenoid current in amps. Should read 0 A when brake pedal is released.

SLARL CUR
SLARL CURR (A)
Range: __________________________________________________________ Min.: 0 A, Max.: 3 A
Indicates the SLARL solenoid current in amps. Should read 0 A when brake pedal is released.

SLARR CUR
SLARR CURR (A)
Range: __________________________________________________________ Min.: 0 A, Max.: 3 A
Indicates the SLARR solenoid current in amps. Should read 0 A when brake pedal is released.
Data Parameters

Antilock Brake System (ABS) Parameters

SLCT LVR POSI
Range: ________________________________ P,R,N,D,1,2,3,4
Indicates shift position determined from the A/T PNP switch signal.

SLIP INDI LAMP
Range: _____________________________________________________ ON/OFF
Indicates the slip indicator light status. Reads ON when the indicator light is on, OFF when the indicator light is off.

SLIP LAMP
Range: ______________________________________________________ OFF/ON
Indicates SLIP lamp status. ON indicates TCS function is active, OFF indicates TCS function is inactive.

SLRFL CUR
SLRFL CURR (A)
Range: _________________________________________________ Min.: 0 A, Max.: 3 A
Indicates the SLRFL solenoid current in amps. Should read 0 A when brake pedal is released.

SLRFR CUR
SLRFR CURR (A)
Range: _________________________________________________ Min.: 0 A, Max.: 3 A
Indicates the SLRFR solenoid current in amps. Should read 0 A when brake pedal is released.

SLRRR CUR
Range: _________________________________________________ Min.: 0 A, Max.: 3 A
Indicates the SLRRR solenoid current in amps. Should read 0 A when brake pedal is released.

SLRRL CUR
Range: _________________________________________________ Min.: 0 A, Max.: 3 A
Indicates the SLRRL solenoid current in amps. Should read 0 A when brake pedal is released.

SMC1
Range: _____________________________________________________ ON/OFF
Indicates the master cut solenoid 1 (SMC1). Reads ON when the solenoid is energized, reads OFF at all other times.

SMC2
Range: _____________________________________________________ ON/OFF
Indicates the master cut solenoid 2 (SMC2). Reads ON when the solenoid is energized, reads OFF at all other times.

SNOW MODE SW
Range: _____________________________________________________ OFF/ON
Indicates the SNOW MODE switch status. Reads ON when switch is in snow mode operating position, reads OFF when switched off.

SPD SEN FR
Range: ______________________________________________________ NORM, OPEN
Indicates front right speed sensor open circuit detection. Reads NORM (normal) unless an open circuit is detected. An OPEN reading indicates an open circuit.
SPD SEN FL
Range: ________________________________ NORM, OPEN
Indicates front left speed sensor open detection. Reads NORM (normal) unless an open circuit is detected. An OPEN reading indicates an open circuit.

SPD SEN RR
Range: ________________________________ NORM, OPEN
Indicates rear right speed sensor open detection. Reads NORM (normal) unless an open circuit is detected. An OPEN reading indicates an open circuit.

SPD SEN RL
Range: ________________________________ NORM, OPEN
Indicates rear left speed sensor open detection. Reads NORM (normal) unless an open circuit is detected. An OPEN reading indicates an open circuit.

SSC
Range: ______________________________________ ON/OFF
Indicates the SSC operating status. Reads ON when active, reads OFF at all other times.

STEERING ANG (°)
STEERING ANGLE (°)
Range: ___________________________ min: –1152 deg; max: 1150.875 deg
Indicates the steering angle sensor output, in degrees. Left turn: Increase, Right Turn: Decrease.

STEERING SEN
Range: ________________________________ NORM, OPEN
Indicates the steering sensor open detection. Reads NORM (normal) unless an open circuit is detected. An OPEN reading indicates an open circuit.

STOP LAMP SW
STOP LIGHT SW
Range: ______________________________________ ON/OFF
Indicates the stop light switch status. Reads ON when the brake pedal is depressed, OFF when the brake pedal is released.

STR ANGLE
Range: ______________________________________ –720° to 720°
Indicates steering angle detected by the steering angle sensor. Approximately 0° when straight ahead, –720 to 720° when vehicle is moving.

STROKE SEN 1
Range: ________________________________ NORM, OPEN
Indicates the stop light switch status. Reads NORM (normal) unless an open circuit is detected. An OPEN reading indicates an open circuit.

TCS OFF LAMP
Range: ______________________________________ OFF/ON
Indicates TCS OFF lamp status. ON indicates TCS OFF lamp is on, OFF indicates TCS OFF lamp is off.

TCS OFF SW
Range: ______________________________________ OFF/ON
Indicates TCS OFF switch status. ON indicates switch is pressed, OFF indicates switch is not pressed.
**TEST MODE**

Range: _______________________________________________________ NORM/TEST

Indicates the test mode status. Reads NORM (normal) unless test mode is active, reads TEST only during test mode operation.

**TRAC STATUS**

Range: ________________________________________________________ ON/OFF

Indicates the TRAC control operating status. Reads ON when TRAC is active, reads OFF at all other times.

**TRAC BRK STATUS**

Range: ________________________________________________________ ON/OFF

Indicates the TRAC brake control status.

**V/R OUTPUT**

Range: ________________________________________________________ OFF/ON

Indicates status of actuator relay. ON indicates relay is active (KOER), OFF indicates relay is inactive (KOEO).

**VDC OFF LAMP**

Range: ________________________________________________________ OFF/ON

Indicates VDC OFF lamp status. ON indicates VDC OFF lamp is on, OFF indicates VDC OFF lamp is off.

**VDC OFF SW**

Range: ________________________________________________________ OFF/ON

Indicates VDC OFF switch status. ON indicates switch is pressed, OFF indicates switch is not pressed.

**VEH SPEED**

Range: ___________________________________________________ 0 to vehicle max.

Indicates vehicle speed, the value is calculated by the ABS control module from the input voltage signals of the wheel speed sensors.

For ABS, this reading is not taken from the vehicle speed sensor (VSS) used by the PCM, and it may not be the same as the speedometer reading. An abnormally high, low, or erratic reading is usually due to wiring problems or faults in one or more wheel speed sensors.

**VEHICLE SPD**

Range: _______________________________ 0 mph to 202 mph or 0 km/h to 326 km/h

Indicates the wheel speed sensor reading. Actual vehicle speed is indicated on the speedometer.

**VLV_CTR**

Range: ________________________________________________________ ON/OFF

Indicates the ABS valve control relay.

**VOLT M/C SEN**

Range: _________________________________________________________ –2.5 to 2.49 V

Indicates the voltage signal of the master cylinder pressure sensor. Typical readings range from 0.3 to 0.9 V when the brake pedal is released.

**VOLT M/C SENS 2**

Range: _________________________________________________________ –2.5 to 2.49 V

Indicates the voltage of the master cylinder pressure sensor 2.
VOLT STROK SEN (V)
Range: ________________________________ –2.5 to 2.49 V
Indicates the voltage signal of the stroke sensor.

VOLT STROK SEN 2 (V)
Range: ________________________________ –2.5 to 2.49 V
Indicates the voltage signal of stroke sensor 2.

VSC EQUIPED
Range: ______________________________________________________ NO/YES
Indicates the existence of VSC system. Reads YES if the test vehicle has a skid control system, reads no if the vehicle does not have skid control.

VSC/TRC OFF SW
Range: __________________________________________________________ ON/OFF
Indicates the status of the vehicle skid control or traction control switch. Reads ON when the switch is sent to the on position, reads OFF when the system is switched off.

VSC WARN LAMP
Range: __________________________________________________________ ON/OFF
Indicates the VSC warning lamp. Should read ON only when the lamp is illuminated, reads OFF at all other times.

WHEEL SPD FL
WHL SPD FL
Range: ________________________________ 0 mph to 202 mph or 0 km/h to 326 km/h
Indicates the wheel speed sensor (FL) reading, actual wheel speed. Similar speed as indicated on speedometer.

WHL SPD FR
Range: ________________________________ 0 mph to 202 mph or 0 km/h to 326 km/h
Indicates the wheel speed sensor (FR) reading, actual wheel speed. Similar speed as indicated on speedometer.

WHEEL SPD RL
WHL SPD RL
Range: ________________________________ 0 mph to 202 mph or 0 km/h to 326 km/h
Indicates the wheel speed sensor (RL) reading, actual wheel speed. Similar speed as indicated on speedometer.

WHEEL SPD RR
WHL SPD RR
Range: ________________________________ 0 mph to 202 mph or 0 km/h to 326 km/h
Indicates the wheel speed sensor (RR) reading, actual wheel speed. Similar speed as indicated on speedometer.

YAW RATE
Range: ___________________________________________________ –70 to 70 d/s
Indicates yaw rate detected by yaw rate sensor. 0 d/s when vehicle is stopped, –70 to 70 d/s when vehicle is moving.

YAW RATE
Range: ________________________________ min: –128 deg/s; max: 128 deg/s
Indicates the yaw rate sensor output, in degrees per second.
YAW RATE SEN
  Range: ____________________________ NORM,OPEN
Indicates the yaw rate sensor open detection, NORMAL: Normal condition.

YAW RATE SENS 1
  Range: ____________________________ min: –128 deg/s; max: 127 deg/s
Indicates the yaw rate sensor 1, in degrees per second.

YAW RATE SENS 2
  Range: ____________________________ min: –128 deg/s; max: 127 deg/s
Indicates the yaw rate sensor 2, in degrees per second.

YAW RATE VALUE
  Range: ____________________________ min: –128 deg/s; max: 127 deg/s
Indicates the yaw rate value, in degrees per second.

YAW ZERO VALUE
  Range: ____________________________ min: –128 deg/s; max: 128 deg/s
Indicates the memorized zero value output, in degrees per second.

ZERO DECELERAT (m/s²)
  Range: ____________________________ min: –25.11 m/s² to max: 24.91 m/s²
Indicates the memorized zero value.

ZERO STEERING
  Range: ____________________________ min: –3276.8 deg/s; max: 3276.7 deg/s
Indicates the memorized zero value, in degrees per second.

ZERO YAW RATE

ZERO YAW RATE 2
  Range: ____________________________ min: –128 deg/s; max: 127 deg/s
Indicates the memorized zero value, in degrees per second.
Airbag (SRS) Parameters

This section defines parameters available from the airbag or supplemental restraint system (SRS) systems. To find the description of a specific parameter, locate the parameter name in the index and then go to the listed page.

**BRACKET(Ohms)**
- Range: ________________________________________________________ 0 to 22.5 Ω
  - Indicates the resistance of the airbag mounting ground.

**CRSHSN1**
- Range: ________________________________________________________ 0 to 22.5 Ω
  - Indicates the resistance of the crash sensor.

**D_Airbag(Ohms)**
- Range: ________________________________________________________ 0 to 22.5 Ω
  - Indicates the driver’s airbag resistance.

**D_AirBag2(Ohms)**
- Range: ________________________________________________________ 0 to 22.5 Ω
  - Indicates the driver’s side airbag resistance.

**D_ABAGR(Ohms)**
- Range: ________________________________________________________ 0 to 22.5 Ω
  - Indicates the driver’s airbag resistance to ground.

**D_PReTNR(Ohms)**
- Range: ________________________________________________________ 0 to 22.5 Ω
  - Indicates the driver’s seat belt pretensioner resistance.

**DAB PAB**
- Range: ________________________________________________________ FIRE/NO FIRE
  - Indicates the deployment status of the driver airbag (DAB) and the passenger airbag (PAB). It normally reads NO FIRE; a FIRE reading means the airbag was deployed.

**DEPLOYMENTS**
- Range: ________________________________________________________ 0/1
  - Indicates a count of the number of times the airbags have been deployed.

**DR_PTENS(Ohms)**
- Range: ________________________________________________________ 0 to 22.5 Ω
  - Indicates the driver’s seat belt retractor (pretensioner) resistance.

**DRV IMPACT ID**
- Range: ________________________________________________________ 01 to 99
  - Indicates the driver SIS ID, a 2-digit number. This information is sent to the SDM when the ignition first turns on.

**DRVR BELT**
- Range: ________________________________________________________ BUCKLED/UNBUCKLED
  - Indicates the status of the driver (DRVR) and passenger (PASS) seat belts.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS_AB(Ohms)</td>
<td>Indicates the driver’s airbag resistance.</td>
<td>0 to 22.5 (\Omega)</td>
</tr>
<tr>
<td>DSBELTR(Ohms)</td>
<td>Indicates the driver’s seat belt retractor (pretensioner) circuit resistance.</td>
<td>0 to 22.5 (\Omega)</td>
</tr>
<tr>
<td>DTC_CNT</td>
<td>Indicates the number of trouble codes set.</td>
<td>not available</td>
</tr>
<tr>
<td>EXTXRSH</td>
<td>Indicates the external crash sensor test voltage.</td>
<td>0.0 to 17.0 V</td>
</tr>
<tr>
<td>IGN_(V)</td>
<td>Indicates the RCM ignition voltage.</td>
<td>0.0 to 17.0 V</td>
</tr>
<tr>
<td>LAMP SRS LAMP</td>
<td>Indicates the PCM command status to the Airbag or SRS lamp on the instrument panel.</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>OCS</td>
<td>Indicates the occupant classification system.</td>
<td>actual</td>
</tr>
<tr>
<td>OPS_ST</td>
<td>Indicates the front passage occupant classification system.</td>
<td>actual</td>
</tr>
<tr>
<td>P_ABAGR(Ohms)</td>
<td>Indicates the passenger side airbag module resistance.</td>
<td>0.0 to 22.5 (\Omega)</td>
</tr>
<tr>
<td>P_ABAGR2(Ohms)</td>
<td>Indicates the passenger side airbag #2 resistance.</td>
<td>0.0 to 22.5 (\Omega)</td>
</tr>
<tr>
<td>P_Airbag(Ohms)</td>
<td>Indicates the passenger side airbag module resistance.</td>
<td>0.0 to 22.5 (\Omega)</td>
</tr>
<tr>
<td>P_AirBAG2(Ohms)</td>
<td>Indicates the passenger’s side airbag resistance.</td>
<td>0.0 to 22.5 (\Omega)</td>
</tr>
<tr>
<td>P_PReTNR(Ohms)</td>
<td>Indicates the passenger retractor (pretensioner) circuit resistance.</td>
<td>0.0 to 22.5 (\Omega)</td>
</tr>
<tr>
<td>PABAGR(Ohms)</td>
<td>Indicates the passenger side airbag module resistance.</td>
<td>0.0 to 22.5 (\Omega)</td>
</tr>
<tr>
<td>Parameter</td>
<td>Range</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>PASS IMPACT ID</strong></td>
<td>10 to 99</td>
<td>Indicates a two digit ID number and typically reads 43.</td>
</tr>
<tr>
<td><strong>PBSW_C(A)</strong></td>
<td>actual</td>
<td>Indicates the passenger buckle switch current measurement.</td>
</tr>
<tr>
<td><strong>PS_AB(Ohms)</strong></td>
<td>0.0 to 22.5 Ω</td>
<td>Indicates the passenger side impact air bag resistance.</td>
</tr>
<tr>
<td><strong>PS_BUKL</strong></td>
<td>IN/OUT</td>
<td>Indicates the passenger buckle switch status.</td>
</tr>
<tr>
<td><strong>PS_PTENS(Ohms)</strong></td>
<td>0.0 to 22.5 Ω</td>
<td>Indicates the passenger's seat belt retractor (pretensioner) resistance.</td>
</tr>
<tr>
<td><strong>PSBELTR(Ohms)</strong></td>
<td>0.0 to 22.5 Ω</td>
<td>Indicates the passenger's seat belt pretensioner resistance.</td>
</tr>
<tr>
<td><strong>SEAT_TRAC TRAK_SW</strong></td>
<td>FORWARD/REVERSE</td>
<td>Indicates the seat track position.</td>
</tr>
<tr>
<td><strong>TIME ON (HOURS)</strong></td>
<td>0 to 21.25 hours</td>
<td>Indicates the length of time in hours since the PCM set the first airbag DTC.</td>
</tr>
<tr>
<td><strong>VBATT (V)</strong></td>
<td>0.0 to 25.0 V</td>
<td>Indicates the voltage being supplied to the airbag electronic control module (ECM).</td>
</tr>
</tbody>
</table>
Data Parameters

Air Conditioning (A/C) Parameters

This section defines data parameters that are available from the A/C electronic control module (A/C ECM), which controls the adjustment of the climate in the passenger compartment of the vehicle. This section applies only to models with a stand alone A/C ECM. Parameters for A/C systems incorporated into the body control module (BCM) are defined in the BCM section.

Air Inlet Damper Pulse
Range: 0 to 255
Displays the pulse of the signal provided to the air inlet damper.

Air Inlet Mode
Range: AUTO/MANUAL
Indicates the setting of the mode switch for the system air intake.

Air Mix Pulse-D
Air Mix Pulse-P
Range: 0 to 255
Shows the signal pulse supplied to the driver (-D) and passenger (-P) side air mixture doors.

Air Out Pulse-D
Air Out Pulse-P
Range: 0 to 255
Shows the signal pulse supplied to the driver (-D) and passenger (-P) side air outlet doors.

Ambi Temp
Range: –30.8 to 50.8°C or –23 to 123°F
Indicates the A/C ECM adjusted ambient air temperature.

Ambi Temp Sensor
Range: –23.3 to 65.95°C or –10 to 150°F
Indicates the ambient temperature as determined by the sensor (not adjusted).

Ambient Temp Shift
Range: see below
Indicates the ambient temperature shift. Possible readings are: INV (invalid), –3°C, –2°C, –1°C, NORMAL, +1°C, +2°C, +3°C.

Auto Blow Up
Range: NO/OFF
Indicates the status of the Foot/Defrost automatic blow up function.

Blower Level
Range: 0 to 31
Indicates the level of the blower motor speed.

Buttom Prs Buzz
Range: ON/OFF
Indicates the on/off status of the button press buzzer.

Compressor Mode
Range: AUTO/MANUAL
Indicates the operating status of the compressor.
Comprs/Def Oper
Range: _____________________________________________________ LINK/NORMAL
Indicates the compressor and defroster operation mode.

Coolant Temp
Range: ____________________________________________ –1.3 to 90.55°C or 34 to 195°F
Indicates the engine coolant temperature.

Emiss Gas Sens
Range: ___________________________________________________________ 0 to 255
Indicates the status of the emissions gas sensor, reading should increase as the amount of gas emissions increases.

Evap Ctrl
Range: __________________________________________________________ AUTO/MANUAL
Indicates the status of the evaporator control.

Evap Temp
Range: __________________________________________________________ –29.7 to 59.55°C or –21 to 139°F
Indicates the temperature of the evaporator as determined by an evaporator sensor.

Foot Air Leak
Range: __________________________________________________________ ON/OFF
Indicates the status of a foot air leak.

Foot/Def Auto Mode
Range: __________________________________________________________ ON/OFF
Indicates the on/off status of the foot defrost automatic mode.

Hand Free Tel
Range: __________________________________________________________ ON/OFF
Indicates the on/off status of the hands free telephone operating mode.

NOX Gas Sens
Range: ___________________________________________________________ 0 to 255
Indicates the status of the NOX gas sensor, reading should increase as the amount of NOX emissions increases.

Reg Ctrl Curr(A)
Range: ___________________________________________________________ 2 to 255A
Indicates the regulator control current as amps.

Reg Press Sens
Range: ___________________________________________________________ –0.45668 to 3.29437 MPaG
Indicates regulator pressure as determined by the regulator pressure sensor.

Room Temperature
Range: ___________________________________________________________ –6.5 to 57.25°C or –20 to 135°F
Indicates the temperature of the passenger compartment air as determined by the room temperature sensor.

Set Temp-D
Set Temp-P
Range: ___________________________________________________________ not available
Shows the selected temperature setting for the driver (-D) and passenger (-P) side.
Data Parameters

Air Conditioning (A/C) Parameters

**Shift Temp**
Range: ______________________________________________________________________________________ see below

Indicates the temperature set shift. Possible readings are: INV (invalid), −2°C, −1°C, NORMAL, +1°C, +2°C.

**Solar Sens-D**
**Solar Sens-P**
Range: ______________________________________________________________________________________ 0 to 255

Shows the solar sensor setting for the driver (-D) and passenger (-P) side.
Body Control Module (BCM) Parameters

This section defines the data parameters available from the body control module (BCM) on vehicles equipped with a BCM that have the ability to communicate with a scan tool. It also includes the Ford Generic Electronic Module (GEM) parameters used on some Mazda models. To find the description of a specific parameter, locate the parameter name in the index and then go to the listed page.

NOTE:
Because of the personalized selection of optional equipment and trim packages available, some BCM parameters displayed may not be supported by the vehicle as identified. Some BCM parameters may appear inactive or invalid.

A thorough understanding of vehicle specific BCM operation will prevent lost time or an inaccurate diagnosis based on incorrect interpretation of data for the vehicle being tested.

For example: An inactive FRONT DOOR LOCK RELAY parameter is noticed by a technician diagnosing an intermittent power-door lock problem while sitting in the driver seat and pushing the door lock button. However, the REAR DOOR LOCK RELAY parameter switches as expected. By thinking that this indicates a fault, a lot of time could be wasted looking for an open in the FRONT DOOR LOCK RELAY circuit or replacing a BCM.

In fact, this would be normal operation if the vehicle has a driver door module with an incorporated power-door lock switch. The FRONT DOOR LOCK RELAY parameter is a device the BCM can command, but this may not be the primary method used to command its operation.

The switch activates the FRONT DOOR LOCK RELAY direct without BCM interaction, therefore the parameter does not change. At the same time, the door module sends a lock request input signal to the BCM to command activation of the REAR DOOR LOCK RELAY, therefore the rear parameters change. The BCM commanded the operation of the REAR DOOR LOCK RELAY, but does not need to command the FRONT DOOR LOCK RELAY. In order to see the FRONT DOOR LOCK RELAY parameter change state, a remote keyless entry or key fob lock signal is needed to request the BCM to command the FRONT and/or REAR DOOR LOCK RELAY to lock one or all the doors.

A vehicle that is not equipped with a remote keyless entry option may switch the parameters in a different manner.

# Codes

Range: __________________________________________________________________________ 0 to 255
Displays the number of diagnostic trouble codes (DTCs) in memory.

1TOUCH_DN

Range: __________________________________________________________________________ ON/OFF
Indicates the one touch down switch status.

ACC Sw

Range: __________________________________________________________________________ ON/OFF
Indicates the status of the ignition switch. Reads ON when the switch is in the accessory position, reads OFF at all other times.

Acc On Sw

Range: __________________________________________________________________________ ON/OFF
Indicates whether the ignition switch is in the accessory (ACC) position. Reads ON with the switch in ACC position and OFF at all other times.
ACC Relay Mon
   Range: __________________________________________________________ ON/OFF
Indicates the status of the ignition accessory relay monitor. Reads ON when the ignition switch is in the accessory position, reads OFF when the switch is off.

ACSW
   Range: __________________________________________________________ ON/OFF
Indicates the air conditioning switch status.

AFS Off Sw
   Range: __________________________________________________________ ON/OFF
Indicates the status of the AFS off switch. Reads ON when the switch is on and OFF when off.

Alarm Function
   Range: __________________________________________________________ ON/OFF
Indicates the status of the panic function of the alarm system. Reads ON when panic is active, reads OFF when panic is disabled.

Air Cond Sw
   Range: __________________________________________________________ ON/OFF
Indicates the status of the Air conditioner switch, reads ON when switched on and OFF when off.

All Unlock/Opn-Cls
   Range: __________________________________________________________ ON/OFF
Indicates the setting of the all unlock system. Reads ON when the system is active, all doors unlock when the driver door is opened. Reads OFF when the system is disabled.

Alt L-Term Sig
   Range: __________________________________________________________ ON/OFF
Indicates the signal status of alternator terminal L. Should read OFF when the starter is cranking, reads ON at all other times.

Armed State Indicator
   Range: __________________________________________________________ ON/OFF
Displays the on/off status of the alarm system. Reads ON when armed and off when disabled.

AT_HORN
   Range: __________________________________________________________ ON/OFF
Indicates the anti-theft horn status.

Auto Light Sw
   Headlamp Auto Signal
   Light Auto Sw
   Range: __________________________________________________________ ON/OFF
Indicates the position of the lighting control switch. Reads ON when the switch is set to the "auto" position and reads OFF at all other times.

AUTO LIGHT SW
   Range: __________________________________________________________ OFF
This Nissan parameter displays, but cannot be monitored.

AUTOLMP
   Range: __________________________________________________________ ON/OFF
Indicates the autolamp switch status.
**Auto Lock Delay**
Range: ________________________________ 30/60
Displays the delay setting of the automatic door lock system in seconds.

**Auto Lock/Shift**
Range: ________________________________ ON/OFF
Indicates the status of the automatic lock shift system. Reads ON when the system is active, all doors lock when the gear selector lever is shifted from park into any other position.

**Auto Unlock/Shift**
Range: ________________________________ ON/OFF
Indicates the status of the automatic unlock shift system. Reads ON when the system is active, all doors unlock when the gear selector lever is shifted into park from any other position.

**Auto Wiper**
Range: ________________________________ ON/OFF
Indicates the status of the automatic windshield wiper system. Reads ON when the system is active and reads OFF when the system is disabled.

**B_AJAR**
Range: ________________________________ OPEN/CLSD
Indicates the hood switch ajar status.

**Back Door Open Sw**
**BACK DOOR SW**
Range: ________________________________ ON/OFF
Indicates the status of the power back door switch. Reads ON when the switch is depressed to open the back door, reads OFF at all other times.

**BACKUPLMP**
**Backup Light Sw**
Range: ________________________________ ON/OFF
Indicates the back-up lamp switch status. Reads ON when the gear selector lever is in reverse position, reads OFF at all other times.

**Back-Up Light Transistor**
Range: ________________________________ ON/OFF
Indicates the status of the back-up lamp transistor. Reads ON when the transistor is on (gear selector lever is in “R” position), and off at all other times.

**BACK_DIM DUTY CYCLE (%)**
Range: ________________________________ 0 to 100%
Indicates the duty cycle of the pulse width modulated (PWM) signal distributed by the BCM to the PWM controlled instrument panel (IP) backlighting. The reading is based on the position of the IP dimmer switch (rheostat). The display reads 0% when the head lamp switch is in the Auto position and the daytime running lamps (DRL) are on, or when the IP dimmer switch is in the Full Dim position. The display reads about 85% when the low beam head lamps or park lamps are on and the IP dimmer switch is in the Full Bright position.

**Back Door Open Sw**
Range: ________________________________ ON/OFF
Indicates the status of the back door courtesy lamp switch. Reads ON when the back door is open, reads OFF when the door is closed.
BATT (V)
Range: _______________________________________________________ 0.0 to 16.0 V
Indicates vehicle battery voltage, the value is the system voltage measured at the BCM ignition feed input.
The reading should be close to normal charging system regulated voltage with the engine running. This is typically 13.5 to 14.5 V at idle. Check the reading against actual voltage measured at the battery or alternator. Check vehicle specifications for exact values.

BATT_SAVR
Range: _______________________________________________________ ON/OFF
Indicates the battery saver relay control.

BRK_FLUID
Range: _______________________________________________________ OK/LOW
Indicates the brake fluid level.

C_LOCK_SW
Range: _______________________________________________________ ON/OFF
Indicates the central lock switch.

C_UNLOCK_SW
Range: _______________________________________________________ ON/OFF
Indicates the central unlock switch.

Com B-Door P/W
Range: _______________________________________________________ OK/STOP
Indicates the connection status between the back door power window ECM and the main BCM. Reads ok when there is a connection, reads stop when unable to communicate. A malfunction sets a DTC.

Com ACC G/Way
Range: _______________________________________________________ OK/STOP
Indicates the connection status between the accessory gateway ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

Com Body No. 4
Com Body No. 5
Range: _______________________________________________________ OK/STOP
Indicates the connection status between the indicated ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

Com CTR Console
Communication CTR Console
Range: _______________________________________________________ WITH/WITHOUT
Indicates current communication between the number 1 console switch and the main BCM. Reads WITH when there is a connection, reads WITHOUT when unable to communicate. A malfunction sets a DTC.
Data Parameters

**Body Control Module (BCM) Parameters**

- **Com CRLAC**
  Communication RL Seat A/C

- **Com CRRAC**
  Communication RR Seat A/C

  Range: ___________________________ WITH/WITHOUT

  Indicates current communication between the indicated (CRLAC and RL = left rear, CRRAC and RR = right rear) seat climate control ECM the and the main BCM. Reads WITH when there is a connection, reads WITHOUT when unable to communicate. A malfunction sets a DTC.

- **Com CRLS**

- **Com CRRS**

  Range: ___________________________ WITH/WITHOUT

  Indicates current communication between the indicated (CRLS = left, CRRS = right) rear seat position control ECM the and the main BCM. Reads WITH when there is a connection, reads WITHOUT when unable to communicate. A malfunction sets a DTC.

- **Com Cruise Ctrl**

  Range: ___________________________ OK/STOP

  Indicates the connection status between the cruise control ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

- **Com Combi Sw**

  Range: ___________________________ OK/STOP

  Indicates the connection status between the combination switch ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

- **Com D-Door**

- **Com P-Door**

- **Com RR-Door**

- **Com RL-Door**

  Range: ___________________________ OK/STOP

  Indicates the connection status between the indicated (D = driver, P = passenger, RR = rear right, RL = rear left) door ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

- **Com D-Door/Mirr**

  Range: ___________________________ OK/STOP

  Indicates the connection status between the driver side mirror ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

- **Com D-Door Mtr**

- **Com P-Door Mtr**

- **Com RR-Door Mtr**

- **Com RL-Door Mtr**

  Range: ___________________________ OK/STOP

  Indicates the connection status between the indicated (D = driver, P = passenger, RR = rear right, RL = rear left) power window regulator ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.
Com D-Seat
Range: ____________________________ OK/STOP
Indicates the connection status between the driver side seat ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

Com D-Seat Sw
Range: ____________________________ OK/STOP
Indicates the connection status between the driver side seat switch ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

Com Double Lock
Range: ____________________________ OK/STOP
Indicates the connection status between the double lock ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

Com Entry & Start
Range: ____________________________ OK/STOP
Indicates the connection status between the entry and start ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

Com FL Seat A/C
Communication FL Seat A/C
Com FR Seat A/C
Communication FR Seat A/C
Range: ____________________________ WITH/WITHOUT
Indicates current communication between the indicated (FL = left, FR = right) front seat climate control ECM the and the main BCM. Reads WITH when there is a connection, reads WITHOUT when unable to communicate. A malfunction sets a DTC.

Com Master Sw
Range: ____________________________ OK/STOP
Indicates the connection status between the power window master switch ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

Com Mayday
Range: ____________________________ OK/STOP
Indicates the connection status between the ECMS and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

Com Mayday G/Way
Range: ____________________________ OK/STOP
Indicates the connection status between the Mayday Gateway and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.
Data Parameters

Body Control Module (BCM) Parameters

**Com Meter**
**Range:** _________________________________________________________ OK/STOP
Indicates the connection status between the meter ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

**Com Park Assist**
**Range:** _________________________________________________________ OK/STOP
Indicates the connection status between the park assist ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

**Com P-Seat**
**Range:** _________________________________________________________ OK/STOP
Indicates the connection status between the passenger seat ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

**Com Pwr B-Door**
**Range:** _________________________________________________________ OK/STOP
Indicates the connection status between the power back door ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

**Com R-Console**
**Range:** _________________________________________________________ OK/STOP
Indicates the connection status between the rear console ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

**Com Slide Roof**
**Range:** _________________________________________________________ OK/STOP
Indicates the connection status between the sunroof ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

**Com S/W Pad Sw**
**Range:** _________________________________________________________ OK/STOP
Indicates the connection status between the steering wheel paddle switches and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

**Com TDS**
**Range:** _________________________________________________________ OK/STOP
Indicates the connection status between the theft deterrent system (TDS) ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

**Com Tilt & Tele**
**Range:** _________________________________________________________ OK/STOP
Indicates the connection status between the steering column tilt and telescope ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.
Data Parameters

**Body Control Module (BCM) Parameters**

**Com Tire Pressure**

<table>
<thead>
<tr>
<th>Range:</th>
<th>OK/STOP</th>
</tr>
</thead>
</table>

Indicates the connection status between the tire pressure ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

**Car Finder**

<table>
<thead>
<tr>
<th>Range:</th>
<th>ON/OFF</th>
</tr>
</thead>
</table>

Displays the status of the car finder of the wireless remote. Reads ON when the car finder feature is active, and reads OFF when it is disabled. When active, the car horn sounds when the remote button is pressed.

**CCNT_TPMS**

<table>
<thead>
<tr>
<th>Range:</th>
<th>actual</th>
</tr>
</thead>
</table>

Indicates the number of continuous codes.

**COURTESY LAMP SW**

**Courtesy Sw**

<table>
<thead>
<tr>
<th>Range:</th>
<th>ON/OFF</th>
</tr>
</thead>
</table>

Indicates the position of the courtesy lamp switch. The reading should be ON when the switch is turned on and OFF at all other times. The BCM uses this data in controlling the courtesy lamp operation.

**Curr Com Rain**

<table>
<thead>
<tr>
<th>Range:</th>
<th>OK/STOP</th>
</tr>
</thead>
</table>

Indicates current communication between the rain sensor ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

**D Door Cty Sw**

**Hood Courtesy Sw**

**P Door Cty Sw**

**Rear Door Courtesy Sw**

**RL Door Courtesy Sw**

**RR Door Courtesy Sw**

<table>
<thead>
<tr>
<th>Range:</th>
<th>ON/OFF</th>
</tr>
</thead>
</table>

Indicates the status of the indicated door courtesy lamp switch. D is driver, Hood is engine compartment, P is passenger, Rear is hatch, RL is rear left and RR is rear right. Reads ON when the switch is on (door open) and off at all other times.

**D Mirror Memory M1**

**D Mirror Memory M2**

**P-Mirror Memory M1**

**P-Mirror Memory M2**

<table>
<thead>
<tr>
<th>Range:</th>
<th>MEM/NOT MEM</th>
</tr>
</thead>
</table>

Indicates whether or not a mirror position is saved in memory. D is driver side, P is passenger side, M1 is memory 1, and M2 is memory 2. Reads MEM when a position is saved and NOT MEM when there is no position saved in memory.
Data Parameters

Body Control Module (BCM) Parameters

D Seat Buckle Sw
P Seat Buckle Sw
SEAT BELT SW
- Range: ON/OFF

Indicates the status of the seat belt (D is driver, P is passenger) switches. Reads ON when the seat belt buckle is latched and reads OFF when the buckle is disconnected.

D_UP_SW
- Range: UP/DOWN

Indicates the status of the driver door up switch.

DD_LOCK
- Range: ON/OFF

Indicates the status of the driver door lock switch.

DD_UNLOCK
- Range: ON/OFF

Indicates the status of the driver door unlock switch.

Dimmer Sw
Dimmer HI Sw
- Range: ON/OFF

Indicates the position of the headlight dimmer switch. Reads ON when the switch is positioned to operate the high beam headlamps, reads OFF at all other times.

DIMMING INPUT (V)
- Range: 0.0 to 5.0 V

Indicates the position of the IP dimmer switch (rheostat). The display reads 4.0 V when the head lamp switch is in the Auto position and the daytime running lamps (DRL) are on, or the IP dimmer switch is in the Full Dim position. The display reads 0 V when the park lamps or the head lamps are on and the IP dimmer switch is in the Full Bright position.

DIMMING LEVEL (%)
- Range: 0 to 100%

Indicates the duty cycle of the signal distributed by the BCM to the pulse width modulated (PWM) door switch backlighting based on the position of the IP dimmer switch (rheostat). It reads 0% when the head lamp switch is in the Auto position and the daytime running lamps (DRL) are on, or the IP dimmer switch is in the Full Dim position. It reads 100% when the head lamps or park lamps are on and the IP dimmer switch is in the Full Bright position.

Display Ext ON Sens
- Range: –2/–1/NORM/+1/+2

Displays the extinction luminous intensity.

Display Ext OFF Sens
- Range: –2/–1/NORM/+1/+2

Displays the extinction release luminous intensity.

DLIDLKSW
- Range: ON/OFF

Indicates the trunk/liftgate lock relay status.

DLIDULSW
- Range: ON/OFF

Indicates the trunk/liftgate unlock relay status.
Data Parameters

Body Control Module (BCM) Parameters

**DOMELM_SW**
Range: __________________________________________________________ ON/OFF
Indicates the dome light switch status.

**Door Key Linked Lock Sw**
Key Sw (Lock)
Key Sw-Lock
Range: __________________________________________________________ ON/OFF
Indicates if the driver door is being locked with a key. Reads ON if the door is being locked with a key, reads OFF at all other times.

**Door Key Linked Unlock Sw**
Key Sw (Unlock)
Key Sw-Unlock
D Door Key Sw-UNLOCK
P Door Key Sw-UNLOCK
Range: __________________________________________________________ ON/OFF
Indicates if a door lock is being activated with a key. D Door is the driver door, P Door is the passenger door, all others apply to any door. Reads ON if the door is being unlocked with a key, reads OFF at all other times.

**Door Lock (Lock)**
Driver Lock Position Sw
Range: __________________________________________________________ ON/OFF
Indicates the manual door lock switch signal for the passenger door. Reads ON if the door is unlocked, reads OFF at all other times.

**Door Lock (Unlock)**
Pass Door Lock Sw
Range: __________________________________________________________ ON/OFF
Indicates the manual door lock switch signal for the driver door. Reads ON if the door is locked, reads OFF at all other times.

**Door Lock Sw**
Range: __________________________________________________________ ON/OFF
Indicates the status of the electric lock/unlock switch. Reads ON when the switch is pressed to lock the doors, and reads OFF at all other times.

**Door Lock Sw-LOCK**
Range: __________________________________________________________ ON/OFF
Displays the door lock switch signal. Reads ON if the door is locked, reads OFF when unlocked.

**Door Lock Sw-UNLOCK**
Range: __________________________________________________________ ON/OFF
Displays the door lock switch signal. Reads ON if the door is unlocked, reads OFF when locked.

**Door Lock Sw Status**
Range: __________________________________________________________ ON/OFF
Indicates the manual door lock control switch signal. Reads ON if the door is locked with the switch, reads OFF at all other times.
Door Unlock Sw Status
Pass Door Unlock Sw
Range: __________________________________________________________ ON/OFF
Indicates the manual door lock control switch signal. Door is the main switch and Pass is the passenger door. Reads ON if the door is unlocked with the switch, reads OFF at all other times.

DOOR SW AS
DOOR SW DR
Range: __________________________________________________________ ON/OFF
Indicates the door switch signal status for the driver (DR) and passenger (AS) doors.

Door Sw LF
Door Sw LR
Door Sw RF
Door Sw RR
Range: __________________________________________________________ ON/OFF
indicates the status of the door switch for the left front (LF), left rear (LR), right front (RF), and right rear (RR) doors. Reads ON when the indicated door is open, and OFF when closed.

DOOR SW-RR
Range: ______________________________________________________ Not Available
Indicates the door switch signal status for the rear door. This Nissan parameter displays even on models without a rear door with remote release.

Door Unlock Sw
Range: __________________________________________________________ ON/OFF
Indicates the status of the electric lock/unlock switch. Reads ON when the switch is pressed to unlock the doors, and reads OFF at all other times.

Down/Door Key
Up/Door Key
Range: __________________________________________________________ ON/OFF
Displays the power window settings. Read on if the system is active, reads OFF when disabled. When active, all of the power windows go down or up if the driver door key is held in the lock position for 1.5 seconds.

DRIVER/LR DOOR AJAR SW
D Door Warning Sw
PASS/RR DOOR AJAR SW
Range: __________________________________________________________ ON/OFF
Indicates the state of the applicable door, reads OFF when the door is fully closed, and reads ON when the door is open or ajar.

Driver PSD Sw
Pass PSD Sw
Range: __________________________________________________________ ON/OFF
Indicates the status of the driver and passenger power slide door main switches. Reads ON when the switch is activated to open the door, reads OFF at all other times.

DRLK_RLY
Range: __________________________________________________________ ON/OFF
Indicates the all doors lock relay.
Data Parameters

Body Control Module (BCM) Parameters

**DRL_L**
- Range: ____________________________ ON/OFF
Indicates the daytime running lamp, left.

**DRL_R**
- Range: ____________________________ ON/OFF
Indicates the daytime running lamp, right.

**DRL Function**
- Range: ____________________________ ON/OFF
Indicates the status of the daytime running lamp (DRL) system. Reads ON when DRL system is activated, reads OFF when the system is off.

**DRUNLK_RLY**
- Range: ____________________________ ON/OFF
Indicates the all doors unlock relay.

**Drv P/W Auto Sw**
- **Pass P/W Auto Sw**
- **RL P/W Auto Sw**
- **RR P/W Auto Sw**
- Range: ____________________________ ON/OFF
Indicates the status of the indicated automatic power window switches. Drv is the driver switch, Pass is the passenger switch, RL is the rear left switch, RR is the rear right switch. Reads ON when the switch is activated and off at all other times.

**Drv P/W Up Sw**
- **Pass P/W UP Sw**
- **RL P/W Up Sw**
- **RR P/W Up Sw**
- Range: ____________________________ ON/OFF
Indicates the status of the indicated power window up switches. Drv is the driver switch, Pass is the passenger switch, RL is the rear left switch, RR is the rear right switch. Reads ON when the switch is activated and off at all other times.

**Drv P/W Down Sw**
- **Pass P/W Down Sw**
- **RL P/W Down Sw**
- **RR P/W Down Sw**
- Range: ____________________________ ON/OFF
Indicates the status of the indicated power window down switches. Drv is the driver switch, Pass is the passenger switch, RL is the rear left switch, RR is the rear right switch. Reads ON when the switch is activated and off at all other times.

**Drvr Door Lock Posit Sw**
- **Lock Posit Sw**
- **Pass Lock Posit Sw**
- **Rear Lock Posit Sw**
- **RL Lock Posit Sw**
- Range: ____________________________ ON/OFF
Indicates the door unlock detection switch signal. Drvr is the driver switch, Lock is the master switch, Pass is the passenger switch, Rear is the hatch switch, RL is the rear left switch. Reads ON when the switch is on (unlocked) and off when the switch is off (locked).
Data Parameters  

ECT Power Mode Sw  
Range: ___________________________________________ ON/OFF
Displays the on/off status of the electronically controlled transmission power mode switch. Reads ON when the switch is active and reads OFF at all other times. When active, the shift pattern is optimized for performance.

ECT Snow Mode Sw  
Range: ___________________________________________ ON/OFF
Displays the on/off status of the electronically controlled transmission snow mode switch. Reads ON when the switch is active and reads OFF at all other times. When active, the shift pattern is optimized for traction and the vehicle starts out in second gear.

E/G Condition  
Range: ___________________________________________ RUN/STOP
Displays the operating status of the engine. Reads RUN when the engine is running, and reads STOP when the engine is off.

Engine Running  
Range: ___________________________________________ ON/OFF
Indicates whether or not the engine is running. Reads ON when the engine is running.

Engine Status  
Range: ___________________________________________ STOP/STALL/RUN/CRANK
Indicates the operating status of the engine.

Entry Delay  
Range: ___________________________________________ 0/14/30
Displays the setting of the delay time of the wireless entry system in seconds.

F Fog Light Sw  
FOG_F_SW  
Front Fog Light Sw  
FRONT FOG LAMP SW  
Range: ___________________________________________ ON/OFF
Indicates the position of the front fog lamp switch. Reads ON only when the front fog lamp switch is activated with the park lamps or low beam head lamps turned on.

Front Fog Sw  
Range: ___________________________________________ ON/OFF
Indicates the position of the front fog lamp switch, reads ON when the switch is on.

Front Washer Switch  
Range: ___________________________________________ ON/OFF
Indicates the status of the windshield washer switch, reads ON when the switch is on.

Front Wiper High  
Range: ___________________________________________ ON/OFF
Indicates the position of the front wiper switch. Reads ON only when the switch is in the high speed position.

Front Wiper Int  
Range: ___________________________________________ ON/OFF
Indicates the position of the front wiper switch. Reads ON only when the switch is in the intermittent position.
**Data Parameters**

**Body Control Module (BCM) Parameters**

**Front Wiper Int Volume**
- **Range:** __________________________________________________________________________ ON/OFF
  Indicates the position of the front wiper switch. Reads ON only when intermittent volume is selected on the switch.

**Front Wiper Low**
- **Range:** __________________________________________________________________________ ON/OFF
  Indicates the position of the front wiper switch. Reads ON only when the switch is in the low speed position.

**Front Wiper Stop**
- **Range:** __________________________________________________________________________ ON/OFF
  Indicates the position of the front wiper switch. Reads ON only when the switch is in the off position and the wipers are parked.

**FLASH TO PASS SW**
- **High Flasher Sw**
- **Passing Light Sw**
- **PASSING SW**
  - **Range:** __________________________________________________________________________ ON/OFF
  Indicates the position of the flash to pass or passing light switch. Reads ON only when the switch is held to momentarily activate the high beams, reads OFF when the switch is released.

**FOGRLY_F**
- **Range:** __________________________________________________________________________ ON/OFF
  Indicates the front fog lamp relay.

**Foot Lights**
- **Range:** __________________________________________________________________________ ON/OFF
  Displays the on/off setting for the foot lights.

**FR FOG SW**
- **Range:** __________________________________________________________________________ OFF
  This Nissan parameter displays, but cannot be monitored.

**FR WASHER SW**
- **WASH_SW**
  - **Range:** __________________________________________________________________________ ON/OFF
  Indicates the status of the windshield washer switch.

**FR WIPER HI**
- **FR WIPER INT**
- **FR WIPER LOW**
- **FR WIPER STOP**
  - **Range:** __________________________________________________________________________ ON/OFF
  Indicates the position of the windshield wiper switch. Reads ON when the switch is in the indicated (high speed, intermittent, low speed, or off) position.

**FRONT WIPERS ACTIVE**
- **Range:** __________________________________________________________________________ YES/NO
  Indicates the state of the wiper motor. Reads YES when the wipers are operating (after about 3 cycles of the wiper blades), reads NO at all other times.
FRWPPRKSW
Range: _______________________________________________________ WIPE/PARK
Indicates the front windshield wiper status.

Fuel Lid Open Sw
Range: _______________________________________________________ ON/OFF
Indicates the status of the fuel lid opener (remote) switch. Reads ON when the switch is pressed to open the fuel lid, reads OFF at all other times.

H-Level Warning Sig
Range: _______________________________________________________ ON/OFF
Indicates the status of the headlamp level warning system, reads ON when the warning lamp is activated, reads OFF at all other times.

HAZARD
Hazard Sw
Range: _______________________________________________________ ON/OFF
Indicates the hazard switch status, reads ON when the switch is on and OFF at all other times.

Hazard Answer Back
Range: _______________________________________________________ ON/OFF
Indicates the status of the wireless hazard answer-back system. Reads ON when the system is active, reads OFF when the system is disabled.

HBEAMSW
Range: _______________________________________________________ ON/OFF
Indicates the high beam switch status.

HEADLAMP
HEAD LAMP SW
Range: _______________________________________________________ ON/OFF
Indicates the status of the headlamp switch signal circuit.

Head Lamp Sw 1
Range: _______________________________________________________ ON/OFF
Indicates the status of head lamp switch 1 (low beams), reads ON when the switch is on.

Head Lamp SW 2
HEAD LAMP SW 2
Range: _______________________________________________________ ON/OFF
Indicates the status of the headlamp switch 2, reads ON when the switch is on.

Headlamp Signal
Head Light Sw
Range: _______________________________________________________ ON/OFF
Indicates the position of the light control switch. Reads ON when the switch is set to the "head" position and reads OFF at all other times.

HEADLAMP WASHER
Range: _______________________________________________________ ON/OFF
Indicates the position of the headlamp washer switch. Reads ON when the switch is activated and OFF at all other times.
HI BEAM SW
HIGH BEAM SELECT
Range: __________________________________________________________ ON/OFF
Indicates the position of the high beam switch. Reads ON when the switch is in the position that activates the high beams.

High Beam SW
Range: __________________________________________________________ ON/OFF
Indicates the status of the high beam light switch, reads ON when the switch is on.

Hood Sw
HOOD SW
Range: __________________________________________________________ ON/OFF
Indicates the status of the engine compartment hood switch. Reads ON if the hood is open and OFF when closed.

HOOD OPEN SW
Range: __________________________________________________________ ON/OFF
Indicates the status of the hood ajar switch signal circuit. An open switch (door open) is displayed as ON.

High Mount STOP Light transistor
Range: __________________________________________________________ ON/OFF
Indicates the status of the high mounted stop lamp transistor. Reads ON when the transistor is on (brake pedal depressed), and off at all other times (brake pedal released).

Hist Com Rain
Range: __________________________________________________________ OK/STOP
Indicates history communication between the rain sensor ECM and the main BCM. Reads OK when there is an active connection between the modules, reads STOP when the modules are unable to communicate. A malfunction sets a DTC.

Horn Sw
Range: __________________________________________________________ ON/OFF
Indicates the status of the horn switch. Reads ON when the horn switch is on (horn sounding) and off at all other times.

HORN_TPM
Range: __________________________________________________________ ACTIVE/INACTIVE
Indicates the horn output.

I-Key Hatch
Range: __________________________________________________________ ON/OFF
Indicates the status of the hatch button on the Intelligent Key remote transmitter. Reads ON only when the hatch button is pressed and reads OFF at all other times.

I-Key Lock
Range: __________________________________________________________ ON/OFF
Indicates the status of the lock button on the Intelligent Key remote transmitter. Reads ON only when the lock button is pressed and reads OFF at all other times.

I-Key Trunk
Range: __________________________________________________________ ON/OFF
Indicates the status of the trunk button on the Intelligent Key remote transmitter. Reads ON only when the trunk button is pressed and reads OFF at all other times.
I-Key Panic
Range: __________________________________________________________ ON/OFF
Indicates the status of the panic button on the Intelligent Key remote transmitter. Reads ON only when the panic button is pressed and reads OFF at all other times.

I-Key Pwr Window Down
Range: __________________________________________________________ ON/OFF
Indicates the status of the power window down feature of the Intelligent Key system. Reads ON when the unlock button of the remote transmitter is pressed and held to lower the windows.

I-Key Unlock
Range: __________________________________________________________ ON/OFF
Indicates the status of the unlock button on the Intelligent Key remote transmitter. Reads ON only when the unlock button is pressed and reads OFF at all other times.

IGKEY_ILLU
Range: __________________________________________________________ ON/OFF
Indicates illuminated entry.

Ign On Sw
IGN ON SW
Range: __________________________________________________________ ON/OFF
Indicates the status of the ignition switch. Reads ON when the switch is in the ON position and reads off at all other times

IGNITION 0
Range: __________________________________________________________ ON/OFF
Indicates the ignition 0 position. Input to the control module from the ignition switch indicating the ignition 0 position. Reads ON when ignition 1 switch circuit is closed, reads OFF at all other times. Positions are:

- UNLOCK
- ACC
- ON (Run)
- START

IGNITION 1
Range: __________________________________________________________ ON/OFF
Indicates the input to the control module from the ignition switch indicating the ignition 1 position. Reads ON when ignition 1 switch circuit is closed, reads OFF at all other times. Ignition 1 switch closed positions are:

- ON (Run)
- START

IG1 Relay Mon1
IG1 Relay Mon2
IG2 Relay Mon1
IG2 Relay Mon2
Range: __________________________________________________________ ON/OFF
Indicates the status of the ignition relay monitors:

- IG1 Mon1 = ignition 1 inner relay
- IG1 Mon2 = ignition 1 outer relay
- IG2 Mon1 = ignition 1 inner relay
- IG2 Mon2 = ignition 1 outer relay

All should read on when the switch is on, and off when the switch is off.

**IGNITION 3**

Range: ___________________________ ON/OFF

Indicates the input to the control module from the ignition switch indicating the ignition 3 position. Reads ON when the switch is closed in the ON (Run) position only, reads OFF at all other times.

**IGNITION ACCESSORY**

Range: ___________________________ ACTIVE/INACTIVE

Indicates the input to the control module from the ignition switch accessory circuit. Reads ACTIVE when ignition accessory switch circuit is closed (in accessory and run positions), reads INACTIVE at all other times.

**IG Sw Signal**

MPX-IG Sw

Range: ___________________________ ON/OFF

Indicates the status if the ignition switch. Reads OFF when the switch is in the off position, reads ON at all other times.

**I/L On/ACC Off**

Range: ___________________________ ON/OFF

Indicates the status if the interior lighting with ACC off. When on, the interior lights illuminate when ACC off is in the on position. When off, the interior lights illuminate when ACC off is in the off position.

**I/Light On/Unlock**

Range: ___________________________ ON/OFF

Indicates the status if the interior lighting with unlock. When on, the interior lights illuminate when unlock is on. When off, the interior lights illuminate when unlock is off.

**Illumination Sw**

Interior Light

Range: ___________________________ ON/OFF

Indicates the status of the interior lighting switch. Reads ON when the switch is pushed in, reads OFF when the switch is not pushed in.

The Illumination SW parameter is for the switch marked ON/OFF and the Interior Light parameter is for the switch marked DOOR.

**Illumination System**

Light Control

Range: ___________________________ ON/OFF

Indicates the status of the lighting control system. Reads ON when the system is on, reads OFF when the system is off.

**INT VOLUME**

Range: ___________________________ 1/2/3/4/5/6/7

Indicates the interval setting for the windshield wipers.

**INADVERTENT POWER RELAY**

Range: ___________________________ ON/OFF

Indicates the state of the inadvertent power battery rundown protection feature of the BCM. Reads OFF when all inadvertent power circuits are functioning normally.
INDICATOR DIMMING
Range: _________________________________________________________ 0 to 100%
Indicates the duty cycle of the pulse width modulated (PWM) signal distributed by the BCM to the
PWM controlled IP backlighting based on the position of the IP switch. The display reads 1.2% when
the headlamp switch is in the Auto position and the daytime running lamps (DRL) are on, or
the IP dimmer switch is in the Full Dim position. The display reads 100% when the head lamps
or park lamps, are turned on and the IP dimmer switch is in the Full Bright position.

INTERIOR LAMP DEFEAT
Range: __________________________________________________________ ON/OFF
Indicates the position of the courtesy/dome lamp override switch. Reads ON only when the
switch is activated, which indicates a BCM to override the normal interior lamp activation inputs
and deactivate the interior lighting.

Interior Light ON Unlock
Range: __________________________________________________________ ON/OFF
Displays the remote wireless entry system setting for the interior lamps. Reads ON and the
interior lights illuminate when the doors are unlocked with the remote. When OFF, the interior
lights do not illuminate when the doors are unlocked.

Key Cyl Lock Sw
KEY CYL LK-SW
Range: __________________________________________________________ ON/OFF
Indicates the status of the door key switch, reads ON when locking the doors with a key.

Key Cyl Unlock Sw
KEY CYL UN-SW
Range: __________________________________________________________ ON/OFF
Indicates the status of the door key switch, reads ON when unlocking the doors with a key.

KEY IN IGNITION
Range: __________________________________________________________ YES/NO
Key Insert On Sw
Key Unlock Warn Sw
Range: __________________________________________________________ ON/OFF
Indicates whether the ignition key is inserted into the ignition switch. Reads YES or ON with key
in the ignition switch, NO or OFF when there is no key in the ignition switch.

KEY ON SW
Range: __________________________________________________________ ON/OFF
Indicates the status of the key switch.

Keyless Keep Lock
Keyless Keep Unlock
Range: __________________________________________________________ ON/OFF
Indicates the status of the keep lock/unlock feature of the keyless entry system. Reads ON only
when both the lock unlock buttons on the remote transmitter are pressed and held.

Keyless Lock
Range: __________________________________________________________ ON/OFF
Indicates the status of the lock button on the keyless entry remote transmitter. Reads ON only
when the lock button is pressed and reads OFF at all other times.
Keyless Panic
Range: __________________________________________________________ ON/OFF
Indicates the status of the panic button on the keyless entry remote transmitter. Reads ON only when the panic button is pressed and reads OFF at all other times.

Keyless Pwr Sliding Left Door
Keyless Pwr Sliding Right Door
Range: __________________________________________________________ ON/OFF
Indicates the status of the power sliding door feature of the keyless entry system. Reads ON when the PSD (power sliding door) button of the remote transmitter is pressed to open or close the indicated door.

Keyless Pwr Rear Hatch
Range: __________________________________________________________ ON/OFF
Indicates the status of the hatch button on the keyless entry remote transmitter. Reads ON only when the hatch button is pressed and reads OFF at all other times.

Keyless Pwr Rear Trunk
Range: __________________________________________________________ ON/OFF
Indicates the status of the trunk button on the keyless entry remote transmitter. Reads ON only when the trunk button is pressed and reads OFF at all other times.

Keyless Unlock
Range: __________________________________________________________ ON/OFF
Indicates the status of the unlock button on the keyless entry remote transmitter. Reads ON only when the unlock button is pressed and reads OFF at all other times.

LAST_ID
Range: ____________________________________________________________ actual
Indicates the last received tire transmitter ID code value.

Latch Circuit
Range: __________________________________________________________ ON/OFF
Displays the latch circuit status. Reads ON with the ignition switch on or the engine running, reads OFF with the ignition switch off or in accessory position.

LBEAM_AUTO
Range: __________________________________________________________ ON/OFF
Indicates the auto low beam out relay.

LEFT FRONT SOLAR SNSR (V)
LIGHT SENSOR (V)
R FRONT SOLAR SENSOR (V)
Range: ___________ 0.0 to 5.0 V
Indicates the output voltage of the applicable ambient light sensor based on the intensity of light detected. As the light intensity increases, the sensor voltage decreases. In the Light state, a low voltage of more than 1.75 volts is present and the DRL will be on. In the Dark state, a high voltage of up to 4.9 volts is present and the head lamps will be on.

Left Turn Sw
Range: __________________________________________________________ ON/OFF
Indicates the status of the turn signal switch, reads ON when the switch is in the left turn position.
**Data Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LF_PW (A)</td>
<td></td>
<td>Indicates the left front power window amperage draw.</td>
</tr>
<tr>
<td>LF_AJAR</td>
<td></td>
<td>Indicates the left front door ajar status.</td>
</tr>
<tr>
<td>LF_ID</td>
<td></td>
<td>Indicates the left front tire transmitter identifier.</td>
</tr>
<tr>
<td>LF_LRN</td>
<td></td>
<td>Indicates the left front learn status.</td>
</tr>
<tr>
<td>LF_MES</td>
<td></td>
<td>Indicates the left front measure status.</td>
</tr>
<tr>
<td>LF_NORM</td>
<td></td>
<td>Indicates the left front normal status.</td>
</tr>
<tr>
<td>LF_PSI</td>
<td></td>
<td>Indicates the left front tire pressure.</td>
</tr>
<tr>
<td>LF_REC</td>
<td></td>
<td>Indicates the left front transmit received after learn.</td>
</tr>
<tr>
<td>LFAWAKE</td>
<td></td>
<td>Indicates the left front awake status.</td>
</tr>
<tr>
<td>LFDR_SW</td>
<td></td>
<td>Indicates the left front door switch.</td>
</tr>
<tr>
<td>LFIDPRG</td>
<td></td>
<td>Indicates the left front sensor programmed.</td>
</tr>
<tr>
<td>LFLOBAT</td>
<td></td>
<td>Indicates the left front low battery.</td>
</tr>
<tr>
<td>LFPW_PEAK (A)</td>
<td></td>
<td>Indicates the left front power window peak amp draw.</td>
</tr>
<tr>
<td>LFPW_SW</td>
<td></td>
<td>Indicates the left front power window switch.</td>
</tr>
</tbody>
</table>

Indicates the left front power window amperage draw.

Indicates the left front door ajar status.

Indicates the left front tire transmitter identifier.

Indicates the left front learn status.

Indicates the left front measure status.

Indicates the left front normal status.

Indicates the left front tire pressure.

Indicates the left front transmit received after learn.

Indicates the left front awake status.

Indicates the left front door switch.

Indicates the left front sensor programmed.

Indicates the left front low battery.

Indicates the left front power window peak amp draw.

Indicates the left front power window switch.
LHTURN_IND
Turn Left Sw
Range: __________________________________________________________ ON/OFF
Indicates the status of the turn indicator switch. Reads ON when the switch is positioned to
operate the left-hand indicators, reads OFF at all other times.

Lighting Time
Range: __________________________________________________________ 7.5/15/30
Displays the setting of the lighting time seconds.

Light Off Delay
Range: __________________________________________________________ 30/60/90
Displays the setting of the automatic lighting delay in seconds. Lights remain on for the displayed
time after the ignition is switched off.

Lin Com
Lin Communication
Range: ____________________________________________________ WITH/WITHOUT
Indicates current communication between the LIN ECM the and the main BCM. Reads WITH
when there is a communication connection, reads WITHOUT when unable to communicate. A
malfunction sets a DTC.

LK BUTTON/SIG
Range: __________________________________________________________ ON/OFF
Indicates a door lock switch signal being received from a remote transmitter.

LOCK SW AS
LOCK SW DR
Range: __________________________________________________________ ON/OFF
Indicates the door lock switch signal status for the driver (DR) and passenger (AS) doors.

Lock/IG On Drv
Range: __________________________________________________________ ON/OFF
Displays the status of the lock command system. Reads ON when active and off when disabled.
When active, all doors automatically lock when the gear selector lever is moved to drive position
while the ignition is switched on.

LOW BEAM DUTY CYCLE (%)
Range: _________________________________________________________ 0 to 100%
Indicates the duty cycle of the pulse width modulated (PWM) ground signal controlling the
headlamp driver module (HDM). The BCM uses this feature to signal the HDM to operate the low
beam head lamps in low beam headlamp mode at full intensity (100%) or in DRL mode at a
reduced intensity (81%).

LR_AJAR
Range: _______________________________________________________ OPEN/CLSD
Indicates the left rear door ajar status.

LR_ID
Range: __________________________________________________________ actual
Indicates the left rear tire transmitter identifier.

LR_LRN
Range: __________________________________________________ ACTIVE/INACTIVE
Indicates the left rear learn status.
### Data Parameters

**Body Control Module (BCM) Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LR_MES</td>
<td></td>
<td>Indicates the left rear measure status.</td>
</tr>
<tr>
<td>LR_NORM</td>
<td></td>
<td>Indicates the left rear normal status.</td>
</tr>
<tr>
<td>LR_REC</td>
<td></td>
<td>Indicates the left rear transmit received after learn.</td>
</tr>
<tr>
<td>LRAWAKE</td>
<td></td>
<td>Indicates the left rear awake status.</td>
</tr>
<tr>
<td>LRIDPRG</td>
<td></td>
<td>Indicates the left rear sensor programmed.</td>
</tr>
<tr>
<td>LRLOBAT</td>
<td></td>
<td>Indicates the left rear low battery.</td>
</tr>
<tr>
<td>LRO_PSI</td>
<td></td>
<td>Indicates the left rear outer tire pressure.</td>
</tr>
<tr>
<td>Lugg Courtesy Sw</td>
<td></td>
<td>Indicates the position of the luggage courtesy lamp switch.</td>
</tr>
<tr>
<td>Mirror Fold Sw (Retractable Mirror)</td>
<td></td>
<td>Indicates the status of the retractable mirror switch.</td>
</tr>
<tr>
<td>Mirror Pos Sw (Right)</td>
<td></td>
<td>Indicates whether or not the power mirror position switch is in the indicated position (right, left, up, or down).</td>
</tr>
<tr>
<td>Mirror Pos Sw (Up)</td>
<td></td>
<td>Indicates whether or not the power mirror position switch is in the indicated position (right, left, up, or down).</td>
</tr>
<tr>
<td>Mirror Return Sw (Retractable Mirror)</td>
<td></td>
<td>Indicates the status of the retractable mirror switch.</td>
</tr>
</tbody>
</table>
Data Parameters

Body Control Module (BCM) Parameters

**Mirror Sel Sw (Right)**
**Mirror Sel Sw (Left)**
Range: ____________________________ ON/OFF
Indicates the position of the power mirror select switch. Reads ON when the switch is in the indicated (right or left) position, off at all other times.

**N Sw**
Range: ____________________________ ON/OFF
Indicates whether or not the gear selector lever is in neutral range. Reads ON when in neutral range, reads OFF in all other ranges.

**N Sw/C Sw**
**P/N Pos Sw**
**P/N Position Sw**
Range: ____________________________ ON/OFF
Indicates the status of the park/neutral position (PNP) switch, or neutral start switch. Reads ON when the gear selector lever is in the park or neutral range, reads OFF in all other ranges.

**Oil Press Sw**
Range: ____________________________ ON/OFF
Indicates the state of the oil pressure warning lamp on the instrument cluster. Reads ON when the lamp is lit, and reads OFF at all other times.

**Optical Sensor (V)**
Range: ____________________________ 0.00 to 5.00 V
Indicates the optical sensor signal voltage, which varies with the amount of ambient light. Reads 0.00 V in darkness and 4.50 to 5.00 in full light.

**Open Door Warning**
Range: ____________________________ ON/OFF
Indicates the status of the open door warning system. Reads ON when the system is active (a door is open) and reads OFF at all other times.

**P/W Lock Sw**
Range: ____________________________ ON/OFF
Indicates the status of the power window lock switch. Reads ON when the lock feature is active, and reads OFF when released.

**PARK_LAMP**
Range: ____________________________ ON/OFF
Indicates the parking lamps status.

**PARK_SW**
Range: ____________________________ ON/OFF
Indicates the park light switch status.

**PARK BRAKE SWITCH**
Range: ____________________________ RELEASE/SET
Indicates the position of the parking brake. Reads SET or ON when the switch is closed (park brake is engaged). Reads RELEASE or OFF when the parking brake is released.
The BCM uses this data in controlling the parking brake indicator, the reminder chime feature and the DRL system.

**PARK LAMP SWITCH**
- **Range:** ______________________________________ ON/OFF
  - Indicates the park lamp switch signal circuit status. A closed switch is displayed as ON.

**Passing Sw**
- **Range:** ______________________________________ ON/OFF
  - Indicates the status of the lamp switch, reads ON when Passing position is selected.

**Passive Mode**
- **Range:** ______________________________________ ON/OFF
  - Displays the passive mode status. Reads ON if passive mode on, and OFF if passive mode off.

**PD_LOCK**
- **Range:** ______________________________________ ON/OFF
  - Indicates the power door lock status.

**PD_UNLOCK**
- **Range:** ______________________________________ ON/OFF
  - Indicates the power door unlock status.

**PWR Condition**
- **Range:** ___________________________________ ALL/ACC ON/IG1 ON/IG2 ON/ST ON
  - Displays the status of various system relays:
    - ALL—all relays are off.
    - ACC ON—the accessory relay is energized
    - IGN1 ON—the ignition 1 relay is energized
    - IGN2 ON—the ignition 2 relay is energized
    - ST ON—the start request relay is energized

**PRK_BRK**
- **Range:** ______________________________________ ON/OFF
  - Indicates the parking brake status.

**PRK_BRAKE**
- **Range:** ______________________________________ ON/OFF
  - Indicates the parking brake switch status.

**Push Sw**
- **Range:** ______________________________________ ON/OFF
  - Indicates the status of the push button ignition switch. Reads ON when the button is depressed.

**PWM_ILLU**
- **Range:** ______________________________________ ON/OFF
  - Indicates the illuminated pulse width modulated (PWM) value.

**R Shade Close**
- **Range:** ______________________________________ YES/NO
  - Indicates the status of the read sun shade limit switch. Reads YES if the switch is off (shade lowered), and NO if the switch is on (shade raised).
**Data Parameters**

**Body Control Module (BCM) Parameters**

**R Shade Delay Time**
- **Range:** ____________________________ OFF/0.7S/0.9S/1.2S

Indicates the status of the read sun shade delay setting. Reads OFF when the system is disabled, other readings are the programmed delay in seconds.

**RDEF_RLY**
- **Range:** ____________________________ ON/OFF

Indicates the rear defrost relay status.

**Rear Def Sw**
- **RDEF_SW**
  - **Range:** ____________________________ ON/OFF

Indicates the rear defogger switch status, reads ON when the switch is on and OFF when off.

**REAR FOG LAMP SW**

**R Fog Light Sw**
- **Range:** ____________________________ ON/OFF

Indicates the position of the rear fog lamp switch. Reads ON when the front fog lamp switch is activated with the park lamps or low beam head lamps turned on, and OFF at all other times.

**Rear Hatch Sw**
- **Range:** ____________________________ ON/OFF

Indicates the status of the rear hatch, reads ON when the hatch is open and OFF when closed.

**Rear Shade Sw**
- **Range:** ____________________________ ON/OFF

Indicates the status of the rear sun shade switch. Reads ON when the switch is pressed, and reads OFF at all other times.

**Rear Washer Sw**
- **RR WASHER SW**
  - **Range:** ____________________________ ON/OFF

Indicates the status of the rear window washer switch. Reads ON when the switch is on.

**Rear Wiper Int**
- **RR WIPER INT**
- **RR WIPER ON**
- **RR WIPER STOP**
  - **Range:** ____________________________ ON/OFF

Indicates the position of the rear window wiper switch. Reads ON when the switch is in the indicated position (Int = intermittent, on = on, stop = off).

**REMOTE_ID**
- **Range:** ____________________________ actual

Indicates the remote identification.

**REMETES**
- **Range:** ____________________________ actual

Indicates the number of programmed transmitters.

**RESET_SW**
- **Range:** ____________________________ ON/OFF

Indicates the driver door key cylinder switch status.
Response Time
Range: ____________________________________________________________ 0.1/1.0
Displays the response time setting in seconds.

Rewipe Function
Range: __________________________________________________________ ON/OFF
Indicates the status of the automatic windshield rewipe system. Reads ON when rewipe is available, and reads OFF when not available.

Rewipe Time
Range: _______________________________________________________________ 3/4
Displays the interval timing for the automatic windshield wiper system in seconds.

RF_AJAR
Range: ____________________________________________________________ OPEN/CLSD
Indicates the right front door ajar status.

RF_ID
Range: ____________________________________________________________ actual
Indicates the right front tire transmitter identifier.

RF_LRN
Range: ____________________________________________________________ ACTIVE/INACTIVE
Indicates the right front learn status.

RF_MES
Range: ____________________________________________________________ ACTIVE/INACTIVE
Indicates the right front measure status.

RF_NORM
Range: ____________________________________________________________ ACTIVE/INACTIVE
Indicates the right front normal status.

RF_PSI
Range: ____________________________________________________________ actual
Indicates the right front tire pressure status.

RF_REC
Range: _______________________________________________________________ YES/NO
Indicates the right front transmit received after learn.

RFAWAKE
Range: _______________________________________________________________ YES/NO
Indicates the right front awake status.

RFDR_SW
Range: ____________________________________________________________ CLSD/AJAR
Indicates the right front door status.

RFIDPRG
Range: _______________________________________________________________ YES/NO
Indicates the right front sensor programmed.

RFLOWBAT
Range: _______________________________________________________________ LOW/OK
Indicates the right front low battery status.
**Data Parameters**

**Body Control Module (BCM) Parameters**

- **RHTURN_IND**
  - **Turn Right Sw**
  - **Range:** ____________________________ **ON/OFF**
  - Indicates the status of the turn indicator switch. Reads ON when the switch is positioned to operate the right-hand indicators, reads OFF at all other times.

- **Right Turn Sw**
  - **Range:** ____________________________ **ON/OFF**
  - Indicates the turn signal switch status, reads ON when the switch is in the right turn position.

- **RR_AJAR**
  - **Range:** ____________________________ **OPEN/CLSD**
  - Indicates the right rear door ajar status.

- **RR_ID**
  - **Range:** ____________________________ **actual**
  - Indicates the right rear tire transmitter identifier.

- **RR_LRNR**
  - **Range:** ____________________________ **ACTIVE/INACTIVE**
  - Indicates the right rear learn status.

- **RR_MES**
  - **Range:** ____________________________ **ACTIVE/INACTIVE**
  - Indicates the right rear measure status.

- **RR_NORM**
  - **Range:** ____________________________ **ACTIVE/INACTIVE**
  - Indicates the right rear normal status.

- **RRIDPRG**
  - **Range:** ____________________________ **YES/NO**
  - Indicates the right rear sensor programmed status.

- **RRLOBAT**
  - **Range:** ____________________________ **LOW/OK**
  - Indicates the right rear low battery status.

- **RRO_REC**
  - **Range:** ____________________________ **YES/NO**
  - Indicates the right rear transmit received after learn status.

- **RRO_PSI**
  - **Range:** ____________________________ **actual**
  - Indicates the right rear outer tire pressure status.

- **P/W Func/Key**
  - **Range:** ____________________________ **ON/OFF**
  - Displays the setting for the driver door key window switches. Reads ON when the driver key window feature is active, and reads OFF when it is disabled.

- **P/W Func/Remote**
  - **Range:** ____________________________ **ON/OFF**
  - Displays the setting for the wireless transmitter window switches. Reads ON when the remote window feature is active, and reads OFF when it is disabled.
P/W Down/Wireless

Indicates the status of the wireless transmitter window switches. Reads ON when the windows are commanded up or down with the remote, reads OFF at all other times.

Seat Belt Indicator

Indicates the status of the seat belt indicator lamp. Reads ON if the lamp is on (belt unlatched), and OFF if the lamp is off (belt latched).

Seat Mem 1 Sw

Indicates the status of the indicated seat memory switches. Reads ON when the indicated switch is activated, reads OFF at all other times.

Seat Mem 2 Sw

Indicates the status of the indicated seat memory switch. Reads ON when the seat memory switch is activated, reads OFF at all other times.

Seat Mem Set Sw

Indicates the status of the indicated seat memory set switch. Reads ON when the seat memory switch is activated, reads OFF at all other times.

Sensitivity

Displays the sensitivity setting.

Shift position N

Indicates whether or not the transmission is in neutral range, reads ON when in neutral and OFF at all other times.

Shift position P

Indicates whether or not the transmission is in park range, reads ON when in park and OFF at all other times.

Shift position R

Indicates whether or not the transmission is in reverse range, reads ON when in reverse and OFF at all other times.

Sport A/T Sw

Displays the on/off status of the electronically controlled transmission sport mode switch. Reads ON when the switch is active and reads OFF at all other times. When active, the shift pattern is altered to delay upshifts and quicken throttle downshifts.

Speed Mode

Displays the speed mode status. Reads ON when speed mode is available, and OFF when speed mode is not available.

SPR_ID

Indicates the spare tire transmitter identifier.
Data Parameters

Body Control Module (BCM) Parameters

STEERING WHEEL CONTROL (V)
Range: ____________________________ 0.0 to 5.0 V
Indicates if voltage is supplied to the steering wheel controls.

STEERING WHEEL SW PWR
Range: ____________________________ 0.0 to 5.0 V
Indicates the voltage of the steering wheel controls power supply.

Stop Light Sw
Range: ____________________________ ON/OFF
Indicates the status of the stop lamp switch. Reads ON when the brake pedal is depressed (brake lamps illuminated), reads OFF when the brake pedal is released.

Stop Light Transistor
Range: ____________________________ ON/OFF
Indicates the status of the stop lamp transistor. Reads ON when the transistor is on (brake pedal depressed), and OFF at all other times (brake pedal released).

Str Unlock Sw
Range: ____________________________ ON/OFF
Displays the status of the steering wheel lock. Reads ON when the steering is unlocked and OFF when the ignition is switched off and the steering lock is engaged.

STSW1
STSW2
Range: ____________________________ ON/OFF
Displays the status of start switch 1 and start switch 2. Reads ON when the indicated switch is depressed and reads OFF at all other times.

Tail Cancel Sw
Range: ____________________________ ON/OFF
Indicates the state of the tail cancel switch of the light control rheostat. Reads ON when the tail cancel switch is on and reads OFF at all other times.

Tail Light Sig
Range: ____________________________ ON/OFF
Indicates the state of the tail light signal. Reads ON when the tail lamps are on and reads OFF at all other times.

Tail Lamp
Tail Light Sw
Range: ____________________________ ON/OFF
Indicates the position of the light control switch. Reads ON when the switch is set to the “tail” or “head” position and reads OFF at all other times.

Tail Light Transistor
Range: ____________________________ ON/OFF
Indicates the status of the tail lamp transistor. Reads ON when the lighting control switch is in the “tail” or “head” position, and OFF at all other times.

TAIL_AJAR
Range: ____________________________ OPEN/CLSD
Indicates the liftgate ajar switch status.
TNSMT_CMD
Range: ______________________________ actual
Indicates the last remote control transmission.

TNSMTR_ID
Range: ______________________________ actual
Indicates the last received transmitter ID code reference.

TRUNK_AJAR
Range: ______________________________ OPEN/CLSD
Indicates the trunk switch status.

Trunk Opener Sw
Trunk/Back Door Open Sw
Range: ______________________________ ON/OFF
Indicates the status of the trunk or rear gate opener switch. Reads ON when the switch is activated to open the trunk or gate.

TRUNK BTN/SIG
Range: ______________________________ ON/OFF
Indicates the status of the trunk, or back door, unlock switch signal from a remote transmitter.

Trunk Cyl Sw
TRUNK KEY SW
Range: ______________________________ ON/OFF
Displays the trunk key switch status. Reads ON when the trunk is being unlocked.

Trunk Key Unlock
Range: ______________________________ ON/OFF
Indicates the trunk lock status. Reads ON if the trunk is locked, reads OFF when unlocked.

Trunk Lid Operation
Range: ______________________________ 1 TIME/2 TIMES/0.8S
Displays the setting of the wireless trunk opener switch. Interpret as follows:
• 1 TIME—trunk opens when the button is pressed once.
• 2 TIMES—trunk opens when the button is pressed twice.
• 0.8S—trunk opens when the button is pressed and held for 0.8 second.

Trunk Main Sw
Range: ______________________________ ON/OFF
Indicates the status of the trunk opener cancel switch. Reads ON when the cancel switch is on, and reads OFF at all other times.

Trunk Opener Monitor
TRUNK OPN MNTR
Range: ______________________________ ON/OFF
Displays the trunk, or back door open monitor. Reads ON when open and OFF when closed.

TRUNK OPNR SW
Range: ______________________________ Not Available
Displays the trunk opener switch status. This Nissan parameter displays even on models without a rear door with remote release.
Data Parameters

Body Control Module (BCM) Parameters

UN BUTTON ON
UN BUTTON/SIG
Range: __________________________________________________________ ON/OFF
Indicates a door unlock switch signal being received from a remote transmitter.

UNLK SW AS
UNLK SW DR
Range: __________________________________________________________ ON/OFF
Indicates the door unlock switch signal status for the driver (DR) and passenger (AS) doors.

Unlock2 Operation
Range: __________________________________________________________ ON/OFF
Indicates the status of the 2 times wireless unlock system. Reads ON when the system is active
and all doors unlock when the button is pressed twice. Reads OFF when the system is disabled.

Unlock w/KOEO & Park
Range: __________________________________________________________ ON/OFF
Indicates the status of the KOEO and park door unlock system. Reads ON when the system is
active, all doors unlock when the ignition is off and the gear selector lever is shifted into Park.

Vehicle Speed
VSS_TPM
Range: ___________________________________________________ 0 to MAX SPEED
Indicates the vehicle speed.

Vehicle Spd Sig
Range: ________________________________________________________ STOP/RUN
VHCL SPEED SEN
Range: __________________________________________________________ ON/OFF
Indicates whether or not the vehicle is in motion, reads STOP or OFF when the vehicle is at rest
and RUN or ON while running or moving.

WARN_1
Range: __________________________________________________________ actual
Indicates the TPMS last warning event #1 –Transmitter ID.

WARN_2
Range: __________________________________________________________ actual
Indicates the TPMS last warning event #2 –Transmitter ID.

WARN_3
Range: __________________________________________________________ actual
Indicates the TPMS last warning event #3 –Transmitter ID.

WARN_4
Range: __________________________________________________________ actual
Indicates the TPMS last warning event #4 –Transmitter ID.

WARN_5
Range: __________________________________________________________ actual
Indicates the TPMS last warning event #5 –Transmitter ID.

Warn By Glass Snsr
Range: __________________________________________________________ ON/OFF
Indicates the status of the glass breakage sensor of the alarm system. Reads ON when the
sensor detects breaking glass, reads OFF at all other times.
Data Parameters

Body Control Module (BCM) Parameters

Warn By Horn
Range: ____________________________ ON/OFF
Indicates the status of the warning by horn system. Reads ON when the system is active and the horn sounds when the alarm is triggered, reads OFF when the horn alarm is disabled.

WASH_FRT
Range: ____________________________ ON/OFF
Indicates the front washer switch status.

WASHPUMP
Range: ____________________________ ON/OFF
Indicates the washer pump status.

WASHRLY
Range: ____________________________ ON/OFF
Indicates the washer relay status.

WIP Sw
Range: ____________________________ ON/OFF
Indicates the availability of power to the windshield wiper switch. Reading should be ON whenever the ignition is switched on, and OFF when the ignition is off.

WIP Sw (+1)  WIP Sw (C1)  WIP Sw (2S)  WIP Sw (SM)
Range: ____________________________ ON/OFF
Indicates the availability of power at the indicated terminal of the windshield wiper switch. Reads ON when power is available at the terminal, and OFF when power is not available.

Wireless Buzzer Response
Range: ____________________________ ON/OFF
Indicates the status of the wireless door lock buzzer response system. Reads ON when the system is active and reads OFF when the system is disabled.

Wireless Door Lock Operation
Range: ____________________________ ON/OFF
Indicates the status of the wireless entry system. Reads ON when the system is active and the doors can be unlocked without a key, reads OFF when the system is disabled.

WPINT_FRT
Range: ____________________________ ON/OFF
Indicates the front wiper interval/auto wiper switch status.

WPFAST_FRT
Range: ____________________________ ON/OFF
Indicates the front wiper relay, fast speed status.

WPRLY_LOW
Range: ____________________________ ON/OFF
Indicates the front wiper relay, low speed status.

WPRLY_REAR
Range: ____________________________ ON/OFF
Indicates the rear wiper relay status.
WPINT_REAR
  Range: ___________________________ ON/OFF
  Indicates the rear wiper interval position switch status.

WPRPRKSTS
  Range: ___________________________ ON/OFF
  Indicates wiper in park position status.
Engine Parameters

This section defines engine data parameters available from the engine control module (ECM), powertrain control module (PCM) or the vehicle control module (VCM). To find the description of a specific parameter, locate the parameter name in the index and then go to the listed page.

+BM
   Range: __________________________________________________________ ON/OFF
 Indicates whether or not electric throttle control system has input power. ON: Idling.

+BM VOLTS
   Range: __________________________________________________________ Min.: 0, Max.: 19.922 V
 Indicates +BM voltage: 10 to 15 V: Idling.

#CARB CODES
   Range: __________________________________________________________ Min.: 0, Max.: 255
 Indicates the number of emission related DTCs.

#CODES
   Range: __________________________________________________________ Min.: 0, Max.: 255
 Indicates number of detected DTCs.

1ST GEAR
2ND GEAR
3RD GEAR
4TH GEAR
   Range: ____________________________________________________________ actual
 Indicates the gear commanded by the module.

2nd AIR MON ENA
   Range: __________________________________________________________ UNABLE/ENABLE
 Indicates the secondary AIR monitor.

2nd AIR MON CMPL
   Range: __________________________________________________________ COMPLETE/INCOMPLETE
 Indicates the secondary AIR monitor.

2ND SELECTED
   Range: __________________________________________________________ YES/NO
 Indicates the gear selected.

40 CYCLES
   Range: __________________________________________________________ CMPLT/INCMP
 Indicates whether a DTC has remained active for 40 drive cycles.

4WD ENGAGED
   Range: __________________________________________________________ ON/OFF
 Indicates the 4WD switch status.

4WD LOW SW
   Range: __________________________________________________________ ON/OFF
 Indicates the position of the four-wheel drive low switch. Reads ON when the switch is on.
5V REF (V)
Range: ________________________________ 0.0 to 5.12 V
Indicates the reference voltage that the system sensors operate on. The nominal reference value is 5.0 V, but voltage may vary slightly depending on system calibration and charging voltage.

A/C CLUTCH
Range: ________________________________ ON/OFF
Indicates the status of the A/C compressor clutch, it reads ON when the clutch is engaged.

A/C CLUTCH RELAY
A/C RELAY
Range: ________________________________ ON/OFF
Indicates a feedback signal from the A/C compressor clutch or relay, it reads:
• ON when the clutch is engaged
• OFF when the clutch is disengaged

Some vehicles provide both the A/C REQUEST and the A/C CLUTCH parameters. They should cycle together (both ON or both OFF) unless the ECM is overriding the instrument panel control. Others models have an A/C REQUEST parameter but do not monitor A/C CLUTCH feedback.

A/C COMP SW
Range: ________________________________ LO/NORM
Indicates the state of the A/C compressor cycling switch. Readings should be:
• LO when pressure is low
• NORM when pressure is normal.
The A/C compressor cycling switch is normally closed.

A/C CUT
A/C CUT SIG
A/C SIG
Range: ________________________________ ON/OFF
Indicates the status of the A/C cut signal from the PCM to the A/C control assembly. Reads ON only when the PCM is actively disabling the A/C compressor in order to prevent overloading the engine during a heavy load operation.

A/C ENABLED
Range: ________________________________ ON/OFF
Indicates the status of the air conditioning switch.

A/C HI-SIDE (psi)
A/C PRESS (psi)
A/C PRESS (kPa)
Range: ________________________________ 25 to 460 psi or 170 to 3170 kPa
Indicates the PCM calculated refrigerant pressure based on the voltage signal from the A/C high-side pressure sensor. The value reflects the load that the A/C compressor is placing on the engine. Typically, readings are slightly low when pressure is decreasing and slightly high when pressure is increasing. The value is used to adjust idle and control the cooling fans.

A/C IDLE UP VSV
Range: ________________________________ ON/OFF
Indicates the ECM command to the A/C idle-up vacuum switching valve (VSV). Reads ON when the VSV opens the valve. When open, the A/C idle up valve bleeds a measured quantity of air from the intake manifold, which increases RPM at idle.
A/C LOAD (V)
Range: _______________________________________________________ 0.0 to 16.0 V
Indicates the air conditioning load signal voltage.

A/C MAG CLUTCH
Range: __________________________________________________________ ON/OFF
Indicates the status of the A/C compressor magnetic clutch. Reads ON when the clutch is engaged and reads OFF at all other times.

A/C PRESS (V)
Range: _______________________________________________________ 0.0 to 5.12 V
Indicates the voltage signal to the ECM from the A/C high-side pressure sensor.
High voltage equals high pressure; low voltage equals low pressure. See “A/C PRESS (psi)” below for calculated measurement information.

A/C RELAY
Range: __________________________________________________________ ON/OFF
Indicates the status of the air conditioning relay.

A/C RELAY
Range: __________________________________________________________ ON/OFF
Indicates a feedback signal from the A/C compressor clutch or relay, it reads:
• ON when the clutch is engaged
• OFF when the clutch is disengaged

A/C REQUEST
A/C REQUEST SW
Range: _________________________________________________ YES/NO or ON/OFF
Indicates the position of the air conditioning switch, it reads YES or ON when the A/C switch is turned on or when the ECM is commanding the A/C system to turn the compressor on. In some cases, the A/C compressor may not turn on even though the switch is set to on.

Several other switch or sensor signals may prevent the ECM from engaging the A/C compressor clutch. A reading of ON or YES means the switch is closed or the ECM has been commanded to turn on the A/C when all other conditions permit. Refer to “A/C CLUTCH” on page 335 for A/C compressor clutch feedback signal information.

A/C SW
Range: __________________________________________________________ ON/OFF
Indicates the status of the air conditioning switch.

A/C SWITCH
Range: __________________________________________________________ ON/OFF
Indicates the position of the air conditioning switch, it reads:
• ON when the air conditioning switch is on and all other in-series switches are closed
• OFF when any series switch in the air conditioning circuit is open

A/C SWITCH
Range: _______________________________________________________ 0.0 to 5.0 V
Indicates the air conditioning switch. The FI computer activates the compressor when a driver request for A/C ECU is received. While the compressor is operated, the engine load correction is performed.
A/C TEMP S (V)
Range: ________________________________________________________ 0.0 to 5.0 V
Indicates the air conditioner evaporator temperature sensor output voltage.

A/C TEMP S (°)
Range: __________________________________________________________ variable
Indicates the ECM calculated air conditioner evaporator temperature.

A/F ADJ-B1
A/F ADJ-B2
Range: _____________________________________________________–0.330 to 0.330
Indicates the correction of factor stored in ECM. The factor is calculated from the difference between the stored target air-fuel ratio and the air-fuel ratio calculated from A/F sensor 1.

A/F ALPHA-B1 (%)
A/F ALPHA-B2 (%)
Range: ________________________________________________________ 50 to 150%
Indicates the mean value of the air-fuel ratio feedback correction factor per cycle.

A/F LEARNED
Range: __________________________________________________________ YES/NO
Indicates whether the block learn multiplier (BLM) is responding to the fuel integrator corrections. Use this reading to double-check the block learn response. Reads:
• YES when block learn is responding, or will respond, to integrator corrections
• NO when block learn is not responding to the integrator

In most cases, YES should display when the engine is in closed loop, and NO in open loop. However, this may vary with a few engine calibrations.

If the fuel integrator reaches its limit and block learn is not enabled (NO), the vehicle may have a driveability problem or it may return to open loop. Refer to “INTEGRATR” on page 404 and “BLM” on page 353 for more information.

A/F LEFT (V)
A/F RIGHT (V)
TARGET A/F (V)
Range: ________________________________________________________ 0.0 to 5.0 V
Indicates the amount of correction necessary to the basic fuel-injection duration to maintain the desired air-fuel ratio.

A/F LEFT and A/F RIGHT provide air-fuel correction information for vehicles with two banks of injectors (V-type engines). TARGET A/F provides air-fuel correction information for vehicles with a single bank of injectors (in-line engines).

The ECM responds to this correction information according to five programmed routines:

Table 18-1 A/F program routines

<table>
<thead>
<tr>
<th>Data</th>
<th>ECM Compensation</th>
<th>Engine Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00 V</td>
<td>Go leaner 10–20%</td>
<td>Rich</td>
</tr>
<tr>
<td>1.25 V</td>
<td>Go leaner 4–10%</td>
<td>Normal</td>
</tr>
<tr>
<td>2.50 V</td>
<td>Lean/rich ±3%</td>
<td>Normal</td>
</tr>
<tr>
<td>3.75 V</td>
<td>Go richer 4–10%</td>
<td>Normal</td>
</tr>
<tr>
<td>5.00 V</td>
<td>Go richer 10–20%</td>
<td>Lean</td>
</tr>
</tbody>
</table>
A/F RATIO
A/F RATIO(1)
Range: _______________________________ 0.0 to 99.9
Indicates the calculated desired air-fuel ratio that the PCM expects during a closed loop
operation on some fuel-injected vehicles. This is not a measured value, but the calculated value
of the ratio that the PCM wants to be delivered based on sensor input signals.

Although the measurement range is from 0.0 to 99.9, the displayed value should be near 14.7 in
most cases. Lower numbers indicate a rich ratio commanded for startup. Higher numbers
indicate a leaner ratio.

A/F RATIO
Range: ____________________________ Min.: 0 ,Max.: 1.999
Indicates the air-fuel ratio. Typical readings range from 0.8 to 1.2 with the engine running at idle.

A/F SSR TEST B1
Range: ____________________________ COMPL/INCMPL
Indicates check mode result for air-fuel ratio sensor (bank 1).

A/F SSR TEST B1
Range: ____________________________ COMPL/INCOMPL
Indicates the check mode test results for the bank 1 air fuel ratio sensor.

A/F SSR TEST B2
Range: ____________________________ COMPL/INCOMPL
Indicates the check mode test results for the bank 2 air fuel ratio sensor.

A/F SSR TEST B2
Range: ____________________________ COMPL,INCMPL
Indicates check mode result for air-fuel ratio sensor (bank 2).

A/T D SWITCH
A/T D SWT
Range: ____________________________ ON/OFF
Indicates the status of the A/T D position switch. Reads ON only when the shift selector lever is
in the D position.

A/T D3 SWITCH
Range: ____________________________ ON/OFF
Indicates the status of the A/T D3 position switch. Reads ON only when the shift selector lever is
in the D3 position.

A/T D4 SWITCH
Range: ____________________________ ON/OFF
Indicates the status of the A/T D4 position switch. Reads ON only when the shift selector lever is
in the D4 position.

A/T R SWITCH
Range: ____________________________ ON/OFF
Indicates the status of the A/T R position switch. Reads ON only when the shift selector lever is
in the Reverse position.

AAT
Range: ____________________________ –40 to 389°F or –40 to 199°C
Indicates the ambient air temperature.
ABSOL PRES (V)

Range: _______________________________________________________ 0.0 to 5.00 V
Indicates the absolute pressure (ABSOL PRES) sensor signal voltage, which is determined by
the MAP/BARO solenoid. See MAP/BARO SOLENOID for more information.

ABSOTPBI (%)

Range: ___________________________________________________ 0 to 100%
Indicates the absolute throttle position as a percentage.

ABV VAC (%)

Range: ___________________________________________________ 0 to 100%
Indicates the air bypass valve solenoid (vacuum) control status as a percentage.

ABV VENT (%)

Range: ___________________________________________________ 0 to 100%
Indicates the air bypass valve solenoid (vent) control signal status as a percentage.

AC (CMPL)
CAT (CMPL)
CAT MONITOR
COMP MON
EGR (CMPL)
EVAP (A/FS) (CMPL)
EVAP MONITOR
FUEL SYS (CMPL)
HEATER CAT (CMPL)
MISFIRE (CMPL)
O2S (A/FS) MONITOR
O2S (A/FS) HTR (CMPL)
O2S (A/FS) (CMPL)
SEC AIR MONITOR
SEC AIR (CMPL)

Range: ___________________________________________________ COMPL/INCMPL
These parameters are part of the readiness monitors used to determine if the OBD-II
self-diagnostics test has been run and/or the resulting status of the test.

AC (ENA)
CAT (ENA)
COMP MON
EGR (ENA)
EVAP (A/FS) (ENA)
FUEL SYS (ENA)
HEATER CAT (ENA)
MISFIRE (ENA)
O2S (A/FS) (ENA)
O2S (A/FS) HTR (ENA)
SEC AIR (ENA)

Range: ___________________________________________________ ENABLE/UNABLE
These parameters are part of the readiness monitors used to determine if the OBD-II
self-diagnostics test has been run and/or the resulting status of the test.
### Data Parameters

#### AC HI PRESS OPN
**Range:** _________________________________________________________ HI/NORM
Indicates the state of the A/C secondary high pressure switch. The switch is normally open (NORM) and closes (HI) when high pressure is sensed.

#### AC_REQ_SIG
**Range:** _________________________________________________________ ON/OFF
Indicates the air conditioning request signal status.

#### AC MON CMPL
**Range:** _________________________________________________________ COMPLETE/INCOMPLETE
Indicates the A/C monitor.

#### AC MON ENA
**Range:** _________________________________________________________ UNABLE/ENABLE
Indicates the A/C monitor.

#### ACC RELAY
**Range:** _________________________________________________________ OFF/ON
Indicates the status of the accessory relay, PID displays ON when the ACC relay is on.

#### ACCEL ENRICH
**Range:** _________________________________________________________ YES/NO
Indicates whether the ECM is momentarily increasing injector pulse width to obtain a richer mixture during acceleration. Normally reads NO, reads YES only during enrichment.

#### ACCEL IDL POS
**Range:** _________________________________________________________ ON/OFF
Indicates whether or not accelerator pedal position sensor detecting idle: ON: Idling.

#### ACCEL LRN VAL #1 & #2
**Range:** _________________________________________________________ 0 to 124.512
Indicates the ETCS accelerator pedal sensor fully closed learned position value.

#### ACCEL LRN VAL#1 & #2
**Range:** _________________________________________________________ Min.: 0 V, Max.: 124.512 V
Indicates the accelerator fully closed learning value Number 1 and Number 2.

#### ACCEL POS1(%) & POS2(%) 
**Range:** _________________________________________________________ Min.: 0 %, Max.: 100 %
Indicates the Absolute Accelerator Pedal Position (APP) Number 1 and Number 2.
- 10 to 25 %: Accelerator pedal released
- 60 to 90 %: Accelerator pedal fully depressed

### Engine Parameters
### Data Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCEL POS1(V)</td>
<td>Min.: 0 V, Max.: 4.98 V</td>
<td>Indicates the Absolute Accelerator Pedal Position (APP) sensor Number 1 voltage.</td>
</tr>
<tr>
<td>ACCEL POS2(V)</td>
<td>Min.: 0 V, Max.: 4.98 V</td>
<td>Indicates the Absolute Accelerator Pedal Position (APP) sensor Number 2 voltage.</td>
</tr>
<tr>
<td>ACCEL SSR #1 AD(V)</td>
<td>Min.: 0 V, Max.: 4.98 V</td>
<td>Indicates the accelerator fully closed value Number 1 (AD).</td>
</tr>
<tr>
<td>ACCPPA(%)</td>
<td>0 to 100%</td>
<td>Indicates the status of tolerator pedal position A.</td>
</tr>
<tr>
<td>ACCPPB(%)</td>
<td>0 to 100%</td>
<td>Indicates the status of tolerator pedal position B.</td>
</tr>
<tr>
<td>ACCS</td>
<td>ON/OFF</td>
<td>Indicates the status of the air conditioning compressor cycling switch.</td>
</tr>
<tr>
<td>ACCS=A/C</td>
<td>ON/OFF</td>
<td>Indicates the position of the air conditioning cycle switch (ACCS). Reads ON if the A/C switch on the instrument panel is on, or the PCM is commanding the A/C compressor on. In some cases, the A/C compressor may not turn on even though the switch is closed. Several other switch or sensor signals may prevent the PCM from engaging the A/C compressor.</td>
</tr>
<tr>
<td>ACM BATTERY VOLTAGE</td>
<td>0.0 to 14.5 V</td>
<td>Indicates the battery input voltage supplied to the ACM control module.</td>
</tr>
<tr>
<td>ACMRLY</td>
<td>ON/OFF</td>
<td>Indicates the state of the AC main relay.</td>
</tr>
<tr>
<td>ACP</td>
<td>OPEN/CLOSED</td>
<td>Indicates the air conditioning pressure switch.</td>
</tr>
<tr>
<td>ACSW</td>
<td>ON/OFF</td>
<td>Indicates the air conditioning switch.</td>
</tr>
<tr>
<td>ACT VLV TMNG(°)</td>
<td>not available</td>
<td>Indicates the actual valve timing.</td>
</tr>
</tbody>
</table>
ACT VSV (ON/OFF)
Range: __________________________________________________________ ON/OFF
Indicates the A/C cut status for active test data support.

ACTUAL CKP
Range: __________________________________________________________ 0 to 255
Indicates whether the 7X synchronization pulses from the ignition module are being received by the PCM.

ACTUAL CMP
Range: __________________________________________________________ 0 to 255
Indicates a count of the signal pulses to the PCM from the camshaft position (CMP) sensor. The count changes continually as the engine runs.

ACCEL POS1 (%)  
ACCEL POS2 (%)  
APP (%)  
APP1 (%)  
APP2 (%)  
APP3 (%)  
APP SENSOR 1 (%)  
APP SENSOR 2 (%)
Range: _________________________________________________________ 0 to 100%
Indicates the accelerator pedal position (APP) as a percentage, it normally reads:
• 0% at idle
• 100% at wide open throttle (WOT)
The value should increase smoothly as the accelerator pedal moves from closed to full throttle.
Some models use three APP sensors, they are located in a module at the base of the accelerator pedal. During normal operation, the PCM only uses the APP1 sensor input, the other two serve as fail safe sensors.

ACCEL SSR #1 AD(V)
Range: _______________________________________________________ 0.0 to 4.98V
Indicates the ETCS accelerator sensor fully closed value Number 1 (AD).

ACIS VSV
Range: __________________________________________________________ ON/OFF
Indicates the current state of the ACIS (Acoustic Control Induction System) vacuum switching valve. This valve controls the IACV (Intake Air Control Valve) in response to engine load. This increases intake efficiency when the throttle is open 60% or more and RPM is above 4,700. During this time the IACV is open (VSV/OFF), all other times the IACV is closed (VSV/ON).

ACG Control
ALT CTRL
Range: ________________________________________________________ 0.0 to 14.5 V
Indicates the calculated output control signal that regulates the charging system rate. The PGM-FI detects electric power consumption, then calculates and controls charging using the generated electric power signal (ACGF) from ACG. During discharge, the ON time of the ACG generated electric power signal increases. The charging system is at maximum output (14.5 V) when the reading is 0 V, and minimum output (12.5 V) when the reading is battery voltage (B+). The battery charging voltage is controlled in either 12.5V mode or 14.5V mode, depending on the electric load conditions.
ACM(%)  
Range: ___________________________________________________________________ 0 to 100%
Indicates the ECM signal to the active control motor mounts. The active control motor mounts
are used to dampen vibration under certain engine idle or load conditions.

AF B1 HEATER  
AF B2 HEATER  
AF B1 S1 HEATER  
AF B2 S1 HEATER  
Range: __________________________________________________________ ON/OFF
Indicates the A/F sensor heater status, it turns off if the battery voltage is above 16 volts. Reads
ON when the heater is on, usually at idle with a cold exhaust. Cylinder bank 1 (B1) contains
cylinder #1. Sensor 1 (S1) is upstream, closest to the engine.

AF B1 LAMBDA  
AF B2 LAMBDA  
AF LAMBDA  
AF LAMBDA B1  
AF LAMBDA B2  
Range: ___________________________________________________________________ 0.0 to 99.9
Indicates the A/F Sensor equivalence ratio, which is the measured air/fuel ratio divided by the
stoichiometric A/F ratio. A value greater than 1 indicates lean operation, and values less than 1
indicates rich operation. B1 and B2 provide information for vehicles with two banks of injectors.

AF FB  
AF FB (ST FUEL TRIM)  
AF FB (ST FUEL TRIM) B1  
AF FB (ST FUEL TRIM) B2  
Range: ___________________________________________________________________ 0.0 to 99.9
Indicates the A/F ratio feedback corrective commands from the ECM. The reading is the air fuel
ratio feedback coefficient.

AF FB AVG  
AF FB AVG (LT FUEL TRIM)  
AF FB AVG (LT FUEL TRIM) B1  
AF FB AVG (LT FUEL TRIM) B2  
Range: ___________________________________________________________________ 0.0 to 99.9
Indicates the A/F ratio feedback average, which is derived from the short term fuel trim value and
it is used for long-term correction of fuel delivery. The reading is the air-fuel ratio feedback
coefficient value.
AF FB CMD
AF FB CMD B1
AF FB CMD B2
Range: ________________________________ 0.0 to 99.9
Indicates the A/F ratio feedback command, which is the target air/fuel ratio that ECM is trying to maintain based on sensor data. Readings should be between 14.2 and 15.2 at idle. B1 or B2 provide information for vehicles with two banks of injectors.

AF FB COND
Range: ___________________________________________ OPEN/CLOSED
Indicates the Air/Fuel Ratio Feedback Condition, it displays the current loop operating status.

AF SENSOR
AF SENSOR (mA)
AF SENSOR B1
AF SENSOR B2
Range: __________________________________________ 0.0 to 99.9
Displays from the air-fuel ratio (A/F) sensor signal, which detects exhaust gas oxygen content.

AI STATUS
Range: __________________________________________ OK/NG
Indicates the status of the air injection system based on pressure sensor feedback to monitor air flow pressure and volume.

AICV VSV
Range: __________________________________________ ON/OFF
Indicates the current state of the AICV (Air Intake Control Valve). This valve controls the AICV in response to engine air demand. When the throttle is open 60% or more and RPM is above 3,600, the AICV is open (ON) to allow extra intake air. At all other times the AICV is closed (OFF).

AIR CONTRL SOL
Range: __________________________________________ ON/OFF
Indicates the air control (secondary air injection) solenoid valve status. Reads ON when secondary air is routed to the exhaust port.

AIR CONTRL SOL
AIR DIVERT SOL
Range: __________________________________________ NORM/DIV or PORT/DIV
Indicates the ECM command to the air injection control, or diverter, valve solenoid, it reads:

- NORM or PORT when the solenoid is commanded to move the valve to direct air downstream to the exhaust ports or the air switching solenoid
- DIV when the solenoid is commanded to move the valve to divert air to the atmosphere

AIR CONTRL SOL is displayed on vehicles with only a single air injection control solenoid. AIR DIVERT SOL is always displayed in conjunction with the AIR SWITCH SOL parameter on vehicles with two solenoids.

AIR INTAKE SOL
Range: __________________________________________ ON/OFF
Shows the ECM command to the secondary air intake valve to open the secondary runners:

- Reads ON when the ECM has commanded the solenoid to open the secondary valve
- Reads OFF when the ECM has not energized the solenoid to open the secondary valve (the engine is operating on the primary intake runners)
### NOTE:
The engine must be warmed up, in closed loop, and operating with certain combinations of speed, throttle opening, and load before AIR INTAKE SOL will read ON.

This is an output signal from the ECM only, it does not indicate whether the solenoid has responded, or whether the valve has in fact opened.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIR PUMP PRS (kPa)</td>
<td>Indicates the AIR PUMP absolute pressure. This is normally atmospheric pressure + 2.5kPa or more when the AIR PUMP is on and the air switching valve is open. The system is closed to atmospheric pressure when the AIR PUMP is OFF and the air switching valve is closed.</td>
<td>0 kPa to 320 kPa</td>
</tr>
<tr>
<td>AIT PMP PLS PRS (kPa)</td>
<td>Indicates the AIR PUMP pulsation pressure. This is cumulative pressure calculated by the ECM.</td>
<td>0 kPa to 639.9 kPa</td>
</tr>
<tr>
<td>AIR PUMP RELAY</td>
<td>Indicates the state of the AIR pump relay, it reads ON when the pump motor is on.</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>AIR PUMP SIGNAL</td>
<td>Indicates the output voltage of the AIR pump motor, it reads LOW when the pump is on.</td>
<td>LOW/HIGH</td>
</tr>
<tr>
<td>AIR SWITCH SOL</td>
<td>Indicates the ECM command to the air injection switching solenoid, it reads:</td>
<td>PORT/CONV</td>
</tr>
<tr>
<td></td>
<td>• PORT when the solenoid has been commanded to move the valve to direct air to the exhaust ports or manifold.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• CONV when the solenoid has been commanded to move the valve to direct air downstream to the catalytic converter.</td>
<td></td>
</tr>
</tbody>
</table>
AIR TEMP (°)
IAT (°)
IAT 1
IAT 2
IAT SENSOR 1 (°)
IAT SENSOR 2 (°)
INTAKE AIR (°)
INTAKE AIR TEMPERATURE SENSOR(2)
  Range: ___________________________________________ variable
Indicates the intake air temperature (IAT) in degrees. Degree readings are PCM calculated from the IAT sensor (1 or 2) signal. Typical ranges are –58°F to 360°F (–50°C to 185°C). Readings should be low on a cold engine and rise as the engine warms up.

AIRFLOW (Hz)
  Range: ___________________________________________ 0 to 1600 Hz
Indicates the volume of intake air to the engine, as Hertz it reads:
  • From 25 to 50 Hz at idle (700 RPM)
  • From 70 to 100 Hz at 2000 RPM depending on engine displacement

AIRFLOW (mS)
  Range: ___________________________________________ 0 to 625 mS
Indicates the volume of intake air to the engine as milliseconds.

AIRFLOW (g/s)
  Range: ___________________________________________ 0 to 500 g/s
AIRFLOW (m3/h)
  Range: ___________________________________________ 0 to 255 m3/h
AIRFLOW (kg/h)
  Range: ___________________________________________ 0 to 408 kg/h
Indicates the amount of air flowing into the engine. The ECM calculates this value of intake airflow based on the MAF sensor output. Readings, which display as grams-per-second (g/s), cubic meters-per-hour (m³/h), or kilograms-per-hour (kg/h) should be low at idle and increase as the throttle opens.

AIRFLOW (V)
AIRFLOW (mV)
  Range: ___________________________________________ 0.0 to 5.0 V
Indicates the volume of intake air entering the engine, it reads:
  • A 5 V when there is no airflow.
  • A 0 V at maximum airflow.
As air volume increases, the voltage output decreases.

AIRFLOW RESET
  Range: ___________________________________________ ON/OFF
Indicates the state of the airflow reset function on some turbocharged vehicles, this function resets the airflow sensor when there is a change from high-speed, heavy-load driving to sudden deceleration. Reads ON only when airflow reset is activated.

AKNOCK
AKNOCK-1
AKNOCK-2
  Range: ___________________________________________ not available
Indicates the status of the knock sensor signal.
**ALL_LAMPS**
Range: __________________________________________________________ ON/OFF
Indicates the status of all warning lamps.

**ALL_SEG**
Range: ______________________________________________________ not available
Indicates the status of all segments.

**ALTERNATOR**
Range: _________________________________________________________ 0 to 100%
Indicates the rate of alternator charging voltage as a percentage of maximum output. This indicates the magnetization ratio of the alternator.

**ALTF(%)**
Range: _________________________________________________________ 0 to 100%
Indicates the generator field current control duty signal status.

**ALTT(V)**
Range: _______________________________________________________ 0.0 to 16.0 V
Indicates the generator output voltage.

**AMBIENT TEMP**
Range: _________________________________________________________ –40 to 419°F or –40 to 215°C
Displays the air temperature outside of the vehicle. A fixed reading of –40°F or –40°C indicates an open sensor circuit. A fixed reading of 419°F or 215°C indicates a shorted sensor circuit.

**AMBIENT TEMP**
Range: _____________________ Min.: –40°F, Max.: 258°F or Min.: –40°C, Max.: 215°C
Indicates the ambient temperature: actual outside atmospheric temperature.

**APP 1 (V)**
**APP 2 (V)**
**APP 3 (V)**
**APS**
**APP SENSOR 1 (V)**
**APP SENSOR 2 (V)**
Range: ________________________________________________________ 0.0 to 5.0 V
Indicates the accelerator pedal position (APP) as voltage, it should read:

- About 0.35–0.95 V at idle
- Above 4.0 V at wide open throttle

Some models use three APP sensors, they are located in a module at the base of the accelerator pedal. The ECM only requires information from one sensor, the other two serve as a fail safe.

**APP 1&2 AGREE**
**APP1/APP2 AGREE**
**APP1/APP3 AGREE**
**APP2/APP3 AGREE**
Range: __________________________________________________________ YES/NO
Indicates the results of a control module test that compares signals from one specific accelerator pedal position (APP) sensor to another specific APP sensor, it reads:

- YES if the sensor signals agree and correspond to the same accelerator pedal positions.
- NO if the sensor signals disagree and correspond to different pedal positions.
APP AVE
Range: ____________________________________________ 0 to 125 counts
Indicates the accelerator pedal position (APP) as step counts. The TAC Module takes the voltages from the 3 APP sensors, averages the readings and converts the readings into counts. The average number of counts is different on every vehicle.

APP CTP SW
Range: __________________________________________________ ON/OFF
Indicates the status of the accelerator pedal position (APP) switch, it reads:
- ON when the accelerator pedal is released.
- OFF when the accelerator pedal is depressed.

APP SENSOR (°)
APP SENSOR 1 (°)
APP SENSOR 2 (°)
Range: __________________________________________________________ 0 to 180°
Indicates the accelerator pedal position (APP) as degrees of throttle opening.

APP SENSOR-A (V)
Range: __________________________________________________________ 0.0 to 5.0 V
Indicates the voltage signal from accelerator pedal position (APP) sensor A, the sensor is a potentiometer connected to the accelerator cable.

APP SENSOR (V)
APP SENSOR B (V)
APP SENSOR-B (V)
Range: ________________________________________________________ 0.0 to 5.0 V
Indicates the voltage signal from accelerator pedal position (APP) sensor B, the sensor is a potentiometer connected to the accelerator cable. It should read half the voltage value of APP sensor A.

APP(%) 
Range: _________________________________________________________ 0 to 100%
Indicates the accelerator pedal position.

APP1 (V)
APP2 (V)
APP3 (V)
Range: ________________________________________________________ 0.0 to 5.0 V
Indicates the voltage signal from accelerator pedal position (APP) sensors.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Accelerator Pedal At 0% (Pedal At Rest)</th>
<th>Accelerator Pedal At 100% (Pedal Fully Depressed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>APP1(V)</td>
<td>Less than 1.1 V</td>
<td>More than 2.0 V</td>
</tr>
<tr>
<td>APP2(V)</td>
<td>More than 3.9 V</td>
<td>Less than 3.0 V</td>
</tr>
<tr>
<td>APP3(V)</td>
<td>More than 3.2 V</td>
<td>Less than 3.5 V</td>
</tr>
</tbody>
</table>

APP2(%) 
Range: _________________________________________________________ 0 to 100%
Indicates the accelerator pedal position sensor 2.
**ARPMDES**

Range: __________________________ variable

Indicates the desired RPM.

**ARPMDES**

Range: __________________________ not available

Indicates the PCM desired ancillary RPM, which is the engine speed required to maintain the vehicle speed being commanded by the speed control system.

**ASCD OD CUT**

OD CUT #1

Range: __________________________ ON/OFF

Indicates a command to shift the transmission from overdrive into a lower gear while operating in cruise control mode. This command may be initiated by the driver pressing the acceleration switch on the cruise control console, or by the ECM, after sensing a loaded engine condition caused by up-hill acceleration. Reads ON when shifted into a lower gear.

**ASD RELAY**

Range: __________________________ ON/OFF

Indicates the status of the auto shutdown relay, it should read ON whenever the engine is running. The ASD relay provides power to the fuel pump, ignition coil, and fuel injectors.

**AST**

Range: __________________________ actual

Indicates the time since start in seconds.

**ASYNCH PULSE**

Range: __________________________ YES/NO

Indicates the asynchronous pulse to the fuel injectors, which provides extra fuel when engine load and speed require it. Readings should be:

- YES when asynchronous pulse function is active
- NO when asynchronous pulse function is inactive

Because these extra pulses are not synchronized with regular injector pulses, they are called asynchronous.

**AT Lockup A or B**

Range: __________________________ ON/OFF

Indicates the status of the lockup solenoids. Solenoid valve A determines the lockup status. Lockup control is on when solenoid coil A is activated. Solenoid valve B controls the lockup area (low, middle, high) in the lockup control ON range.

<table>
<thead>
<tr>
<th>Solenoid A</th>
<th>Solenoid B</th>
<th>Lockup Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td>Low Range</td>
</tr>
<tr>
<td>ON</td>
<td>Cycling ON/OFF</td>
<td>Middle Range</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>High Range</td>
</tr>
</tbody>
</table>

**ATCHK**

Range: __________________________ LOW/HIGH

Indicates the status of the slow speed data link between PGM-FI and AVT, it is used to transmit a timing retard request or automatic transmission trouble codes.
ATF TEMP 1
Range: _________________________________________ –40 to 419°F or –40 to 215°C
Indicates the trans internal fluid temperature. A fixed reading of –40°C or –40°F would indicate an open sensor circuit, A fixed reading of 419°F or 215°C would indicate a shorted sensor circuit.

ATM PRESS
Range: _______________________________________ 0 to 37.0 inHG or 10 to 125 kPa
Indicates the ECM calculated barometric (atmospheric) pressure reading from the ATM Press sensor voltage signal.

ATM PRESS
Range: ___________________________________________ Min.: 0 kPa, Max.: 150 kPa
Indicates atmospheric pressure: Equivalent to atmospheric pressure (absolute pressure).

ATM PRESS(V)
Range: _______________________________________________________ 0.0 to 5.12 V
Indicates the barometric (atmospheric) pressure (ATM) Press sensor provided, analog voltage parameter that varies directly with atmospheric (barometric) pressure.

The ECM uses the ATM Press sensor voltage and the manifold absolute pressure (MAP) sensor voltage to calculate the manifold vacuum and determine true absolute pressure.

Some systems do not have an ATM Press sensor. However, the ECM provides a BARO reading by sampling the MAP sensor reading with the key on and the engine off just before cranking. At this point, manifold pressure should equal, or be very close to, atmospheric pressure. The ECM also updates these BARO estimates when the engine is running by sampling MAP voltage when the engine is at wide-open throttle.

ATSDLB
Range: ______________________________________________________ not available
Indicates the status of the (H) serial data line between the fuel injection ECM and the TCM.

AUTO LRN TIMER
Range: __________________________________________________________ ON/OFF
Indicates whether the vehicle theft deterrent (VTD) is in learn mode or it has timed out. Reads ON when learn mode is active.

AUTO OIL
Range: __________________________________________________________ ON/OFF
Indicates the ECM command to the automatic engine oil feeder pump. The oil feeder pump moves reserve oil from the reservoir into the crankcase. It Reads ON when the ECM has commanded the pump to run.

B/FUEL SCHDL (msec)
Range: __________________________________________________________ ???
Indicates the base fuel schedule at the moment a malfunction is detected. “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned onboard correction. When engine is running, specification range is indicated in “SPEC”.

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**Data Parameters**

B1S1 HTR AMPS
B1S2 HTR AMPS
B2S1 HTR AMPS
B2S2 HTR AMPS

Range: ____________________________ 0.0 to 1.5 A

Indicates heated oxygen sensor (HO2S) B1S1, B1S2, B2S1 and B2S2 heater element current, which is low when heater circuit resistance is high. The heater current is high when circuit resistance is low.

B1S1 L-R (Sec)
B2S1 L-R (Sec)
B1S1 R-L (Sec)
B2S1 R-L (Sec)

Range: ____________________________ 0 to 1.000 sec

Indicates the lean-to-rich (L-R) and rich-to-lean (R-L) oxygen sensor (O2S) switching times for bank 1 (B1) and bank 2 (B2). The ECM monitors for fluctuations in voltage ranging from greater than 0.600 V to less than 0.400 V.

The quicker the switching time, the better the condition of the O2S.

**BACK-UP LIGHT SW**

Range: ____________________________ ON/OFF

Indicates the status of the back-up light switch, it reads ON when the back up lights are on.

**BARO**
BARO S
BARO Sensor
BARO TCM
BAROPRES

Range: ____________________________ 10 to 125 kPa, 400 to 850 mmHg or 0 to 37.0 inHg

Indicates the ECM calculated barometric pressure expressed as kilo Pascal (kPa), millimeters of mercury (mmHg), or inches of mercury (inHg). the value is based on the BARO sensor voltage signal. Readings vary by altitude and ambient weather, expect to see about:

- 100 kPa (29.6 "Hg) at sea level
- 60 kPa (17.8 "Hg) at 14,000 feet

Compare BARO voltage and BARO pressure readings. Voltage should be high when pressure is high and low when pressure is low. If either, or both, of the readings appear abnormal for the expected local barometric pressure, the sensor signal to the ECM is inaccurate or the ECM calculations are incorrect for some reason.

**BARO (V)**
BARO S (V)
BARO SENSOR (V)

Range: ____________________________ 0.0 to 5.12 V

Indicates the voltage signal from the barometric pressure (BARO) sensor. The reading should be high when barometric pressure is near atmospheric pressure at sea level. It should drop as barometric pressure drops.

The ECM uses the BARO sensor voltage and the manifold absolute pressure (MAP) sensor voltage to calculate the manifold vacuum and determine true absolute pressure.

Some systems do not have a BARO sensor. However, the ECM provides a BARO reading by sampling the MAP sensor reading with the key on and the engine off just before cranking. At this point, manifold pressure should equal, or be very close to, atmospheric pressure. The ECM also
updates these BARO estimates when the engine is running by sampling MAP voltage when the engine is at wide-open throttle.

**BARO(\text{Hz})**
- Range: ___________________________ 125 to 160 Hz
  
  Indicates the barometric pressure as hertz.

**BARO\_EGR\_SOL**
- Range: ___________________________ ON/OFF
  
  Indicates the BARO/SEGRP solenoid status.

**BASADJ**
- Range: ___________________________ ON/OFF
  
  Indicates whether the BCM is in base idle adjustment mode, it reads ON when the ECM is in base idle air adjustment mode.

**BATT (V)**
- **BATTERY (V)**
  - Range: ___________________________ 0.0 to 16.0 V
  
  Indicates vehicle battery voltage. The engine control system has no specific sensor to measure battery voltage, but some ECMS calculate this analog parameter from a sensing circuit across the supply voltage circuit.

  The reading should be close to normal charging system regulated voltage with the engine running. This is typically 13.5 to 14.5 V at idle. Check the reading against actual voltage measured at the battery or alternator. Check vehicle specifications for exact values.

**BATT TEMP (V)**
- **BATT TEMP (°)**
  - Range: ___________________________ 0.0 to 5.1 V
  
  Indicates a direct voltage reading from the battery temperature sensor, which is a variable resistor in parallel with a 5 V reference signal to the ECM.

  Sensor voltage and temperature are inversely related. Low temperature produces high voltage; high temperature produces low voltage.

**BATT TEMP (°)]**
- Range: ___________________________ –40 to 199°C or –40 to 389°F
  
  Indicates the approximate temperature of the battery. The ECM uses the battery temperature sensor signal to regulate the charging system. The ECM charges a cold battery at a higher rate than a warm battery.

  The ECM uses the battery voltage parameter for self-diagnostics. Some ECM functions are modified if voltage falls too low or rises too high. For example, if voltage drops below a minimum value, the ECM attempts to recharge the battery by increasing idle speed. This may affect the idle speed control, fuel metering, and ignition timing parameters.

**BBP SENSOR**
- Range: ___________________________ variable
  
  Indicates the brake boost pressure sensor (booster pressure) signal expressed as kilo Pascal (kPa), millimeters of mercury (mmHg), or inches of mercury (inHg).
BLM
BLOCK LEARN
Range: ____________________________________________________________0 to 255

Indicates whether the ECM is commanding a rich or a lean mixture. The block learn multiplier (BLM) number represents the operation and long-term correction of the fuel metering of some fuel-injected engines.

Like “INTEGRATR” on page 404, the BLM number can range from 0 to 255. The midpoint is 128. A BLM number higher than 128 indicates that the ECM commanded a long-term rich mixture correction. A BLM number lower than 128 indicates that the ECM is commanding a lean mixture (Figure 18-3).

The BLM number follows the integrator number and makes long-term corrections to fuel metering in response to short-term integrator changes. For example, integrator and block learn may both start at 128. The integrator number may move up toward or above 130. At that point, the BLM number may move up to 129. The integrator then returns to 128 to indicate that it is controlling fuel metering at the midpoint of an overall richer operating condition. A similar action occurs when the ECM commands a leaner mixture and the numbers move downward. Refer to “INTEGRATR” on page 404 for more information.

Figure 18-3 Rich/lean correction from base midpoint (0)

Depending on the vehicle, block learn is stored in either volatile or nonvolatile ECM memory.

If BLM is stored in volatile memory, the values are erased when the engine is turned off and returned to 128 when the engine is restarted. If BLM is stored in nonvolatile memory, the values are retained when the engine is turned off and returned to the stored values when the engine is started. Disconnecting the battery or removing the ECM fuse erases nonvolatile memory and returns BLM value to 128.

Compare BLM numbers to injector on-time. Numbers above 128 indicate increased on-time, while numbers below 128 indicate decreased on-time. BLM corrections operate only in closed loop. In open loop, the number goes to a fixed value, usually 128.

BLM CELL
Range: ____________________________________________________________0 to 15

Indicates which block learn multiplier (BLM) cell the engine is operating in at the moment.

The BLM is divided into 16 cells, numbered from 0 to 15. The cells are arranged in a theoretical grid, four or five high and four or five wide. The height represents engine load from low to high, and the width represents engine speed from low to high. Any combination of engine load and

---

Figure 18-3 shows the rich/lean correction from the base midpoint (0) for various BLM numbers. The figure indicates that numbers above 128 indicate increased on-time, while numbers below 128 indicate decreased on-time.
speed fits into one of the 16 cells in the theoretical grid. Some fuel control programs do not use all 16 cells.

**BLOCK F INFO**

Range: ______________________________________________________ not available

Indicates the block F Information (H) data.

**BLOWER FAN SW**

Range: __________________________________________________________ ON/OFF

Indicates the blower motor switch.

**BOO**

BrakeOnOff

**BRAKE SW**

**BRAKE SWITCH**

**BRAKE SWITCH B**

**BRAKE SWT**

Range: __________________________________________________________ ON/OFF

Indicates the status of the brake pedal switch, it reads:

- ON when the brakes are applied
- OFF when the brakes are not applied

**BOO=BRAKE SW**

Range: __________________________________________________________ ON/OFF

Indicates the status of the brake on/off (BOO) switch. It reads ON when the ECM has recognized a 4-3 downshift, which should unlock the torque converter clutch on some models. When ON, related parameters should be:

- 4-3 DOWNSHIFT reads YES
- TCC COMMAND reads OFF.

**BOOST PRS VSV**

**BOOST VSV**

Range: __________________________________________________________ ON/OFF

Indicates the ECM command to the turbocharger wastegate control (BOOST) valve vacuum switching valve. Reads ON when the VSV opens the wastegate valve.

**BOOST SENSOR**

Range: __________________________________________________________ variable

Indicates turbocharger boost pressure inside the intake manifold, it should read:

- Close to barometric pressure at idle
- High when the engine is fully loaded WOT
- Zero during closed throttle deceleration

**BPA**

Range: __________________________________________________________ ON/OFF

Indicates the brake pressure applied switch.

**BRAKE BOOSTER PRESS SENSOR**

Range: _______________________________8.9 to 3.4 V, 10 to 101 kPa or 3 to 20 inHg

Indicates the negative pressure (vacuum) or the relative voltage of the negative pressure internal to the brake booster assembly.
BRAKE SW1
BRAKE SW2

Range: ________________________________ ON/OFF

Indicates brake switch (BRAKE SW1) and stop lamp switch (BRAKE SW2) status, which are input to the automatic speed control system.

B1S1 L-R(Sec)
B2S1 L-R(Sec)
B1S1 R-L(Sec)
B2S1 R-L(Sec)

Range: ________________________________ 0 to 1.000 sec

Indicates the lean-to-rich (L-R) and rich-to-lean (R-L) oxygen sensor (O2S) switching times for bank 1 (B1) and bank 2 (B2). The ECM monitors for fluctuations in voltage ranging from greater than 0.600 V to less than 0.400 V.

BYPASS AIR

Range: ________________________________ ON/OFF

Indicates the secondary air injection bypass.

BYPASS AIR 1

Range: ________________________________ ON/OFF

Indicates the secondary air injection bypass 1.

C SHAFT SPD (km.h) (MPH)

Range: ________________________________ 0 to vehicle max.

Indicates the vehicle speed calculated from the countershaft RPM on a manual transmission.

C.C. CANCEL HISTORY

Range: ________________________________ 0000(H) to 8000(H)

Indicates the cruise control cancel history, which shows the reason why cruise control was canceled. The “C.C. CANCEL HISTORY.1” data is the latest data, possible readings are:

- 000(H): NO DATA
- 0001(H): MAIN SW OFF = Main switch was pressed
- 0002(H): BRAKE PEDAL = Brake pedal was pressed.
- 0004(H): GEAR/CLUTCH PDL: AT = Except D range. MT = Clutch pedal was pressed.
- 0008(H): C.C. CANCEL SW ON = Cancel switch was pressed.
- 0010(H): VSA/ABS ACT = VSA/ABS control was active.
- 0020(H): SET/RES SW & BRAKE pressed at the same time.
- 0040(H): CAN COM: CAN communication problem
- 0080(H): Out of Vehicle SPD: Vehicle speed is out of control.
- 0100(H): IHCC COM ERROR: Communication error with IHCC control module.
- 0200(H): Vehicle SPD ERROR: Vehicle speed data in ECM is error.
- 0400(H): Accel ERROR: Abnormal acceleration or deceleration.
- 0800(H): 1ST GEAR: Drive with 1st gear position.
- 1000(H): IHCC request: Cancellation request from IHCC.
• 4000(H): Vehicle SPD ERROR: Vehicle speed memory in ECM is error.
• 8000(H): IHCC ERROR: IHCC control module failed

CACBYP
Range: __________________________________________________________ ON/OFF
Indicates the charge air cooler solenoid valve.

CALC B1 TWC(°)
Range: ______________________________________ 572 to 1949°F or 300 to 1065°C
Indicates the temperature of the bank 1 catalytic converter as calculated by the control module based on various systems inputs. The scan tool will display a higher value at higher catalytic converter temperatures. The scan tool will display lower values at lower catalytic converter temperatures.

CALC B2 TWC(°)
Range: ______________________________________ 572 to 1949°F or 300 to 1065°C
Indicates the temperature of the bank 2 catalytic converter as calculated by the control module based on various systems inputs. The scan tool will display a higher value at higher catalytic converter temperatures. The scan tool will display lower values at lower catalytic converter temperatures.

CALC CAT TMP
Range: ______________________________________ 572 to 1949°F or 300 to 1065°C
Indicates the PCM calculated catalytic converter temperature on some vehicles. The calculations are based on sensor inputs for exhaust oxygen content, engine coolant temperature, load, speed, and other values.

CALC LOAD(%)  
Range: ________________________________________ Min.: 0 %, Max.: 100 %
Indicates the calculated load by ECM.
• 15.0 to 35.0 %: Idling
• 10.0 to 30.0 %: Running without load (2,000 rpm)

CALC VACUUM
Range: ___________________________________________ 0 to 80 kPa or 0 to 24 inHg
Indicates the PCM-calculated intake manifold vacuum, which is directly related to engine load. The lower the displayed value, the greater the engine load.

CAL ID
Range: _________________________________________________ 1111111 to 9999999
Indicates the ECM calibration ID number, which is used for service identification.

CAL/LD VAL(%)
CAL/LD VALUE
CALC LOAD (%)
Range: _________________________________________________________ 0 to 100%
Indicates a PCM calculated relative engine load, which is derived by dividing the actual manifold airflow volume by the maximum possible manifold airflow volume.
A high number indicates a heavy load, a low number a lighter load.
IDLE SWITCH
Range: _______________________________ ON/OFF or CLSD/OPEN

Indicates the position of the idle switch:

- CLSD or ON at closed throttle, typical of a stationary, idling engine
- OPEN or OFF when the throttle is off idle

Idle speed control on engines using the IDLE SW parameter are not regulated by the ECM. The CALC CLSD THRT parameter is calculated by the ECM based on throttle position sensor input.

CAM HI TO LO
CAM LO TO HI
Range: _______________________________ 0 to 65535

Indicates a count of the number of camshaft position (CMP) sensor signal changes as voltage goes from low to high.

CAM PHASE ACT (°)
Range: _______________________________ 0 to 25°

Indicates the actual PCM commanded camshaft retard in degrees.

CAM PHASE DES (°)
Range: _______________________________ 0 to 25°

Indicates the PCM desired camshaft phase angle.

CAM PHASE DUTY (%)
Range: _______________________________ 0 to 100%

Indicates the duty cycle the PCM is applying to the camshaft phase solenoid to achieve desired cam retard or advance.

CAM PHASE VARI
Range: _______________________________ 0 to 25%

Indicates the difference in degrees between the desired and actual camshaft angle.

CAM SENSOR
CRANK SENSOR
Range: _______________________________ YES/NO

Indicates the status of the camshaft position (CMP) and crankshaft position (CKP) sensor signals used in direct ignition systems (DIS). The CMP signal is used for fuel injection timing and cylinder identification. The CKP signal is used to control fuel injection quantity and determine engine speed and spark advance.

When starting or running the engine, these parameters read YES. These parameters are useful when troubleshooting a no-start problem.
CAN CIRC 1
CAN CIRC 2
CAN CIRC 3
CAN CIRC 4
CAN CIRC 5
CAN CIRC 6
CAN CIRC 7
CAN CIRC 8
CAN CIRC 9
Range: _______________________________________________ UNKNOWN/NORM(OK)
Indicates the condition of controller area network (CAN) circuits 1 to 9.

CAN CTRL VSV
Range: _______________________________________________ ON/OFF
shows the status of the EVAP canister control vacuum switching valve, which is used for active
test support.

CASeGND (V)
Range: _______________________________________________ –16.0 to 16.0 V
Indicates the voltage difference between the PCM case ground and the hardwired fuel level input
from the fuel pump driver module.
A typical reading is 0.027 V, values above 0.050 V indicate high resistance.

CAT CMPL
Range: _______________________________________________ COMPLETE/INCOMPLETE
Indicates the catalyst monitor status.

CAT MON TEMP
CAT MONITOR CONDITION
CAT MONITOR CONDITION B1
CAT MONITOR CONDITION B2
Range: _______________________________________________ OK/NG
Indicates the catalytic monitoring system temperature condition, which indicates the capability to
detect catalytic system deterioration.

CAT ENA
Range: _______________________________________________ UNABLE/ENABLE
Indicates the catalyst monitor status.

CAT MONITOR
COMPONENT MONITOR
EVAP MONITOR
FUEL SYS MONITOR
MISFIRE MONITOR
O2S(A/FS) MONITOR
SEC AIR MONITOR
Range: __________________________ COMPLETE/INCOMPLETE or AVAILABLE/NOT AVAILABLE
These parameters are part of the readiness monitors used to determine if the OBD-II
self-diagnostics test has been run and/or the resulting status of the test.
CAT OT FC CYL#1
CAT OT FC CYL#2
CAT OT FC CYL#3
CAT OT FC CYL#4
CAT OT FC CYL#5
CAT OT FC CYL#6
CAT OT FC CYL#7
CAT OT FC CYL#8

Range: __________________________________________________________ OFF/ON

Indicates if Catalyst Over Temp protection Fuel Cut for that cylinder is active (reads ON).

CAT TEMP B1S1
CAT TEMP B1S2
CAT TEMP B2S1
CAT TEMP B2S2
CAT TEMP B2S2

Range: __________________________________ –40 to 11,756.3°F or –40 to 6,513.5°C

Indicates the calculated temperature of the catalyst substrate for the indicated cylinder bank or oxygen sensor. For example, B1S1/B2S2 is the reading from bank 1 sensor 1 which is the upstream O2S. B1S2/B2S2 is the reading from bank 1 sensor 2, which is the downstream O2S. Temperature readings of 400°C to 800°C indicate a properly warmed-up catalyst.

CAT mon_ready

Range: __________________________________________________________ YES/NO

Indicates that the catalyst efficiency monitor has successfully completed.

CAT TEMP 11
CAT TEMP 21

Range: __________________________________ –40 to 11,756.3°F or –40 to 6,513.5°C

Indicates the catalyst temperature for bank 1, sensor 1.

Indicates the catalyst temperature for bank 1, sensor 2.

CC ENGAGED

Range: __________________________________________________________ YES/NO

Indicates the status of the cruise control switch it reads:

• YES when the cruise control switch is on and the set/coast switch is activated
• NO when the cruise control switch is on and the set/coast switch is released

CC INHIBITED

Range: __________________________________________________________ YES/NO

Indicates the PCM commanded operating state of the cruise control system, it reads:

• YES when cruise is inhibited
• NO when cruise is not inhibited
**CC ON/OFF SW**
**CC RES/ACC**
**CC RES/ACC SW**
**CC SET/CST SW**

Range: _________________________________________________ ON/OFF or YES/NO

Indicates the current state of the cruise control switches, it should read:

- ON or YES when the circuits are closed
- OFF or NO when the circuits are open

The resume (RES) accelerate (ACC) and the set coast (CST) switches are in parallel to each other and in series with the On/Off switch.

The CC RES/ACC and CC SET/CST parameters should only read YES when CC ON/OFF reads ON. If the CC ON/OFF parameter reads OFF, the CC RES/ACC and CC SET/CST parameters should both read NO.

**CCM CMPL**

Range: ___________________________________________ COMPLETE/INCOMPLETE

Indicates the comprehensive component monitor.

**CCM ENA**

Range: __________________________________________________ UNABLE/ENABLE

Indicates the comprehensive component monitor.

**CCP COMMAND**

Range: __________________________________________________________ ON/OFF

Indicates the ECM output signal to the charcoal canister purge (CCP) valve. It reads ON when the ECM has de-energized the solenoid to allow purging, and reads OFF when the solenoid is energized to prevent purging.

**CCSFault**

Range: __________________________________________________________ YES/NO

Indicates the presence of a fault in the coast clutch solenoid circuit. It only reads YES when a circuit fault is present.

**CDCV**

Range: __________________________________________________________ ON/OFF

Indicates the canister drain cut valve control signal.

**CHASSIS PITCH**

Range: __________________________________________________________ YES/NO

Indicates the pitch status of the chassis, it reads:

- YES when pitch conditions exist
- NO when pitch conditions do not exist

**CHECK MODE**

Range: __________________________________________________________ OFF/ON

Indicates check mode. ON: Check mode ON.

**CHIME**

Range: __________________________________________________________ ON/OFF

Indicates the chimer control.
CHRGLP
Range: __________________________________________________________ ON/OFF
Indicates the generator warning light status.

CHT
CHT SENSOR
Range: __________________________________________________________ –40 to 399°F or –40 to 199°C
Indicates the cylinder head temperature.

CHT_FAULT
Range: __________________________________________________________ YES/NO
Indicates the cylinder head temperature status.

CHTIL
Range: __________________________________________________________ ON/OFF
Indicates the operating status of the cylinder head temperature indicator lamp (CHTIL) and should only read ON if the lamp is on.

CHTIL_FAULT
Range: __________________________________________________________ YES/NO
Indicates the cylinder head temperature indicator lamp status.

CKP A NO PULSE
CKP B NO PULSE
CKP NO PULSE
Range: ___________________________________________________________ 0 to 255
Indicates the crankshaft position sensor A (or B) disappearance counter (Counts).

CKP A NOISE
CKP B NOISE
CKP NOISE
Range: ___________________________________________________________ 0 to 255
Indicates the crankshaft position sensor A (or B) noise counter (Counts).

CKP RESYNCS
Range: ___________________________________________________________ 0 to 255
Indicates a count of the number of times the PCM had to synchronize the crankshaft position (CKP) sensor.

CKP SENSOR(RPM)
Range: __________________________________________________________ variable
Indicates the engine speed based on the signal from the crankshaft position (CKP) sensor.

CLEAR FLOOD
Range: __________________________________________________________ YES/NO
Indicates whether the ECM is operating in clear flood mode, and only reads YES when clear flood is active. On many fuel-injected engines, the ECM responds to engine cranking with a wide-open throttle by commanding a clear flood mode, which provides a very lean air-fuel mixture to help clear a flooded engine.

CLR DIST
Range: __________________________________________________________ actual
Indicates the distance since the diagnostic trouble codes were cleared.
CLUTCH SWITCH
Range: __________________________________________________________ ON/OFF
Indicates the state of the clutch pedal position switch, it reads ON when the clutch pedal is
depressed and the switch is electrically closed.

CLV
Range: _________________________________________________________ 0 to 100%
Indicates the PCM calculated load value. This percentage, current air flow divided by peak air
flow, indicates the capacity of the engine load. Normal readings at idle are 10 to 35%.

CMP 1 NO PULSE
CMP 2 NO PULSE
CMP A NO PULSE
CMP B NO PULSE
CMP NO PULSE (COUNTS)
Range: ______________________________________________________ not available
Indicates the camshaft position (CMP) sensor disappearance counter (Counts).

CMP NOISE 1
CMP NOISE 2
CMP A NOISE
CMP B NOISE
Range: ______________________________________________________ not available
Indicates the camshaft position (CMP) 1 (or 2) noise counter. This counter detects the noise
compared with CKP sensor 1 (or 2).

CMP CTRL CMD (°)
Range: __________________________________________________________ 0 to 180°
Indicates the camshaft position sensor control command. The ECU calculates the target angle of
the camshaft, and uses it to regulate the VTC control valve solenoid.

CMP CTRL (°)
Range: __________________________________________________________ 0 to 180°
Indicates the camshaft position sensor control in degrees, which is the cam angle controlled by
the camshaft actuator.

CMP RESYNCS
Range: ___________________________________________________________ 0 to 255
Indicates a count of the number of times the PCM had to synchronize the camshaft position
(CMP) sensor.

CMP SENSOR(RPM)
Range: __________________________________________________________ variable
Indicates the engine speed based on the signal from the camshaft position (CKP) sensor.

CMP_FAULT
Range: __________________________________________________________ YES/NO
Indicates the camshaft position sensor status.

CoastClSol
Range: __________________________________________________________ ON/OFF
Indicates the PCM command to the coast clutch solenoid, which allows engine braking in third
gear when fourth gear is enabled by the transmission control switch. Reads ON when the coast
clutch solenoid is activated.
### Data Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoastClSol (mA)</td>
<td>0 to 1000 mA</td>
<td>Indicates the actual current of the PCM output to the coast clutch solenoid in milliamperes. When activated, coast clutch solenoid allows engine braking in third gear when fourth gear is disabled by the transmission control switch.</td>
</tr>
<tr>
<td>COLD STARTUP</td>
<td>YES/NO</td>
<td>Indicates whether the engine is operating in cold-start mode. A cold-start is when the engine coolant temperature (ECT) rises above a predetermined temperature during an ignition cycle. During the next ignition cycle, the ECT should be below the predetermined point. Also, the ECT and the intake air temperature (IAT) are less than 122°F (50°C) and are within 5°F (3°C) of each other at start-up. When the above is true, the display reads YES.</td>
</tr>
<tr>
<td>COLP</td>
<td>ON/OFF</td>
<td>Indicates the refrigerant pressure switch (middle pressure) status.</td>
</tr>
<tr>
<td>COMMEGR(%)</td>
<td>0 to 100%</td>
<td>Indicates the commanded EGR status.</td>
</tr>
<tr>
<td>COMMEVAP(%)</td>
<td>0 to 100%</td>
<td>Indicates the commanded evaporative purge.</td>
</tr>
<tr>
<td>COMMTAC(%)</td>
<td>0 to 100%</td>
<td>Indicates the commanded throttle actuator control.</td>
</tr>
<tr>
<td>COMPONENT MONITOR</td>
<td>NOT AVAILABLE/AVAILABLE</td>
<td>Indicates the comprehensive component monitor.</td>
</tr>
<tr>
<td>COND FAN</td>
<td>ON/OFF</td>
<td>Indicates the FAN signal.</td>
</tr>
<tr>
<td>COND FAN LO</td>
<td>ON/OFF</td>
<td>Indicates the FAN 1 control signal.</td>
</tr>
<tr>
<td>COOL FAN(%)</td>
<td>0 to 100%</td>
<td>Indicates the duty cycle on engines that control the engine fan by pulse-width modulation. As the commanded state increases, so does the percentage of ON time the duty cycle percent is proportional to the fan speed:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• A low reading indicates a low fan speed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• A high reading indicates a high fan speed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 0% indicates the fan is off.</td>
</tr>
</tbody>
</table>
COOLANT (°)
COOLANT TEMP
ECT (°)

Range: _________________________________________ –40 to 199°C or –40 to 389°F

Indicates the ECM calculated engine coolant temperature (ECT) in degrees based on the ECT sensor signal. The sensor is a thermistor installed in the engine coolant passages.

Typical readings for a fully warmed engine running at idle are 185° to 220°F (85° to 105°C). A reading of -40°C or -40°F may indicate an open in the sensor or the sensor circuit. A reading above 185°C or 366°F may indicate a short in the sensor or the sensor circuit.

COOLANT (V)

Range: ________________________________________________________ 0.0 to 5.1 V

Indicates the voltage signal from the engine coolant temperature (ECT) sensor.

Sensor voltage and temperature are inversely related. A low temperature produces a high voltage signal, and a high temperature produces a low voltage signal.

COOLANT TEMP

Range: _____________________ Min.: –40°F, Max.: 258°F or Min.: –40°C, Max.: 140°C

Indicates the engine coolant temperature. 80 to 105°C (176 to 221°F): After warming up.

- If value –40°C (–40°F): sensor circuit open
- If value 140°C (284°F): sensor circuit shorted

COOLING FAN
LOW RAD FAN
FAN CTRL
HIGH RAD FAN

Range: __________________________________________ ON/OFF or OFF/LOW/HIGH

Indicates the ECM command to operate the radiator cooling fan. The LOW RAD FAN and HI RAD FAN parameters refer to one fan with two speed settings.

CPP

Range: ____________________________________________ RELEASED/DEPRESSED

Indicates the clutch pedal position switch

CPP_SW

Range: ____________________________________________ RELEASED/DEPRESSED

Indicates the clutch pedal position switch.

CRANK

Range: ____________________________________________ YES/NO

Indicates whether the ignition switch cranking circuit is closed through the starter motor solenoid, it reads:

- YES when the cranking circuit is closed and the engine is cranking
- NO when the circuit is open

The CRANK signal causes the ECM to shut down temporarily as the engine cranks because power cannot be ensured with the high current draw of the starter.

CRANK #2 RPM

Range: ____________________________________________ 0 to 2000 rpm

Indicates the speed of the camshaft as determined by the CMP and CKP sensor signal, it is used in direct ignition systems (DIS).
CRANK REQUEST
Range: _____________________________________________________________________ YES/NO
Indicates the PCM request to engage the cranking relay and power the starter, it only reads YES when the ignition switch is in the crank position.

CRANKING
Range: _____________________________________________________________________ ON/OFF
Indicates the position of the ignition switch, it reads:
• ON when the ignition switch is in the crank (start) position
• OFF at all other times

The ECM uses this signal to control the fuel injection, idle speed, and ignition timing during engine cranking.

CRANKING RPM
Range: _____________________________________________________________________ 0 to 800 rpm
Indicates engine RPM while the starter is cranking. The ECM uses this information to calculate fuel metering for the best air-fuel ratio at starting. You this parameter to check cranking performance or troubleshoot starting problems.

CRUISE BRAKE SW
Range: _____________________________________________________________________ ON/OFF
Indicates state of the brake switch for cruise control, it reads ON when the brake pedal is depressed.

CRUISE CANCEL SW
Range: _____________________________________________________________________ ON/OFF
Indicates the status of the cruise control cancel switch, it reads ON when the cruise control cancel switch is pressed.

CRUISE CONTROL
Range: _____________________________________________________________________ ON/OFF
Indicates the cruise control state, it reads ON when the cruise control is active.

CRUISE INDICATOR
CRUISE LAMP
CRUISE LIGHT
Range: _____________________________________________________________________ ON/OFF
Indicates whether the cruise control lamp is on or off. When using cruise control ECM turns on the cruise control light on the instrument panel.

CRUISE MAIN SW
CRUISE MASTER (MAIN) SWT
CRUISE SW
MAIN SW
Range: _____________________________________________________________________ ON/OFF
Indicates the status of the cruise control main switch, it reads ON when the switch is turned on and electrically closed.

When this switch is on, it sends a signal to the throttle actuator control (TAC) Module that allows all other cruise control functions.
CRUISE RESUME SWT
Range: __________________________________________________________ ON/OFF
Indicates the status of the cruise control resume switch, it reads ON when the switch is turned on and electrically closed.

CRUISE SET SWT
Range: __________________________________________________________ ON/OFF
Indicates the status of the cruise control set switch, it reads ON when the switch is turned on and electrically closed. The Cruise Control light on the dash should also be on.

CRUS REQ TH (°)(%)
Range: _______________________________________________ 0 to 180° or 0 to 100%
Indicates the throttle valve position requested by the cruise control module.

CTP
CTP (APS)
CTP SW
Range: ___________________________________________ON/OFF or OPEN/CLOSED
Indicates the closed throttle position (CTP) status, it should read:
• ON or CLOSED with a closed throttle
• OFF or OPEN whenever the throttle is opened
The ECM uses this parameter to cut fuel delivery and lean the mixture during deceleration within certain RPM ranges. This parameter may be ECM-calculated based on the throttle position (TP) sensor or it may have a separate CTP switch integrated into the TP sensor.

CURRENT SENSOR (V)
Range: ______________________________________________________ not available
Indicates the voltage signal from the air pump electric current sensor.

CYL
Range: _________________________________________________________ 6 5 4 3 2 1
Indicates each cylinder. The displayed number shows each cylinder.

CYL 1 (2, 3, 4, 5, or 6) MISFIRE
Range: ___________________________________________________________ actual
Indicates the cylinder misfire counter (counts). It indicates the number of misfires that occurred at the specific cylinder.

Cyl. DEACT. PERFORMANCE TST
Range: __________________________________________________________ OFF/ON
Indicates ON if all the Displacement On Demand (DOD) enabling conditions are met. The parameter displays OFF if one or more enabling conditions are out of range.

CYL DEACT SYSTEM COMMAND
Range: ________________________________________________________ V4/V8
Indicates the current status of the total number of cylinders being commanded to be active.
### Data Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CYL #1 (%)</td>
<td></td>
</tr>
<tr>
<td>CYL #2 (%)</td>
<td></td>
</tr>
<tr>
<td>CYL #3 (%)</td>
<td></td>
</tr>
<tr>
<td>CYL #4 (%)</td>
<td></td>
</tr>
<tr>
<td>CYL #5 (%)</td>
<td></td>
</tr>
<tr>
<td>CYL #6 (%)</td>
<td></td>
</tr>
<tr>
<td>CYL #7 (%)</td>
<td></td>
</tr>
<tr>
<td>CYL #8 (%)</td>
<td></td>
</tr>
<tr>
<td>CYL x MISFIRES</td>
<td>0 to 100%</td>
</tr>
</tbody>
</table>

Indicates the misfire rate detected in cylinders 1 to 8 expressed as a percentage the previous 1000 crankshaft revolutions.

A 0% reading means no misfires occurred during the past 1000 crankshaft revolutions.

The “x” in CYL x MISFIRES is a variable from 1 to 8, indicating the cylinder being monitored.

<table>
<thead>
<tr>
<th>CYL 1 DEACT SOL COMMAND</th>
<th>Range: ON/OFF</th>
</tr>
</thead>
</table>

Indicates the current status of cylinder 1. Reads OFF if the cylinder is being commanded to deactivate. By default, the cylinder is normally activated.

<table>
<thead>
<tr>
<th>CYL 4 DEACT SOL COMMAND</th>
<th>Range: ON/OFF</th>
</tr>
</thead>
</table>

Indicates the current status of cylinder 4. Reads OFF if the cylinder is being commanded to deactivate. By default, the cylinder is normally activated.

<table>
<thead>
<tr>
<th>CYL 6 DEACT SOL COMMAND</th>
<th>Range: ON/OFF</th>
</tr>
</thead>
</table>

Indicates the current status of cylinder 6. Reads OFF if the cylinder is being commanded to deactivate. By default, the cylinder is normally activated.

<table>
<thead>
<tr>
<th>CYL 7 DEACT SOL COMMAND</th>
<th>Range: ON/OFF</th>
</tr>
</thead>
</table>

Indicates the current status of cylinder 7. Reads OFF if the cylinder is being commanded to deactivate. By default, the cylinder is normally activated.

<table>
<thead>
<tr>
<th>CYL ALL MISS RATE</th>
<th>Range: Min.: 0, Max.: 255</th>
</tr>
</thead>
</table>

Indicates all cylinders misfire rate: 0 to 35.
Data Parameters

CylHdTemp (V)  
Range: ______________________________________________________ 0.25 to 4.75 V  
Indicates cylinder head temperature expressed as voltage. The higher the voltage, the lower the temperature.

D SWITCH  
Range: __________________________________________________________ ON/OFF  
Indicates the transmission Drive range switch status.

D/C Converter Control ELD Unit  
ELD  
Range: ______________________________________________________ not available  
Indicates the total vehicle electric load based on current in the main power harness. This value is taken from the electric load detector (ELD) sensor signal, which is installed on the main fuse box.

D/C CTRL VOL (V)  
Range: ________________________________________________________ 0.0 to 25 V  
Indicates the battery charging voltage of the D/C converter in standard (14.5 V) mode.

D/M MUFFLER SW  
Range: __________________________________________________________ ON/OFF  
Indicates the status of the muffler mode changeover switch on the Mitsubishi 3000GT Turbo and Dodge Stealth turbo with a dual-mode (D/M) muffler, it reads:
- ON when the switch is in the TOUR position
- OFF when the switch is in the SPORT position

A valve in the main muffler inlet switches between two different inlet apertures: a large aperture (sport mode) for improved fuel consumption and driveability and a smaller aperture (tour mode) for quieter operation at lower engine RPM. The changeover switch is located on the dash.

DAMPING CTRL  
Range: __________________________________________________________ ON/OFF  
Indicates the damping control status. The damping control eases the fluctuation in revolution speed with a IMA motor, it reads ON when the function is active.

DBW (drive by wire)  
Range: __________________________________________________________ not available  
Indicates the calculated volume of idle airflow with the accelerator pedal fully closed as counts. The greater the number of counts, the more the idle air passage is open.

DCRKMF  
Range: __________________________________________________________ not available  
Indicates the crankshaft sensor for misfire detection disconnect counter.

DCT_CNT  
Range: __________________________________________________________ actual  
Indicates the number of trouble codes set.

DECEL ENLEAN  
DECEL FUEL C/OFF  
FC AIRFLOW  
Range: ______________________________________________________ YES/NO or ON/OFF  
Indicates whether the ECM is reducing injector pulse width to create a lean air-fuel mixture for deceleration, it should read:
Lean mixtures, or fuel cutoff, on deceleration help to prevent high HC emissions and allow the engine to return to a 14.7:1 idle air-fuel ratio more quickly. Reduced fuel flow also helps to prevent stalling at idle from an overly rich mixture.

**DECHOKE**

- Range: __________________________________________________________ YES/NO

No additional information is available for this parameter.

**DES IDLE RPM**

**DESIRED IDLE**

- Range: __________________________________________________________ 0 to engine max.

Indicates the desired idle RPM the PCM is attempting to maintain.

If there is a large difference between actual and desired idle readings, the ECM may have reached its control limit without being able to control the idle speed. This may be due to either a basic mechanical or electrical problem with the engine.

**DESIRED FAN RPM**

- Range: __________________________________________________________ 0 to fan max.

Indicates the desired fan speed the PCM is attempting to maintain. The PCM compensates for various engine loads based on engine coolant temperature in order to keep the fan at the desired speed by turning on the fan clutch and monitoring the fan speed sensor.

**DESIRED TP (%)**

- Range: __________________________________________________________ 0 to 100%

Indicates the desired throttle angle that the PCM is trying to maintain. Compare the actual and desired throttle position readings. They should be equal or close to each other.

**DIST DTC CLEAR**

- Range: __________________________________________________________ Min.: 0 km/h, Max.: 65,535 km/h

Indicates distance after DTC cleared: Equivalent to drive distance after DTCs erased.

**DISTANCE SINCE DTC CLEARED**

- Range: __________________________________________________________ variable

Indicates the distance accumulated since an emission diagnostic trouble code was cleared. The distance displayed will increase as the vehicle is driven.

**DOWNLVR**

- Range: __________________________________________________________ ON/OFF

Indicates the status of the gear shifter (Slap Shift).

- ON when selector lever is – side
- OFF when selector lever is other than the above

**DPFE (V)**

- Range: __________________________________________________________ 0.45 to 4.60 V

Indicates the differential pressure feedback EGR (DPFE) sensor signal, which reflects exhaust pressure. The PCM uses DPFE to compute optimum EGR flow.

Pressure feedback EGR systems control EGR flow rate by monitoring pressure drop across a remotely located sharp-edged orifice. There are several sensor designs, some have an aluminum housing and use a 0.55 V offset, others have an aluminum or plastic housing and use a 1.0 V offset. Typically, sensor output should be as shown in the table below:
Data Parameters

Table 18-4 Typical sensor outputs for DPFE parameter

<table>
<thead>
<tr>
<th>0.55 Volt Offset</th>
<th>1.0 Volt Offset</th>
</tr>
</thead>
<tbody>
<tr>
<td>inHg</td>
<td>kPa</td>
</tr>
<tr>
<td>8.83</td>
<td>29.81</td>
</tr>
<tr>
<td>6.62</td>
<td>22.36</td>
</tr>
<tr>
<td>4.41</td>
<td>14.90</td>
</tr>
<tr>
<td>2.21</td>
<td>7.46</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

DPFEGR
Range: ______________________________________________________ not available
Indicates the delta feedback pressure exhaust gas recirculation.

DRIVE Count
DRIVE_CNT
Range: ______________________________________________________ 0 to 255
Indicates the number of times the engine has been started since the last DTC P1000 (monitor readiness) set.

DRIVE DIST (km)(mile)
Range: ______________________________________________________ actual distance
Indicates the drive distance.

DRIVE TIME (min)
Range: ______________________________________________________ actual minutes
Indicates the total drive time in minutes.

DRV STATUS
Range: ____________________________________________ IDLE, F/C, or F/C DECEL
Indicates the control status of the vehicle, reading are:
- IDLE during idling control
- F/C during fuel cut control
- F/C DECEL during fuel cut control on deceleration.

DTC Count
DTC_CNT
Range: ______________________________________________________ 0 to 255
Indicates the DTC count. The count includes DTC needing no action.

DTC STORED
Range: ______________________________________________________ actual count
Indicates the total number of current DTCs set this ignition cycle.

E-ABV STEPS
E-ABV STEP POS
Range: ______________________________________________________ 0 to 125
Indicates the position of the supercharger bypass valve stepper motor. Reads 125 when the valve is fully open, and 0 when closed.
Data Parameters

**EACV**
Range: _________________________________________________________ 0 to 100%
Indicates electrical current to the EACV (the variable solenoid valve that controls engine idle speed). The current increases with intake airflow. The EACV is duty cycle controlled.

**EC IGN RLY**
Range: __________________________________________________________ ON/OFF
Indicates the commanded state of the engine control (EC) or PCM ignition relay control circuit. The scan tool will display On or OFF. On indicates the EC ignition relay control circuit is being grounded by the control module, allowing voltage to the ignition system. OFF indicates the EC ignition relay is not being commanded by the control module.

**EC IGN RLY FBK**
Range: __________________________________________________________ variable
Indicates the voltage signal sent to the control module from the engine control (EC) or PCM ignition relay. The scan tool will display battery voltage when the engine is running. The scan tool will display no voltage when the relay is OFF.

**ECONO LIGHT**
Range: __________________________________________________________ ON/OFF
Indicates the status of the economy light. The light is turned ON when the fuel system is in the lean-burn zone.

**ECRK1**
**ECRK2**
Range: __________________________________________________________ not available
Indicates the crankshaft sensor 1 (or 2) disconnect/noise counter for V6 engines.

**ECT**
Range: _________________________________________________________ –40 to 399°F or –40 to 199°C
Indicates the engine coolant temperature.

**ECT 1 (°)**
**ECT SENSOR (°)**
Range: _________________________________________________________ –40 to 199°C or –40 to 389°F
Indicates the engine coolant temperature (ECT) as degrees. The reading is calculated by the ECM based on the resistance value change of the NTC thermistor ECT sensor. Typical readings at idle are 70°C to 100°C (158°F to 212°F).

**ECT 1 (V)**
**ECT SENSOR (V)**
**ECT (V)**
Range: _________________________________________________________ 0.0 to 5.0 V
Indicates the engine coolant temperature (ECT) as voltage. The ECT is a thermistor installed in the engine coolant passages. A 5 V reference signal is applied to the ECT. As temperature increases, sensor resistance decreases to provide a variable voltage signal to the PCM. The PCM converts ECT sensor voltage to temperature.

Typical ECT readings are 0.70 V to 0.40 V on a warm engine at idle.

**ECT LAMP 1**
Range: __________________________________________________________ ON/OFF
Indicates the status of engine coolant temperature lamp 1. This lamp turns ON when the engine coolant is “cold” (less than 56°C).
ECT LAMP 2
Range: __________________________________________________________ ON/OFF
Indicates the status of engine coolant temperature lamp 2. This lamp flashes when the engine coolant is heated (above 118°C) and turns ON when it is overheated (above 124°C).

ECT_FAULT
Range: __________________________________________________________ YES/NO
Indicates the engine coolant temperature status.

ECYL1
ECYL2
Range: ______________________________________________________ not available
Indicates the cylinder sensor 1 (or 2) disconnect/noise counter for V6 engines.

EGR BOOST SOL
Range: __________________________________________________________ ON/OFF
Indicates the EGR boost sensor solenoid valve control signal.

EGR CMPL
Range: ______________________________________________________ COMPLETE/INCOMPLETE
Indicates the EGR monitor.

EFE COMMAND
Range: __________________________________________________________ ON/OFF
Indicates whether the ECM has commanded the early fuel evaporation (EFE) system to turn on, it should read:
• ON when the EFE system has received a signal to energize
• OFF when the system is de-energized to remove heat from the air-fuel mixture

The EFE system is used on carbureted engines to preheat the incoming air-fuel mixture for a cold engine. The EFE system may be a vacuum-operated manifold heat control valve or an electric grid heater under the carburetor.

This parameter is an output signal from the ECM only. It does not indicate whether the EFE system has responded.

EGR COMMAND
EGR SOLENOID
EGR SYS
EGR SYSTEM
Range: __________________________________________________________ ON/OFF
Indicates whether the ECM has commanded the EGR vacuum solenoid or vacuum switching valve (VSV) to open, should read:
• ON when the solenoid has received a signal to energize, open a vacuum line, and apply vacuum to the EGR valve
• OFF when the solenoid has been de-energized to cut off EGR vacuum

Typically, readings are OFF in park or neutral, at idle, or in open loop, and ON at cruising speed in closed loop.

These are output signals only. The reading does not indicate whether the solenoid or valve responded or whether the EGR valve actually opened.
EGR ENA
Range: ________________________________ UNABLE/ENABLE
Indicates the EGR monitor.

EGR L COM
EGR V L COMMAND
Range: ______________________________________________________ not available
Indicates the ECM command for EGR valve lift.

EGR LIFT
Range: ______________________________________________________ not available
Indicates the actual EGR valve lift subtracted from zero-lift, which is learned from the EGR valve life sensor.

EGR LIFT SENSOR
EGR VLS
Range: ________________________________________________________ 0.0 to 5.0 V
Indicates voltage changes in proportion to EGR valve position. As vacuum is applied to the diaphragm of the EGR valve, the lift amount of the EGR valve also increases.

EGR MON
Range: ____________________________________________________ COMPL/INCMP
Indicates the status of the exhaust gas recirculation (EGR) system monitor. Reads COMPL (completed) if the monitor successfully ran, INCMP (incomplete) if not. This monitor is enabled during EGR operation after certain base operating conditions are satisfied.

EGR POS(%)  
Range: _________________________________________________________ 0 to 100%
Indicates the exhaust gas recirculation valve position.

EGR POS(V)
Range: ________________________________________________________ 0.0 to 5.0 V
Indicates the exhaust gas recirculation valve position.

EGR STEPS
EGR STEP POS
Range: ___________________________________________________________ 0 to 125
Indicates the position of the EGR valve stepper motor as counts. A 125 reading indicates the motor plunger is fully extended and the EGR valve is fully open.

EGR TEMP (V)
Range: _______________________________________________________ 0.0 to 5.12 V
Indicates a feedback signal from a thermistor mounted in the EGR passage, which reflects the amount of EGR flowing.

On most vehicles, a high voltage signal means a high EGR flow rate; low voltage means low or no EGR flow. However, on some 1996 and later Nissan vehicles, high voltage means a low flow rate; low voltage means high or no EGR flow.

EGR TEMP (°)
Range: ________________________________ –50 to 320°C or –58 to 600°F
Indicates EGR gas temperature based on the signal of a sensor located slightly downstream from the EGR control valve. A decrease in EGR temperature indicates either restricted EGR flow or a system malfunction.
EGR VAC SOL(%)  
Range: _________________________________________________________ 0 to 100%
Indicates the exhaust has recirculation solenoid valve (vacuum) status.

EGR VENT SOL(%)  
Range: _________________________________________________________ 0 to 100%
Indicates the exhaust gas recirculation solenoid A.

EGR_FAULT  
Range: __________________________________________________________ YES/NO
Indicates the exhaust gas recirculation status.

EGRBARO  
Range: __________________________________________________________ 0.0 to 5.0 V
Indicates the EGR BARO sensor voltage signal (BARO/SEGRP solenoid). The signal is used by the PCM to control EGR flow. The greater the EGR flow, the lower the voltage.

EGRBARO  
Range: __________________________________________________________ ON/OFF
Indicates the BARO/SEGRP solenoid.

EGRC SOLENOID  
Range: __________________________________________________________ ON/OFF
Indicates the ECM command to the EGR vacuum solenoid. Should read ON when the EGR valve is closed, and OFF when the EGR valve is open.

EGRCFault  
Range: __________________________________________________________ YES/NO
Indicates whether the PCM detected a fault in the EGR control solenoid circuit that regulates vacuum to the EGR valve. YES means a fault is present.

EGRFOpen  
Range: __________________________________________________________ YES/NO
Indicates whether the PCM has detected an open circuit in the EGR vacuum regulator valve or EVR circuit, YES means a fault is present.

EGRFSShort  
Range: __________________________________________________________ YES/NO
Indicates whether the PCM has detected a short circuit in the EGR vacuum regulator valve or EVR circuit, YES means a fault is present.

EGRMDSD  
Range: __________________________________________________________ variable
Indicates the desired EGR motor position.

EGRVFault  
Range: __________________________________________________________ YES/NO
Indicates whether the PCM detected a fault in the EGR vacuum solenoid circuit, YES means a fault is present.

EGRVR (%)  
Range: _________________________________________________________ 0 to 100%
Indicates the signal of the EGR valve position sensor as a percentage (EGR valve duty cycle percentage). A low reading indicates low EGR flow, a high reading indicates high EGR flow.
EGRVR_FAULT
Range: __________________________________________________________ YES/NO
Indicates the exhaust gas recirculation valve duty cycle status.

EGT SENSOR (V)
Range: __________________________________________________________ 3.4 to 0.9 V

EGT SENSOR (°C) (°F)
Range: __________________________________________________________ 500 to 700°C, or 1060 to 1484°F
Indicates the temperature of the exhaust gases either as the voltage signal from the exhaust gas temperature sensor, or as ECM calculated temperature.

ELEC LOAD
ELEC LOAD SIG
ELEC LOAD SW
LOAD SIGNAL
Range: __________________________________________________________ ON/OFF
Indicates the electrical load on the charging system (such as head lamps, brake lamps, rear defrost). The ECM uses this signal to compensate for electrical loading at idle, it reads:

• ON when certain combinations of accessories are on
• OFF when certain combinations of accessories are off

ElecPrsCtrl
Range: __________________________________________________________ 0 to 100 psi
Indicates the PCM commanded transmission electronic control pressure. This is a calculated parameter based on PCM-controlled Pulse-Width output.

ENG LOAD (%)
Range: __________________________________________________________ 0 to 100%
Indicates current engine operating load as a percentage of maximum engine load.

ENG RESTART COND
Range: __________________________________________________________ OK/NG
Indicates whether the engine can be restarted after the engine was shut down by the auto idling stop system.

ENG RUN TIME
Range: __________________________________________________________ Min.: 0 second, Max.: 65,535 seconds
Indicates engine run time: Time after engine start that cycle.

ENG OIL PRESS SW
Range: __________________________________________________________ OFF/ON
Indicates the presence of engine oil pressure. This should remain on from engine start to engine shut off.

ENG OIL TEMP
Range: __________________________________________________________ –40 to +419°F or –40 to +215°C
Indicates the engine oil temperature in degrees Celsius or fahrenheit, which the PCM uses to control the cooling fans.

ENG ON RUN TIME
Range: __________________________________________________________ 0 to 65,535 sec
Indicates the time lapse since the engine was started during this key cycle.
ENG SPD
  Range: ___________________________________________________ 0 to engine max.

Indicates engine RPM. On most vehicles, the ECM relies on the engine speed sensor for this value. On others, the TCM internally calculates this parameter by directly monitoring the pulses of the ignition coil to determine engine speed.

ENG SPD FROM EFI
  IAT FROM EFI
  ECT FROM EFI
  TPS FROM EFI
  ACCEL POS FROM EFI
  Range: ___________________________________________ varies by system Min/Max

Indicates processed data received from the Engine F/I control module by the Transmission control module, and is used to process upshift and downshift decisions. This should match data collected when monitoring Engine control module parameters.

ENG TORQ (N-M)
  Range: _____________________________________________________ 0 to 65025 Nm

Indicates engine torque as calculated by the PCM.

ENGINE LOAD (%)
  Range: _________________________________________________________ 0 to 160%

Indicates relative engine load based on engine speed (RPM), the number of cylinders, and manifold airflow. A high number indicates a heavy load; a low number, a light load.

ENGINE MOUNT
  Range: ________________________________________________________ IDLE/TRVL

Indicates the state of the engine mount operation corresponding to the engine speed and the vehicle speed. The parameter reads as follows with the engine running:

- Idle (with vehicle stopped)—IDLE
- All other conditions—TRVL

ENGINE OIL LIFE
  Range: ________________________________________________________ not available

No additional information is available for this parameter.

ENGINE OIL PRESSURE
  Range: ________________________________________________________ variable

Indicates engine oil pressure as kilo Pascal (kPa), millimeters of mercury (mmHg), inches of mercury (inHg), and kilograms per square centimeter (kgf/cm2).

ENGINE RPM
  RPM
  Range: ___________________________________________________ 0 to engine max.

Indicates engine speed, which the PCM computes from the ignition reference pulses. Engine speed should remain close to desired idle under various engine loads with the engine idling.

ENGTRQ SIGNAL (%)
  Range: _________________________________________________________ 0 to 100%

Indicates engine torque as calculated by the ECM based on the MAP sensor value. The ECM transmits the signal to the motor control module.
EOP SENSOR (V)
EOP SENSOR (kgf/cm²)
  Range: ______________________________________ 0.0 to 9.9 kgf/cm² or 0.0 to 5.0 V
Indicates the engine oil pressure either as the engine oil pressure sensor signal voltage, or as an
ECM calculated pressure. This value is used for the VPS.

EOT SENSOR (°C) (°F)
  Range: ________________________________________ –40 to 199°C or –40 to 389°F
EOT SENSOR (V)
  Range: ________________________________________________________ 0.0 to 5.0 V
Indicates the engine oil temperature either as the engine oil temperature sensor signal voltage,
or as an ECM calculated pressure.

EPC (V)
  Range: _______________________________________________________ 2.0 to 14.5 V
Indicates the average operating voltage of the pulse-width-modulated electronic pressure control
solenoid. A low average voltage reading indicates a higher EPC pressure; a higher reading
indicates a lower EPC pressure.

EPS
EPS SIGNAL
  Range: ________________________________________________________ LOW/HIGH
Indicates the voltage level of the EPS signal line. It only reads HIGH when electrical load of the
EPS becomes higher than the specified value.

EQ RAT
  Range: ______________________________________________________ not available
Indicates the desired equivalence ratio (Lambda).

EQ RAT11
  Range: ______________________________________________________ not available
Indicates the (A/F) ratio as commanded by the ECM for bank 1, sensor 1.

ESC ACTIVE
  Range: ______________________________________________________ YES/NO
Indicates whether the ECM is controlling spark advance, it should read:
  • YES after the engine starts and the ECM controls timing
  • NO when the engine is cranking, the ignition module controls timing, and electronic spark
timing is disabled

ESC COUNTER
  Range: ______________________________________________________ 0 to 255
Indicates the relative duration and magnitude of spark knock as a count.
Any number greater than 0 indicates that knock occurred. A low number means short duration; a
higher number indicates longer duration and magnitude.

ESC FAILURE
  Range: ______________________________________________________ YES/NO
Indicates whether an electronic spark control failure was detected, it should read:
  • YES when any of the ESC components fail, usually accompanied by trouble code 43.
  • NO when the system is working properly
Data Parameters

EST ECT (°C) (°F)
Range: _________________________________________ –40 to 199°C or –40 to 389°F
Indicates the estimated coolant temperature as calculated by the ECM.

ETC_ACT (°)
Range: __________________________________________________________ 0 to 100°
Indicates actual throttle plate opening in degrees. Readings of 6% or less reflect a closed
throttle, and 85% or more reflects a wide open throttle.

ETC_DES (%)
Range: _________________________________________________________ 0 to 100%
Indicates the ECM desired throttle plate opening in degrees.

EVAP BYPASS SOL
Range: __________________________________________________________ ON/OFF
Indicates the status of the evaporative bypass solenoid valve. The EVAP 2-way valve is
by-passed when the solenoid valve is controlled to ON.

EVAP CMPL
Range: __________________________________________________________ COMPLETE/INCOMPLETE
Indicates the EVAP monitor.

EVAP CVS VALVE
EVAP CVS VLV
Range: __________________________________________________________ ON/OFF
Indicates the status of the evaporative canister vent shut solenoid valve. The valve closes the
canister vent.

EVAP ENA
Range: __________________________________________________________ UNABLE/ENABLE
Indicates the EVAP monitor.

EVAP MON
EVAP mon ready
Range: __________________________________________________________ COMPL/INCMP or YES/NO
Indicates the status of the evaporative emissions (EVAP) system monitor. Reads COMPL
(completed) or YES if the monitor has completed or conditions for monitoring have been met.
Reads INCMP (incomplete) or NO if the monitor has not completed or conditions for monitoring
have not been met.

The sequence of events required to enable this monitor vary, depending upon the EVAP system
components.

EVAP MONITOR
Range: __________________________________________________________ COMPLETE/INCOMPLETE
Indicates the EVAP monitor.

EVAP MONITOR
Range: __________________________________________________________ NOT AVAILABLE/AVAILABLE
Indicates the EVAP monitor.

EVAP PC DUTY (%)
Range: __________________________________________________________ 0 to 100%
Indicates the duty cycle of the evaporative purge control solenoid valve. This indicates the drive
percentage of the purge control solenoid valve when on.
EVAP PC SOL
Range: ____________________________________________ ON/OFF
Indicates the status of the evaporative purge cut solenoid valve. The canister purging is accomplished by drawing fresh air through the canister and into a port on the throttle body when then solenoid is OFF.

EVAP PF SW
Range: ____________________________________________ ON/OFF
Indicates the status of the evaporative purge flow switch. This is the vacuum switch that detects EVAP purge line failure. The switch turns on when vacuum exists.

EVAP PRES (V)
Range: ____________________________________________ 0.0 to 5.0 V
Indicates the pressure in the evaporative emissions (EVAP) purge line. As EVAP pressure increases, sensor voltage increases. The ECM uses this signal to detect pressure leaks and faulty components.

EVAP PURGE (%)
Range: ____________________________________________ 0 to 100%
Indicates the pulse-width modulated duty cycle applied to the EVAP purge valve by the PCM. At 100%, the valve should be fully open to purge the system.

EVAP PURG(V)
Range: ____________________________________________ 0.0 to 5.0 V
Indicates the evaporative emission canister purge valve voltage.

EVAP SOLENOID
PURGE VSV
PURGE SOL
Range: ____________________________________________ ON/OFF
Indicates the PCM command status for the vacuum switching valve (VSV) or solenoid that controls the evaporative emission (EVAP) purge valve, reads ON when the system is purging.

EVAP TST
Range: ____________________________________________ PASS/FAIL
Indicates whether the EVAP diagnostic monitor has successfully completed.

EVAP VENT SOL
Range: ____________________________________________ ON/OFF
Indicates the status of the EVAP vent solenoid, it should read:
• ON when the EVAP vent solenoid is closed to create a vacuum in the fuel tank
• OFF when the solenoid is open to allow purge

EVAPCP
Range: ____________________________________________ ON/OFF
Indicates the evaporative emission canister purge valve duty cycle. Displays whether the canister purge solenoid is on or off.

EVAPCP%
Range: ____________________________________________ 0 to 100%
Indicates the evaporative emission canister purge valve duty cycle.
EVAPCPFault
Range: _____________________________ YES/NO
Indicates whether the PCM detects a fault in the EVAP canister purge solenoid circuit. Reads YES if a fault is detected.

EVAPCV%
EVAPCV(%) Range: _____________________________ 0 to 100%
Indicates the duty cycle of the EVAP canister vent solenoid, which controls the amount of air entering the EVAP system:
- 0% indicates the solenoid is fully open
- 100% indicates the solenoid is fully closed

EVAPCVFault
EVAPCV_FAULT Range: _____________________________ YES/NO
Indicates whether the PCM detects a fault in the canister vent solenoid circuit. Reads YES when a fault is present.

EVAPPrgFlw (V)
Range: _____________________________ 0.0 to 5.0 V
Indicates the presence of purge flow from the canister to the engine. Voltage should increase as purge flow increases:
- 0.4 to 1.3 V at idle
- 0.4 to 4.0 V at steady cruise

EVAPSOAK
Range: _____________________________ actual
Indicates that the EVAP monitor soak time conditions have been met.

EVAPVM%
Range: _____________________________ 0 to 100%
Indicates the evaporative emission vapor management valve status.

EVAPVM_FAULT
Range: _____________________________ YES/NO
Indicates the evaporative emission vapor management valve fault.

EVAPVMA
Range: _____________________________ ON/OFF
Indicates the commanded state of the EVAPVM.

EVMV(A)
Range: _____________________________ not available
Indicates the evaporative vapor management current.

EXH BYPASS VSV
Range: _____________________________ ON/OFF
Indicates the ECM command to the vacuum switching valve (VSV), which actuates the second turbocharger wastegate control valve. It only reads ON when the VSV opens the second wastegate valve.
EXH CTRL VSV
EXH GAS CTL VSV

Range: __________________________________________________________ ON/OFF

Indicates the ECM command to the vacuum switching valve (VSV), which actuates the second turbocharger exhaust gas control valve. It reads ON when the VSV opens the valve.

EXH V/T LEARN

Range: _______________________________________________________ YET/CMPLT

Indicates the condition of Exhaust Valve Timing Control Learning.

- YET—Exhaust Valve Timing Control Learning has not been performed yet
- CMPLT—Exhaust Valve Timing Control Learning has already been performed successfully

EXHAUST OXYGEN
REAR O2
LEFT O2
RIGHT O2

Range: _______________________________________________________ RICH/LEAN

F BNK UP
O2S #1 STATUS
O2S #2 STATUS
R BNK UP
REAR O2 STATUS

Range: _______________________________________________________ RICH/CENTER/LEAN

Indicates the general rich or lean condition of the exhaust as measured by the oxygen sensor (O2S). Exhaust oxygen content is related to oxygen content in the intake air-fuel mixture and thus indicates the intake air-fuel ratio.

The exhaust O2S is the primary sensor that indicates whether the engine is running rich or lean. The O2S must be hot (above 500°F/260°C), and the ECM must be in closed loop before the ECM responds to the sensor signal.

RICH or LEAN indicates the general condition of the exhaust. The O2 voltage indicates the exact sensor signal. Refer to "O2 (mV)" on page 420 for more information.

Some vehicles have separate oxygen sensors for the left and right banks, or front and rear banks on transverse-mounted V6 engines. Exhaust conditions from these sensors are shown as LEFT O2 and RIGHT O2, F BNK UP or R BNK UP (upstream), or EXHAUST OXYGEN and REAR O2. Some vehicles that have two sensors display them as O2S #1 and O2S #2, with #1 indicating the bank that contains cylinder number 1.

F INJECTOR (mS)

Range: __________________________________________________________ variable

Indicates the operating status of the fuel injection and displays the open time length, in milliseconds, of an injector contained in bank 2 during valve pausing as commanded by the ACM control module.

FAIL #1
FAIL #2

Range: __________________________________________________________ ON/OFF

Indicates whether the PCM has executed a fail safe function.
FAIL #1
FAIL #2
 Range: __________________________ ON/OFF
Indicates whether the ETCS fail safe function was executed. If ON is displayed, then the ETC was/is in fail safe mode after detecting ETCS failure.

FAIL #1
 Range: __________________________ ON/OFF
Indicates whether or not the fail safe function executed. ON: ETCS has failed.

FAIL #2
 Range: __________________________ ON/OFF
Indicates whether or not the fail safe function executed. ON: ETCS has failed.

FAN 1
 Range: __________________________ ON/OFF
Indicates the FAN1 control signal.

FAN 2
 Range: __________________________ ON/OFF
Indicates the FAN2 control signal.

FAN 3
 Range: __________________________ ON/OFF
Indicates the FAN3 control signal.

FAN CTRL ECT (°C) (°F) (V)
 Range: __________________________ variable
Indicates the status of the fan control engine coolant temperature sensor as voltage or temperature. Voltage at idle should be from 1.4 to 0.6 V. (H.LIMIT) 158°F to 212°F, (L.LIMIT) 70°C to 100°C, and possible variance range is 8°C (at 100°C) and 14°F (at 212°F).

FAN HIGH CTRL
FAN LOW CTRL
 Range: __________________________ ON/OFF
Indicates the status of the fan high control. When the 2 stage radiator fan is controlled to high (low) mode by the ECM, the fan high control indicates ON.

FAN_DUTY(%)
 Range: __________________________ 0 to 100%
Indicates the variable fan duty cycle.

FAST IDLE SOL
 Range: __________________________ ON/OFF
Indicates the status of the fast idle solenoid valve. It reads ON at low engine coolant temperatures when the PCM transmits a command to raise the idle RPM.

FAN MOTOR
 Range: __________________________ actual
Indicates the status of the electrical fan motor for active test data support.

FAN SPEED (RPM)
 Range: __________________________ 0 to fan max.
Indicates the fan speed in RPM. The PCM controls the fan by modulating the fan clutch and monitoring the fan speed sensor.
FAT
Range: __________________________________________________________ ON/OFF
Indicates the DLC FAT terminal.

FAULT CODE DISPLAY
Range: ____________________________________________________________ actual
Indicates the diagnostic trouble codes.

FC CTP
Range: __________________________________________________________ ON/OFF
Indicates the status of the ECM command to cut fuel (FC) during closed-throttle (CTP) deceleration. It reads ON when the ECM commands a fuel cut after sensing a closed throttle.

FC IDL
Range: __________________________________________________________ ON/OFF
Fuel cut idle: ON: Fuel cut operating, “ON” when throttle valve is fully closed and engine speed is over 2,800 rpm.

FC TAU
Range: __________________________________________________________ ON/OFF
Indicates fuel cut TAU (fuel cut during very light load). ON: Fuel cut operating. A fuel cut is being performed under very light load to prevent engine combustion from becoming incomplete.

FCIL
Range: __________________________________________________________ ON/OFF
Indicates the fuel cap off indicator lamp status.

FCIL_FAULT
Range: __________________________________________________________ YES/NO
Indicates a fuel cap off indicator lamp fault.

FIA CTRL SOL
Range: __________________________________________________________ ON/OFF
Indicates the status of the fuel injector air control solenoid valve. It is turned ON in order to better atomize the fuel under various driving conditions.

FlexFuel (Hz)
Range: __________________________________________________________ –32512 to 32768 Hz
Indicates the flexible fuel output frequency.

FLI
FLI (%)
FUEL SENDER (V)
FUEL LEVEL (V) (%)
FUEL LVL SENSOR (V) (%)
Range: __________________________________________________________ 0.0 to 5.0 V, 0 to 12 V or 0 to 100%
Indicates the amount of fuel remaining in the tank as voltage or a percentage. Percent readings indicate current level to total capacity. Voltage readings should be:
• Below 1 V for an empty tank
• About 2.5 V or 6 V (depending on system) for a full tank

FLI_FAULT
Range: __________________________________________________________ YES/NO
Indicates the a flex fuel sensor fault.
FLUID TEM (V)  
Range: ___________________________ 0.0 to 5.0 V  
Indicates the transmission fluid temperature voltage.

FP  
Range: ___________________________ ON/OFF  
Indicates the fuel pump status.

FP (%)  
Range: ___________________________ 0 to 100%  
Indicates the fuel pump status in percentage.

FP MODE  
Range: ___________________________ ON/OFF  
Indicates the fuel pump has been turned on or off in response to a PCM command.

FP RES RELAY  
Range: ___________________________ ON/OFF  
Indicates the fuel pump (FP) resistor relay status.

FP RLY  
Range: ___________________________ ON/OFF  
Indicates whether the fuel pump relay has turned on or off in response to a PCM command.

FP SENSOR (kPa) (mmHg) (in.Hg) (V)  
Range: ___________________________ variable  
Indicates pressure in the fuel rail as monitored by the fuel pressure sensor. This signal can determine fuel pressure regulator performance. At idle, pressure readings should be:
• 270 kPa to 360 kPa  
• 2025 mmHg to 2700 mmHg  
• 79 inHg to 106 inHG  

FP_RLY  
Range: ___________________________ ON/OFF  
Indicates the fuel pump relay status.

FPFault  
Range: ___________________________ YES/NO  
Indicates whether the PCM has detected a fault in the fuel pump circuit.  
FPFault reads YES when a fault is present.

FPM  
FPMonitor  
Range: ___________________________ ON/OFF  
Indicates the fuel pump monitor.

FPTDR (V)  
Range: ___________________________ LOW/HIGH  
Indicates the input level voltage level of the FPTDR line.

FR ACM SOL CURRENT  
Range: ___________________________ not available  
Indicates the actual electric current applied to the front ACM control module as amperes.
FR ACM SOL MAX CURRENT
FR ACM SOL MIN CURRENT
  Range: ________________________________ not available
Indicates the maximum or minimum current applied to the front ACM control module for the
ignition cycle as amperes.

FRP PSI
  Range: ________________________________ 37 to 150 psi
Indicates the fuel rail pressure.

FRP(V)
  Range: ________________________________ not available
Indicates the fuel rail pressure voltage.

FRP_DSD
  Range: ________________________________ actual
Indicates the fuel rail pressure desired.

FRP_FAULT
  Range: ________________________________ YES/NO
Indicates a fuel rail pressure fault.

FRT
  Range: ________________________________ –40 to 399°F or –40 to 199°C
Indicates the fuel rail temperature.

FRT(V)
  Range: ________________________________ 0.0 to 5.0 V
Indicates the fuel rail temperature voltage.

FRZSTR (1)
  Range: ________________________________ actual count
Indicates the status of the freeze frame data as a count. A count is recorded every time the ECM
stores freeze frame data.

FSS
FSS B1
FSS B2
  Range: ________________________________ not available
Indicates the status of the fuel system, which may be divided by cylinder banks (1 or 2).

FT CELL
  Range: ________________________________ 0 to 23
Indicates the fuel cell that the PCM is currently operating in, which is determined by manifold
absolute pressure (MAP) and RPM inputs.

FT LEARN
  Range: ________________________________ ENABLED/DISABLED
Indicates if conditions are appropriate for enabling long term fuel trim correction, reads:
  • ENABLED when long term fuel trim is responding to the short term fuel trim
  • DISABLED when long term fuel trim is not responding to in short term fuel trim
### FT SENSOR (°C) (°F) (V)
- **Range:** variable
- Indicates the status of the fuel temperature sensor on the fuel rail. This indicates the temperature of the fuel in the fuel rail.

### FTP SENSOR
- **FTP SNSR**
- **Range:** variable
- Indicates the status of the fuel tank pressure sensor on the fuel tank junction box as voltage or pressure. With no tank pressure (fuel fill cap open to atmosphere) reading should be:
  - 0.6 kPa
  - 4.5 mmHg
  - 0.2 inHg
  - 2.3V to 2.7V.
- Minimum and maximum readings are:
  - –8.3 kPa to 8.3 kPa
  - –62 mmHg to 62 mmHg
  - –2.5 inHg to 2.5 inHg
  - 0.0V to 5.0V

### FTP(V)
- **Range:** 0.0 to 5.0 V
- Indicates the fuel tank pressure transducer voltage.

### FTP_FAULT
- **Range:** YES/NO
- Indicates a fuel tank pressure transducer fault.

### FTT SENSOR (°C) (°F) (V)
- **Range:** variable
- Indicates the temperature of the fuel in the fuel tank based on the fuel tank temperature sensor signal. The sensor is on the fuel tank junction box.

### FUEL CMPL
- **Range:** COMPLETE/INCOMPLETE
- Indicates the fuel system monitor.

### FUEL CUT
- **Range:** ON/OFF
- Indicates whether the PCM is commanding the fuel injectors to turn off. It reads ON when the command is cut fuel (injectors off), and OFF at all other times.

### FUEL CUT DECEL
- **FUEL CUTOFF SOL**
- **Range:** ON/OFF
- Indicates whether the PCM is commanding the fuel injectors to turn off due to a deceleration condition. It reads:
  - ON when the ECM energizes the solenoid to open the fuel line for normal delivery
  - OFF when the ECM de-energizes the solenoid to close the fuel line and cut fuel delivery during deceleration
FUEL ENA
Range: ________________________________ UNABLE/ENABLE
Indicates the fuel system monitor. Reads ENABLE when the monitor is active.

FUEL (%) FRONT
FUEL (%) REAR
Range: ________________________________ –25 to +25%
Indicates the adaptive adjustment made to fuel injector pulse width for the front and rear cylinder
banks at idle. Should read:
• A negative value if the PCM is decreasing the pulse width from programmed values
• A positive value if the PCM is increasing the pulse width from programmed values

FUEL LEVEL (AVERAGE)
FUEL LEVEL (L)
Range: ________________________________ 0 to 72 liters or 0 to 19 gallons
Indicates the amount of fuel remaining in the tank.

FUEL LEVEL (mV)
Range: ________________________________ 1000 to 6200 mV
Indicates the amount of fuel remaining in the tank as millivolts:
• 1000mV to 3600mV indicates a full tank
• 2700mV to 6200 V indicates a near empty tank

FUEL LEVEL (V)
Range: ________________________________ 0.0 to 5.0 V
Indicates the fuel tank level signal voltage.

FUEL METER CTRL (%)
Range: ________________________________ 0 to 100%
Indicates the status of the fuel meter control, which represents the amount of fuel remaining in
the fuel tank as a percentage of total capacity.

FUEL MISFIRE
Range: ________________________________ actual count
Indicates the accumulated misfire counter for 2VI method fuel system problems.

FUEL PMP SP CTL
Range: ________________________________ LO/HI or ON/OFF
Indicates the current state of the fuel pump relay.

The fuel pump supply voltage is controlled (LO/HI) by the ECM from the intake manifold pressure
and engine RPM. The relay is turned ON at high fuel pump control mode.

FUEL PRES SOL
Range: ________________________________ ON/OFF
Indicates the fuel pump regulator control.

FUEL PRESS (V)
Range: ________________________________ 0.0 to 5.0 V
Indicates the fuel tank level signal voltage.

FUEL PRS UP VSV
Range: ________________________________ ON/OFF
Indicates the status of the fuel pressure up vacuum switching valve.
FUEL PUMP
Range: __________________________________________________________ ON/OFF
Indicates the fuel pump status, reads ON when the ECM senses a running fuel pump.

FUEL PUMP CTRL
Range: __________________________________________________________ LOW/HIGH
Displays the fuel pump control relay status, which indicates if the fuel pump is operating at HIGH or LOW capacity. Status is determined by intake manifold pressure and engine RPM.

FUEL PUMP RELAY
PUMP RELAY
Range: __________________________________________________________ ON/OFF
Indicates the current state of the fuel pump relay.

FUEL REF VOL (V)
Range: ________________________________________________________ 0.0 to 5.0 V
Indicates the status of the reference supply voltage for the fuel level sensor. It displays the input voltage to monitor and correct the supply voltage for the fuel level sensor.

FUEL STATUS
FUEL SYS
Range: _______________________________________ CL/CL FLT/OL/OL DRV/OL FLT
Indicates whether the vehicle is operating in open or closed loop, reads as follows:

- CL—Normal closed loop
- CL FLT—One O2S is not switching and the PCM is using the other one for feedback
- OL—Normal open loop
- OL DRV—Open loop because of driver action or other special circumstances
- OL FLT—Open loop with O2S problem or primary side coil failure

FUEL SYS1
FUEL SYS2
FUELSYS1
FUELSYS2
Range: _______________________________ OL/CL or OPEN/CLSD
Indicates the operating status of fuel banks 1 and 2, read as follows:

- OL or OPEN for open loop
- CL or CLSD for closed loop

When a fuel bank status is OL or OPEN, the ECM ignores the main O2S signal. When a fuel bank status is CL or CLSD, the ECM uses main O2S feedback to make corrections to fuel injection duration. With the engine fully warm and running at idle, these parameters should indicate closed loop.

At 2500 RPM with no load, these parameters should also indicate closed loop. Deceleration could cause these parameters to indicate open loop during fuel cutoff. Some vehicles display only FUEL SYS1, while others display the status of both fuel banks.

FUEL SYS #1
FUEL SYS #2
Range: _______________________________ UNUSED,OL,CL,OL-DRV,OL-FLT,CL-FLT
Indicates the fuel system status (#1 = bank 1, #2 = bank 2). Reading should be CL with the engine warmed up and running at idle. Interpret readings as follows:

- UNUSED: This parameter is not used on this engine
- OL (Open Loop): Has not yet satisfied conditions to go closed loop
- CL (Closed Loop): Using heated oxygen sensor as feedback for fuel control
- OL-DRV: Open loop due to driving conditions (fuel enrichment)
- OL-FLT: Open loop due to detected system fault
- CL-FLT: Closed loop but heated oxygen sensor, which used for fuel control malfunctioning

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FUEL SYS MON</strong></td>
<td>Indicates the fuel system monitor.</td>
</tr>
<tr>
<td>Range:</td>
<td>NOT AVAILABLE/AVAILABLE</td>
</tr>
<tr>
<td><strong>FUEL TANK CAP (L)</strong></td>
<td>Indicates the capacity of the fuel tank in liters or in gallons.</td>
</tr>
<tr>
<td>Range:</td>
<td>0 to 34 gallons or 0 to 128 liters</td>
</tr>
<tr>
<td><strong>FUEL TEMP (°)</strong></td>
<td>Indicates the ECM calculated fuel temperature within the intake manifold fuel rail. The ECM uses this parameter to fine-tune engine management.</td>
</tr>
<tr>
<td>Range:</td>
<td>–30 to 224°C or –22 to 435°F</td>
</tr>
<tr>
<td><strong>FUEL VOLATI</strong></td>
<td>Indicates the rate that the fuel can vaporize in the cylinder as calculated by the control module. HI displays when calculated fuel volatility is high. LO displays when the fuel volatility is low.</td>
</tr>
<tr>
<td>Range:</td>
<td>LO/HI</td>
</tr>
<tr>
<td><strong>FUEL(PSI)</strong></td>
<td>Indicates the fuel pressure.</td>
</tr>
<tr>
<td>Range:</td>
<td>35 to 120 psi</td>
</tr>
<tr>
<td><strong>FUEL_GAUGE</strong></td>
<td>Indicates the fuel gauge indicator control.</td>
</tr>
<tr>
<td>Range:</td>
<td>ON/OFF</td>
</tr>
<tr>
<td><strong>FUEL_LEVEL(%)</strong></td>
<td>Indicates the fuel level in percentage.</td>
</tr>
<tr>
<td>Range:</td>
<td>0 to 100%</td>
</tr>
<tr>
<td><strong>FUEL_mon_ready</strong></td>
<td>Indicates the fuel monitor has successfully completed.</td>
</tr>
<tr>
<td>Range:</td>
<td>YES/NO</td>
</tr>
<tr>
<td><strong>FuelLvlnp(%)</strong></td>
<td>Indicates the fuel level in percentage.</td>
</tr>
<tr>
<td>Range:</td>
<td>0 to 100%</td>
</tr>
<tr>
<td><strong>FuelLvlnp(V)</strong></td>
<td>Indicates the fuel level in voltage.</td>
</tr>
<tr>
<td>Range:</td>
<td>0.0 to 5.0 V</td>
</tr>
<tr>
<td><strong>FuelPumpA</strong></td>
<td>Indicates the actual state of the PCM commanded fuel pump output.</td>
</tr>
<tr>
<td>Range:</td>
<td>ON/OFF</td>
</tr>
</tbody>
</table>

FuelPumpA should read the same as the fuel pump monitor and fuel pump command output readings (all three should be ON or OFF at the same time).
**Data Parameters**

**FUELPW**
**FUELPW(mS)**
Range: 0.0 to 99.9 mS
Indicates the current commanded pulse width of the fuel injectors.

**FUELPW1 (mS)**
**FUELPW2 (mS)**
Range: 0 to 99.9 mS
Indicates the current commanded pulse width of the injectors affected by O2S1 and O2S2. The displayed value is the pulse width that was commanded at the time of the last update.

On some vehicles, updating may occur only when a position indicator pulse (PIP) signal is being received, and the last updated value is retained after the PIP signal stops. In these cases, a value greater than zero may display during KOEO.

**FuelTankPrs(V)**
Range: 0.0 to 5.0 V
Indicates signal voltage from the fuel tank pressure sensor. The EVAP monitor requires input from this sensor.

With the gas cap removed, signal voltage should be between 2.4 and 2.8 V. During the evaporative emissions test, expect voltage to decrease while the PCM applies vacuum to the fuel tank.

**GEAR**
Range: actual
Indicates the gear commanded by the module.

**GEAR POSITION**
Range: variable
Indicates the estimated gear position, calculated from both the “Main shaft speed sensor” and the “countershaft speed sensor”.

**GEN L TERMINAL**
Range: ON/OFF
Indicates the state of the generator “L” terminal and reads as follows:
- ON under normal operating conditions
- OFF if the PCM detects incorrect voltage in the L terminal circuit

**GEN LIGHT**
Range: ON/OFF
Indicates the generator warning light status.

**GEN OUT(V)**
Range: 0.0 to 16.0 V
Indicates the generator output voltage.

**GEN. FIELD**
Range: ON/OFF
Indicates the status of the generator field, reads ON when the system is charging.

**GEN(%)**
Range: 0 to 100%
Indicates the generator field current control duty signal.
GEN_FAULT
Range: __________________________________________________________ YES/NO
Indicates if generator output fault is present. Reads YES if there is a charging problem.

GEN_MON
Range: __________________________________________________________ ON/OFF
Indicates the generator monitor status.

GENERATOR (%)
Range: __________________________________________________________ 0 to 100%
Indicates the level of charge that the PCM is requesting as a percentage.

GENFDC%
Range: __________________________________________________________ 0 to 100%
Indicates the generator field duty cycle.

GENVDSD(V)
Range: __________________________________________________________ actual
Indicates the generator voltage desired.

HAC PRS ZONE
Range: __________________________________________________________ ON/OFF
Indicates the high air charging pressure zone signal.

HEADLIGHT SW
Range: __________________________________________________________ ON/OFF
Indicates the headlamp switch.

HFC
Range: __________________________________________________________ ON/OFF
Indicates the fan control high speed status.

HFC_FAULT
Range: __________________________________________________________ YES/NO
Indicates the fan control high speed fault status.

HI A/C PRESS
Range: __________________________________________________________ YES/NO
Indicates A/C system pressure and reads YES when the pressure is high.

HI PS PRESS
HI PS PRESSURE
P/S OIL PRESSURE SWITCH
P/S PRESS SW
PSP_SW
PSP SWT
PSP SWITCH
Range: __________________________________________________________ ON/OFF
Indicates the power steering pressure (PSP) switch status. Reads OFF when the steering wheel directs the wheels straight ahead, and reads ON when the steering wheel is turned or held turned in either direction. Turning the steering wheel builds pressure in the system.
HIGH ALTITUDE

Range: ___________________________ YES/NO

Indicates whether the vehicle is operating at high altitude, it reads YES when the ECM is controlling the engine for high altitude operation with low barometric pressure.

On some fuel-injected vehicles, the ECM compares the throttle position, mass airflow, and RPM readings to determine engine load. If the throttle is open more than expected for a given load, the ECM assumes it is operating at high altitude and adjusts fuel metering accordingly. Reads YES during high altitude operation.

HIGH BATTERY

Range: ___________________________ YES/NO

Indicates the vehicle battery state, reads NO under normal conditions and YES when battery voltage is higher than specifications.

On most vehicles, a high battery voltage condition causes the ECM to disable the output solenoids to protect the ECM from high current.

HO2 SNSR-1 (mV)
HO2 SNSR-2 (mV)

Range: ___________________________ 0 to 1000 mV

Indicates heated oxygen sensor (HO2S) output as millivolts. Sensor 1 is upstream (closest to the engine) and HO2S 2 is downstream (after the converter).

Sensor 1 voltage should fluctuate constantly from about 50 mV (lean exhaust) to 800 mV (rich exhaust) during closed loop operation. Sensor 2 voltage fluctuates slowly over a longer period of time due to the oxygen storage capability of an efficiently operating catalyst. If the voltage fluctuates rapidly on a hot catalyst, low catalyst efficiency may be the cause.

HO2S (mA)
HO2S S1 (mA)

Range: ___________________________ –8.89 to 8.89 mA

Indicates heated oxygen sensor (HO2S) output as milliamperes:

- Negative value = lean
- around 0 = ideal
- Positive value = rich

Sensor 1 (S1) is upstream, closest to the engine.

HO2S (AF) B1 S1 HEATER
HO2S (AF) B2 S1 HEATER
HO2S S-1 HEATER
HO2S B1 S2 HEATER
HO2S B2 S2 HEATER

Range: ___________________________ ON/OFF

Indicates the HO2S heater circuit status, it turns off if the battery voltage is above 16 volts. Reads ON when the heater is on, usually at idle with a cold exhaust. Cylinder bank 1 (B1) contains cylinder #1. Sensor 1 (S1) is upstream, closest to the engine.

HO2S 1 HEATER
HO2S 2 HEATER
HO2S 3 HEATER

Range: ___________________________ ON/OFF

Indicates the PCM command status to the HO2S 1, HO2S 2, and HO2S 3 heater circuits.
**Data Parameters**

HO2S B1 H CUR
HO2S B2 H CUR
HO2S B1 HEATER CURRENT (mA)
HO2S B2 HEATER CURRENT (mA)
HO2S B1 S2 HEATER CURRENT (mA)
HO2S B2 S2 HEATER CURRENT (mA)
HO2S B1 S2 H CUR
HO2S B2 S2 H CUR
HO2S B2 S2 C (A)
HO2S S2 H C (A)
HO2S S2 HEATER CURRENT (mA)
HO2S S2 HEATER
HO2S S2 HTR

Range: ______________________________________________________ not available

Indicates the current applied by the ECM to the HO2S heater as amperes or milliampères.

**HO2S HEATED OXYGEN SENSOR (A/F)**

Range: _______________________________________________________ 13.9 to 15.5

Indicates the air/fuel ratio (A/F) as determined by HO2S feedback signals.

HO2S B1 S1 (V)
HO2S B2 S1 (V)
HO2S B1 S2 (V)
HO2S B2 S2 (V)
HO2S S1 (V)
HO2S S2 (V)
HO2S S3 (V)

Range: _______________________________________________________ 0.0 to 1.4 V

Indicates heated oxygen sensor (HO2S) output as volts. Cylinder bank 1 (B1) contains cylinder #1. Sensor 1 (S1) is upstream (closest to the engine) and S2 is downstream (after the converter).

**HO2S_mon_ready**

Range: ____________________________________________________ YES/NO

Indicates the heated oxygen sensor (HO2S) monitor has successfully completed.

**HO2S11 (mA)**
**HO2S12 (mA)**
**HO2S21 (mA)**
**HO2S22 (mA)**

Range: ______________________________________________________ –8.89 to 8.89 mA

Indicates the drive current supplied by the ECM to control the HO2S heater. The two digits after HO2S position the sensor:

- 11—Bank 1, Upstream
- 12—Bank 1, Downstream
- 21—Bank 2, Upstream
- 22—Bank 2, Downstream

**HOT OPEN LOOP**

Range: ____________________________________________________ YES/NO

Indicates whether the PCM has commanded open loop operation due to high engine temperature and reads YES only when in open loop.
**Data Parameters**

**Engine Parameters**

**HTD CAT MON CMPL**

Range: ________________________________ COMPLETE/INCOMPLETE

Indicates the heated catalyst monitor.

**HTD CAT MON ENA**

Range: ________________________________ UNABLE/ENABLE

Indicates the heated catalyst monitor.

**HTR11**

**HTR12**

**HTR21**

**HTR22**

Range: ________________________________ ON/OFF

Indicates the HO2S heater circuit status for:

- 11—Bank 1, Upstream
- 12—Bank 1, Downstream
- 21—Bank 2, Upstream
- 22—Bank 2, Downstream

**HTR11Fault**

**HTR12Fault**

**HTR21Fault**

**HTR22Fault**

**HTR11_Fault**

**HTR12_Fault**

**HTR21_Fault**

**HTR22_Fault**

Range: ________________________________ YES/NO

Indicates the HO2S heater circuit fault exists for:

- 11—Bank 1, Upstream
- 12—Bank 1, Downstream
- 21—Bank 2, Upstream
- 22—Bank 2, Downstream

**HTRCM11(A)**

**HTRCM12(A)**

**HTRCM21(A)**

**HTRCM22(A)**

Range: ________________________________ ON/OFF

Indicates the heater current monitor for the heated exhaust oxygen sensor:

- 11—Bank 1, Upstream
- 12—Bank 1, Downstream
- 21—Bank 2, Upstream
- 22—Bank 2, Downstream

**I/P PULLY RPM**

**I/P PULLY SPD (rpm)**

Range: ___________________________________________ 0 to engine max.

Indicates the engine speed computed from the turbine revolution sensor signal.
IAB CTRL SOL
Range: _____________________________ ON/OFF
Indicates the state of the intake air bypass control solenoid valve, it should be ON at idle and OFF at all other times.

IAB HI CTRL SOL
Range: _____________________________ ON/OFF
Indicates the state of the intake air bypass high control solenoid valve, it should only be ON during high RPM operation.

IAB LOW CTRL SOL
Range: _____________________________ ON/OFF
Indicates the state of the intake air bypass low control solenoid valve, it should only be ON during low RPM operation.

IAC (%)
ISC (%)
IAC/AAC (%)
IAC(%)
Range: _____________________________ 0 to 100%
Indicates the duty cycle of the pulse-width-modulated (PWM) signal being applied to the idle air control (IAC) valve.
As the duty ratio exceeds 50%, the valve shaft moves in to open the air bypass passage. At a duty ratio less than 50%, the shaft moves to close the air bypass passage.

IAC COM
IAC COMMAND (COUNTS)
Range: _____________________________ not available
Indicates the PCM commanded status of the idle air control valve as a count.

IAC DIRECTION
IVSMDIR1
IVSMDIR2
Range: _____________________________ FWD/REV
Indicates the direction the ECM is commanding the idle air control (IAC) motor to move:
• FWD to reduce idle airflow
• REV to increase idle airflow

IAC STEPS
IAC/AAC STEPS
IDLE AIR CONTRL
ISC STEP
IVSMSTP (DEC)
MOTOR POS STEPS
Range: _____________________________ 0 to 125 or 0 to 255
Indicates the position of the idle air control (IAC) valve as a step count.
Stepper-motor IAC valves have either 125 or 255 positions, and readings vary from 0 to 125 or from 0 to 255:
• 0 means the motor has moved to its outer limit to close the IAC valve.
• 125 or 255 means the motor has moved to its inner limit to fully open the IAC valve.
**Data Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IAC_FAULT</strong></td>
<td></td>
<td>Indicates whether the PCM detects a fault in the idle air control (IAC) system, reads YES if a fault is present.</td>
</tr>
<tr>
<td><strong>IACV(%)</strong></td>
<td>0 to 100%</td>
<td>Indicates the idle air control percentage.</td>
</tr>
<tr>
<td><strong>IACV(mS)</strong></td>
<td>not available</td>
<td>Indicates the idle air control in milliseconds.</td>
</tr>
<tr>
<td><strong>IAR SOL</strong></td>
<td></td>
<td>Indicates the status of the intake air resonator solenoid valve. When the engine RPM is in the mid-range, the valve is turned ON to decrease air intake noise.</td>
</tr>
<tr>
<td><strong>IASV</strong></td>
<td></td>
<td>Indicates the intake air shutter valve.</td>
</tr>
<tr>
<td><strong>IAT</strong></td>
<td>–40 to 399°F or –40 to 199°C</td>
<td>Indicates the intake air temperature.</td>
</tr>
<tr>
<td><strong>IAT (V)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IAT 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IAT 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IAT SENSOR 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IAT SENSOR 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INTAKE AIR TEMPERATURE SENSOR(2)</strong></td>
<td>0.0 to 5.0 V</td>
<td>Indicates the voltage signal from the IAT sensor, which is typically installed in the air cleaner. A 5 V reference signal is applied to the sensor, resistance decreases as temperature increases.</td>
</tr>
<tr>
<td><strong>IAT_FAULT</strong></td>
<td></td>
<td>Indicates the inlet air temperature status.</td>
</tr>
<tr>
<td><strong>IATDC</strong></td>
<td>–40 to 399°F or –40 to 199°C</td>
<td>Indicates the intake air temperature 2.</td>
</tr>
<tr>
<td><strong>IATDC(V)</strong></td>
<td>0.0 to 5.0 V</td>
<td>Indicates the intake air temperature 2 in voltage.</td>
</tr>
<tr>
<td><strong>IATLC(V)</strong></td>
<td>0.0 to 5.0 V</td>
<td>Indicates the Lysholm compressor intake air temperature signal voltage.</td>
</tr>
</tbody>
</table>
IDL A/V LEARN
Range: ___________________________ YET/CMPLT
Indicates the condition of Idle Air Volume Learning.
- YET: Idle Air Volume Learning has not been performed yet
- CMPLT: Idle Air Volume Learning has already been performed successfully

IDLE CTRL SOL (%)
IAC COM (%)
Range: ___________________________ –100 to 100%
Indicates the drive percentage of the IAC solenoid valve.

IDLE LEARN
Range: ___________________________ COMPLETED/NOT COMPLETED/NOT APPLICABLE
Indicates whether the PCM completed the “idle learn” program.

IDLE STOP CTRL
Range: ___________________________ YES/NO
Indicates whether the ECM is operating in idle stop control mode.

IDLE TARGET TH (°)
MOTOR TH CMD (°)
Range: ___________________________ 0 to 180°
Indicates the PCM calculated target throttle valve position at idle in degrees.

IDLE UP SOL
Range: ___________________________ ON/OFF
Indicates the status of the idle up solenoid valve. The valve is turned ON when A/C SW is turned on, but it is controlled ON/OFF depending on the engine operating conditions.

IDLE UP VSV
Range: ___________________________ ON/OFF
Indicates the ECM command to the vacuum switching valve (VSV) is used to actuate the idle up valve. When ON, the idle up valve bleeds air into the intake manifold to raise RPM.

IDLING
Range: ___________________________ ON/OFF
Indicates whether the engine is running at idle.

IG LEVEL
IG1 LEVEL
Range: ___________________________ HIGH/LOW
Indicates the status of the IG1 voltage level.

IG MISFIRE
Range: ___________________________ actual count
Indicates the misfire accumulated counter for 2VI method ignition systems.

IG T ADJ (V)
Range: ___________________________ 0.0 to 5.0 V
Indicates the status of the ignition timing adjuster volume switch as volts. Ignition timing at idle is controlled by this volume switch.
IGDSBL
Range: _______________________________________________________________ 0/1
Indicates the cessation of injection (B). Bit changes to 1 if injection of each cylinder ceases. Bit 0
doesn’t always show cylinder #1.

IGN (V)
IGNITION (V)
Range: _______________________________________________________ 0.0 to 25.5 V
Indicates the key-on system voltage.

IGN ACC SIG
Range: __________________________________________________________ ON/OFF
Indicates the state of the ignition switch ACC input signal to the control module. This parameter
displays ON when the ignition switch is in the ignition accessory position and OFF when the
ignition switch is in any other position.

IGN ADJ TERM
OCT ADJ
Range: _____________________________________________ ON/OFF or CLSD/OPEN
Indicates the state of the ignition timing adjustment terminal:
• ON or CLSD when shorted to ground, adjustment mode
• OFF or OPEN when open, normal mode

IGN ADVANCE(°)
Range: __________________________________________________________ Min.: –64 deg., Max.: 63.5 deg.
Indicates the ignition timing advance for Number 1 cylinder. Typical readings range from 5 to 22°
BTDC with the engine running at idle.

IGN ADVANCE (°)
IGN ADV(°)
IGN TIMING(°)
SPK ADV (°)
SPK ADV (°BTDC)
SPARK ADV (°)
SPARK ADVANCE
TIMING (°BTDC)
TOTAL ADV (°)
Range: _________________________________________________________ –90 to 90°
Indicates the amount of total spark advance or retard being commanded by the ECM as degrees.
The value including base timing on most vehicles, On some vehicles, such as Chrysler Imports,
the value does not including base timing.

IGN CYCLES
Range: ____________________________________________________________0 to 50
Indicates the number of times the engine has been started since the last DTC set or codes were
cleared.

IGN CYCLE DTC
Range: ____________________________________________________________ YES/NO
Indicates whether a DTC set on the current ignition cycle.
**IGN EVENTS X**

Indicates the number of ignition events the ECM expects to occur during the next 1000 crankshaft revolutions. The PCM uses this information to determine the misfire rate. Range varies by the number of cylinders:

- 0 to 2000 for a 4-cylinder engine
- 0 to 3000 or a 6-cylinder engine
- 0 to 4000 or a 8-cylinder engine

The “X” in “IGN EVENTS X” is a value from 1 to 8, depending on the cylinder being monitored.

**IGN FUEL VTD**

Indicates whether a Vehicle Theft Deterrent (VTD) code is stored in memory.

**IGNITION**

Indicates ignition counter: 0 to 800.

**IGNITION 1 (V)**

Indicates system voltage measured by the ECM at its ignition feed circuit. Ignition voltage is only present when the vehicle is running.

**IGNITION SW**

Indicates the status of the ignition switch:

- ON when the switch is on, the engine is running and not cranking
- OFF when the switch is in any position other than run

**IGRTNE (V)**

Indicates the signal voltage on the IGRTNE circuit.

**IGRTNI (V)**

Indicates the signal voltage on the IGRTNI circuit.

**ILLUMINAT(%)**

Indicates the dimming control command as a percentage.

**IMA (V)**

Indicates the status of the idle mixture adjuster volts. This is a variable resistor that controls the idle mixture.

**IMA OUTPUT (kw)**

Indicates the Integrated Motor Assist (IMA) output current the ECM requests of the Motor Control Module (MCM) for assist or regeneration.
IMA REQUEST (kW)
Range: ___________________________ not available
Indicates the target value which the ECM requests of the motor control module for assist or regeneration.

IMA STANDBY
Range: ___________________________ YES/NO
Indicates the status of the Integrated Motor Assist (IMA) standby status. Reads NO if the IMA cannot assist the engine and reads YES at all other times.

IMA TORQUE
Range: ___________________________ –15 to 15 kgfm or –147 to 147 N.m
Indicates the status of the Integrated Motor Assist (IMA) motor torque.

IMMobilizer
Range: ___________________________ BAN/RUN
Indicates the status of the immobilizer system:
• BAN, the immobilizer module prevents ECM from starting the engine.
• RUN, the immobilizer module allows ECM to start the engine.

IMRC
Range: ___________________________ ON/OFF
Indicates the intake manifold runner control.

IMRC MON SW
Range: ___________________________ ON/OFF
Indicates the intake manifold runner control monitor.

IMRC POS SENSOR
IMRC VP SENSOR (V)
Range: ___________________________ 0.0 to 5.0 V
Indicates the intake manifold runner control solenoid valve position sensor signal voltage.

IMRC SOL
IMRC SOL VLV
Range: ___________________________ ON/OFF
Indicates the status of the intake manifold runner control solenoid valve.

IMRC VLV CMD
IMT (IMRC) VLV CMD
Range: ___________________________ OPEN/CLOSE
Indicates the PCM command to the intake manifold runner control solenoid valve position switch. It should read CLOSE at low engine speed.

IMT (IMRC) VALVE SW
IMT (IMRC) VLV SWT
IMT VLV SW
Range: ___________________________ OPEN/CLOSE
Indicates the status of the intake manifold runner control solenoid valve position switch. It should read CLOSE at low engine speed.

IMTV
Range: ___________________________ ON/OFF
Indicates the intake manifold tuning valve.
**IMTV (%)**  
Range: ___________________________________________________________________________ 0 to 100%  
Indicates the PCM-command status for the intake manifold tuning valve. At 100% the valve should be fully open.

**IMTV (%)**  
Range: ___________________________________________________________________________ 0 to 100%  
Indicates the duty cycle of the intake manifold tuning valve.

**IMTV_FAULT**  
Range: ___________________________________________________________________________ YES/NO  
Indicates an intake manifold tuning valve fault.

**INDDRNG (ON/OFF)**  
Range: ___________________________________________________________________________ ON/OFF  
Indicates the “Drive” position indicator output.

**INDLRNG (ON/OFF)**  
Range: ___________________________________________________________________________ ON/OFF  
Indicates the “Low” position indicator output.

**INDNRNG (ON/OFF)**  
Range: ___________________________________________________________________________ ON/OFF  
Indicates the “Neutral” position indicator output.

**INDPRNG (ON/OFF)**  
Range: ___________________________________________________________________________ ON/OFF  
Indicates the “Park” position indicator output.

**INDRRNG (ON/OFF)**  
Range: ___________________________________________________________________________ ON/OFF  
Indicates the “Reverse” position indicator output.

**INGEAR**  
Range: ___________________________________________________________________________ actual  
Indicates if the vehicle is in gear.

**INH SW3M (ON/OFF)**  
Range: ___________________________________________________________________________ ON/OFF  
Indicates the PNP switch 3 status.

**INH SW4 (ON/OFF)**  
Range: ___________________________________________________________________________ ON/OFF  
Indicates the PNP switch 4 status.

**INH SW3 (ON/OFF)**  
Range: ___________________________________________________________________________ ON/OFF  
Indicates the PNP switch 3 status.

**INH SW2 (ON/OFF)**  
Range: ___________________________________________________________________________ ON/OFF  
Indicates the PNP switch 2 status.

**INH SW1 (ON/OFF)**  
Range: ___________________________________________________________________________ ON/OFF  
Indicates the PNP switch 1 status.
INI IAT TMP
INI COOL TEMP
INI COOL TMP

Range: _____________________________________ –40°F to 249°F or –40°C to 120°C

Indicates the initial intake air temperature on engine first start. Should be close to ambient air temperature.

INJ (mS)
INJ PW (mS)
INJ #1 (mS)
INJ #1 PW (mS)
INJ #2 (mS)
INJ #2 PW (mS)
INJ B1 (mS)
INJ B2 (mS)
INJ L(mS)
INJ L(mS)
INJECTOR (mS)
INJ PULSE-B1(mS)
INJ PULSE-B2(mS)
INJ #x (mS)

Range: _____________________________________ 0 to 65.3 mS

Indicates fuel-injection pulse width in milliseconds. The pulse width is the length of time that the ECM commands the fuel injectors to turn on.

A high pulse width indicates more on-time and a richer mixture. A low pulse width indicates less on-time and a leaner mixture. There are no definite specifications for injector pulse width, but the reading should change as engine speed and load change. Typical readings at idle are 2.2 to 3.0 mS, and 2.1 to 2.9 mS at 3000 rpm.

The “x” in INJ #x is a variable from 1 to 8, depending on the cylinder.

INJ PW B1(mS)
INJ PW B2(mS)

Range: _____________________________________ 0 to 1000 mS

Indicates the amount of time the PCM commands each injector ON during an engine cycle in milliseconds. A longer injector pulse width causes more fuel to be delivered. The injector pulse width increases as the engine load increases.

• B1 represents cylinder bank 1 (cylinders 1, 3, 5, and 7)
• B2 represents cylinder bank 2 (cylinders 2, 4, 6, and 8)
**Data Parameters**

- **INJ1Fault**
- **INJ2Fault**
- **INJ3Fault**
- **INJ4Fault**
- **INJ5Fault**
- **INJ6Fault**
- **INJ1_Fault**
- **INJ2_Fault**
- **INJ3_Fault**
- **INJ4_Fault**
- **INJ5_Fault**
- **INJ6_Fault**

**Range:** __________________________________________________________ YES/NO

Indicates whether the PCM has detected an injector circuit fault, it reads YES when the PCM detected a fault.

**INJECTOR MODE**

**Range:** __________________________________________________________ ON/OFF

Indicates the status of the injector mode control operation. It reads ON right after the ignition switch is turned on under cold circumstances.

**INLET AIR TEMP**

**Range:** ________________________________________________________ HOT/COOL

Indicates the state of the intake air temperature switch:

- **HOT** when air temperature is approximately 60°F (15°C) or more
- **COOL** when air temperature is about 40°F (4°C) or less

**INPUT RPM**

**Range:** ______________________________________________________0 to 8192 rpm

Indicates the rotational speed of the input shaft.

**INT AIR CTL VSV**

**INTAKE AIR VSV**

**Range:** __________________________________________________________ ON/OFF

Indicates the ECM command to the vacuum switching valve (VSV) that actuates the second turbocharger intake air control valve. When ON, the VSV should be activated and the control valve should be open.

**INT/V SOL B1 (%)**

**INT/V SOL B2 (%)**

**Range:** __________________________________________________________ 0 to 99%

Indicates the control value of the intake valve timing control solenoid valve. It should read:

- **0%** to **2%** at idle.
- **0%** to **80%** when revving the engine up to 2000 RPM quickly.

**INT/V SOL-B1**

**INT/V SOL-B2**

**Range:** __________________________________________________________ ON/OFF

Indicates the state of the intake valve timing control solenoid.
INT/V TIM B1 (°)
INT/V TIM B2 (°)
Range: –127 to 128°
Indicates the intake camshaft advance angle. It should read:
- –5° to 5° at idle.
- 0° to 45° when revving the engine up to 2000 RPM quickly.

INTAKE AIR
Range: Min.: –40°F, Max.: 258°F or Min.: –40°C, Max.: 140°C
Indicates the intake air temperature: equivalent to ambient air temperature.
- If value –40°C (–40°F): sensor circuit open
- If value 140°C (284°F): sensor circuit shorted

INTAKE CNTRL
Range: 0 to 255
Indicates the position of the intake tuning valve stepper motor inside the intake manifold runner as a step count. The greater the count, the wider the intake tuning valve opening.

INTAKE CTL VSV1
INTAKE CTL VSV2
INTAKE VSV
Range: ON/OFF
Indicates the status of the vacuum switching valve (VSV) that actuates the intake manifold runner control valve. Reads ON when the VSV is activated to open the valve.

INTAKE CTRL SOL
Range: ON/OFF
Indicates the status of the intake air duct runner control solenoid valve. Reads ON when the solenoid is activated, this reduces the sound of the intake air.

INTEGRATR
Range: 0 to 255
Indicates whether the ECM is commanding a rich or a lean mixture as part of the short-term fuel metering correction strategy.

The integrator number can range from 0 to 255. An integrator number higher than 128 indicates the ECM is commanding a short-term rich mixture. An integrator number lower than 128 indicates that the ECM is commanding a short-term lean mixture.

Compare integrator numbers to injector on-time. A number above 128 indicates increased on-time. A number below 128 indicates decreased on-time. Integrator corrections operate only in closed loop. In open loop, the integrator number goes to a fixed value, usually 128.

The block learn multiplier (BLM) is a long-term fuel metering correction factor. BLM is derived from the integrator correction. Block learn and integrator indicate the same directions of fuel metering correction. High numbers indicate rich mixtures; low numbers indicate lean mixtures. Refer to “BLM” on page 353 for more information.

ISOLT1
Range: 0.0 A / 0.7 A
Indicates the torque converter clutch solenoid valve output current.

ISOLT2
Range: 0.8 A / 0.0 A
Indicates the pressure control solenoid valve A (line pressure solenoid valve) output current.
**Data Parameters**

**ISOLT3**
- **Range:** ________________________________ 0.8 to 0.0 A
- Indicates pressure control solenoid valve B (secondary pressure solenoid valve) output current.

**ISTPIM**
- **Range:** ________________________________ not available
- Indicates whether the ECM is in the IACV step motor inspection mode.

**IVS**
- **Range:** ________________________________ IDLE/OFF IDLE
- Indicates the idle validation switch status.

**IXREF**
- **IXREF/QXREF**
  - **Range:** ________________________________ not available
  - Indicates the status of the learned ICMD at idle.

**KAMFUSE**
- **Range:** ________________________________ FAULT/OK
- Indicates the status of the keep alive memory power.

**KNOCK**
- **Range:** ________________________________ YES/NO
- Indicates whether the ECM is actively making adjustments to compensate for spark knock. This value is based on knock sensor (KS) signal, it reads:
  - YES if the sensor indicates knock
  - NO if the sensor does not indicate engine knock

**KNOCK ADVANCE (°)**

**KNOCK CTRL**
- **Range:** ________________________________ not available
- Indicates the corrected spark advance angle the ECM is applying to compensate for knock.

**KNOCK CRRT(°)**
- **Range:** ________________________________ Min:–64 CA, Max.: 1,984 CA
- Indicates the correction learning value based on the knock sensor signal. 3 to 28° Crank Angle: Driving at 44 mph (70 km/h).

**KNOCK CRRT VAL**
- **Range:** ________________________________ –64 CA to 1,984 CA
- Indicates the correction learning value of knocking. When driving 44 mph, a reading of 0 to 22 CA is considered normal.

**KNOCK CTRL EGR**
- **Range:** ________________________________ not available
- Indicates the ignition timing correction the ECM is applying to compensate for engine knock caused by the EGR system being active.
KNOCK FB(°)
Range: __________________________________________ Min: –64 CA, Max.: 1,984 CA
Indicates the feedback value of knocking. –25 to 0° Crank Angle: Driving at 44 mph (70 kph).

KNOCK FB VAL
Range: _________________________________________________ –64 CA to 1,984 CA
Indicates the correction learning value of knocking. When driving 44 mph, a reading of –22 to 0 CA is considered normal.

KNOCK RET (°)
KNOCK RETARD (°)
KNOCK RETARD CYL 1 (°)
KNOCK RETARD CYL 2 (°)
KNOCK RETARD CYL 3 (°)
KNOCK RETARD CYL 4 (°)
KNOCKR(°)
Range: ___________________________________________________________ 0 to 90°
Indicates the additional spark retard angle the ECM is applying to compensate for knock.
The value does not indicate that timing is retarded after top dead center. It indicates the amount of advance that has been taken away.

KNOCK SENSOR
KNOCK SNSR 1 (V)
KNOCK SNSR 2 (V)
Range: ________________________________________________________ 0.0 to 5.0 V
Indicates the voltage signal of the knock sensor (KS). The normal range is 0.8 to 1.0 V, higher voltage indicates increased knock.

There are 2 types of KS currently being used: broadband sensors and flat sensors. Broadband sensors have a single wire and the flat sensors have two wires. Broadband and flat sensor signals are processed differently by the PCM. Both systems constantly monitor the KS system for a signal that is not present or falls within the noise channel range.

KSOK
Range: ___________________________________________________________ OK/NG
Indicates the status of the knock sensor circuit, it reads OK during normal operation and NG if a fault is detected.

L SWITCH
Range: __________________________________________________________ ON/OFF
Indicates the transmission Low range switch.

LCHSTS
Range: __________________________________________________________ ON/OFF
Indicates the status of the latched starter switch signal, it reads ON when STS is turned on.

LDP_EVAPCP(A)
Range: ______________________________________________________ not available
Indicates the EVAP control system incorrect purge flow detection valve status.

LDP_IDL(A)
Range: ______________________________________________________ not available
Indicates the EVAP system leak detection idle current.
**Data Parameters**

- **LDP_MON(A)**
  - Range: not available
  - Indicates the EVAP system leak detection pump monitoring current.

- **LDP_REF(A)**
  - Range: not available
  - Indicates the EVAP system leak detection pump reference current.

- **LDP_SLDV(A)**
  - Range: not available
  - Indicates the EVAP control system small leak detection valve.

- **LDP_VSLD(V)**
  - Range: not available
  - Indicates the EVAP control system very small leak detection valve.

- **LFC**
  - Range: ON/OFF
  - Indicates the status of the electrically driven fan.

- **LFC_FAULT**
  - Range: YES/NO
  - Indicates a fan control low speed fault.

- **LFTRIM 1 (%)**
  - **LFTRIM 2 (%)**
  - Range: –35 to 35%
  - Indicates whether the ECM is commanding a rich or a lean mixture as part of the long-term fuel metering correction strategy.

  Similar to short-term fuel trim (SFTRIM), the LF TRIM number can range from -35% to +35%, with 000% as the midpoint. A number above zero percent indicates the PCM has commanded a long-term rich mixture correction. A number below zero percent indicates the PCM is commanding a lean mixture.

  The LF TRIM number follows the short-term fuel (ST FUEL) number and makes long-term corrections to the fuel-metering in response to a pattern or trend of short-term fuel changes.

  Compare LF TRIM numbers to injector on-time. Numbers above zero percent indicate increased on-time. Numbers below zero percent indicate decreased on-time. LF TRIM corrections operate only in closed loop. In open loop, the number goes to a fixed value.

- **LG FL IDLE (mS)**
  - Range: not available
  - Indicates the long term fuel correction being applied at idle.

- **LIFT SWITCH**
  - Range: ON/OFF
  - Indicates the status of the lift switch, it reads ON when the lift switch is turned on.

- **LINE PRES(%)**
  - Range: 0 to 100%
  - Indicates the line pressure solenoid status in percentage.

- **LINE PRESS(A)**
  - Range: not available
  - Indicates the line pressure solenoid status.
LO SPEED CUT
Range: ___________________________ NON/CUT
Indicates the vehicle cruise condition.
• NON—Vehicle speed is maintained at the ASCD set speed
• CUT—Vehicle speed decreased to excessively low compared with the ASCD set speed, and
  ASCD operation is cut off

LOAD (%)
Range: ___________________________ 0 to 100%
Indicates the relative engine load. The ECM calculates this value by dividing the actual manifold
airflow volume by the maximum possible manifold airflow volume. A high number indicates a
heavy load, a low number a lighter load.

LONGFT1(%) Range: ___________________________ 0 to 100%
Indicates long term fuel trim 1 in percentage.

LONGFT2(%) Range: ___________________________ 0 to 100%
Indicates long term fuel trim 2 in percentage.

LOOP
LOOP STATUS (L)
LOOP STATUS (R)
O2S FB COND
OPEN/CLSD LOOP Range: ___________________________ OPEN/CLSD
Indicates whether the engine is operating in open or closed loop, it should read:
• OPEN during warm-up, open loop
• CLSD during normal operating temperature operation, closed loop

Some vehicles display separate parameters for the left and right banks.

Some failure conditions (many associated with trouble codes) cause the ECM to return to
open-loop operation. Some vehicles may normally return to open-loop operation at idle. This is
usually because the O2S cools off at idle, and the ECM returns to open loop. You should be able
to restore closed-loop operation by accelerating off idle to warm the sensor.

LOW BATTERY
Range: ___________________________ YES/NO
Indicates the vehicle battery state, reads NO under normal conditions and YES when battery
voltage is below specifications.

LOW CLNT LEVEL
Range: ___________________________ YES/NO
Indicates whether the low coolant level switch has been activated, it reads:
• YES if the coolant level is low
• NO at all other times

LOW FUEL INDI
Range: ___________________________ ON/OFF
Indicates the status of the low fuel indicator lamp on the instrument cluster. It should read ON
when the low fuel indicator lamp is on. The low fuel lamp blinks if a malfunction is detected in the
fuel tank pressure or temperature sensor circuits.
LOW OIL LAMP
Range: ___________________________ ON/OFF
Indicates the status of the engine oil pressure lamp. It should read ON when the engine oil pressure indicator lamp is on.

LOW OIL LEVEL
Range: ___________________________ YES/NO
Indicates the status of the engine oil level is low, it reads:
• YES when the PCM detects a low engine oil level
• NO under normal operation

LOW OIL PRESS
Range: ___________________________ YES/NO
Indicates the status of the engine oil pressure sensor, it reads:
• YES when oil pressure is low
• NO under normal operation

LOW RPM RANGE
Range: ___________________________ ON/OFF
Indicates whether the engine is operating in the low RPM range. It reads ON during low RPM operation, and OFF at all other times.

LOW SELECTED
Range: ___________________________ YES/NO
Indicates the transmission L range switch.

LT ADP B2S2 (ms)
Range: ___________________________ not available
Indicates the long-term ADP values of the rear O2S for compensating fuel.

LT ALPHA (%)
LT ALPHA B2 (%)
LT TRIM-1 (%)
LT TRIM-2 (%)
LT TRIM B1 (%)
LT TRIM B2 (%)
Range: ___________________________ variable
Indicates whether the ECM is commanding a rich or a lean mixture as part of the long-term fuel metering correction strategy. The value changes in response to changing patterns of the short-term fuel trim corrections.

Long-term fuel trim ranges from –100% to +100%, –25% to +25%, or 0 to 200% depending on the vehicle. Depending on which scale is used, zero or 100 percent serves as the midpoint. A number above the midpoint indicates the PCM is commanding a long-term rich mixture correction. A number the midpoint indicates the PCM is commanding a lean mixture.

Long-term fuel trim numbers follow the short-term fuel trim numbers to make long-term fuel metering corrections, in response to a pattern of short term corrections.

Compare Long-term fuel trim values to injector on-time. Numbers above the midpoint indicate increased on-time, while numbers below the midpoint indicate decreased on-time. Fuel trim corrections operate only in closed loop. In open loop they revert to a fixed value.
LT FUEL TRIM (COUNTS)
LT FUEL TRIM B1 (COUNTS)
LT FUEL TRIM B2 (COUNTS)
Range: _______________________________ 0 to 255
Indicates the status of the long-term fuel trim as a step count. This is derived from the short term fuel value and it is used for long term correction of fuel delivery:
  • A value below 128 counts or 0% indicates O2S feedback shows a rich condition and the vehicle control module (VCM) is commanding a lean mixture in response.
  • A value above 128 counts or 0% indicates O2S feedback shows a lean condition and the VCM is commanding a rich mixture in response.

Numbers 1 and 2 refer to the individual cylinder banks.

LT TRM AVG1 (%)
LT TRM AVG2 (%)
Range: _______________________________ 0 to 100%
Indicates the average of all long term fuel trim cells as percentage. The short term fuel trim cells are rated, for the amount of which they are used.

For example, an idle cell is rated higher than a wide open cell. If a fueling malfunction occurs in the idle cell and the wide open cell, the average would be more affected by the idle cell than the wide open cell.

A low value indicates that the fuel system is rich and fuel delivery is being reduced. A high value indicates that a lean condition exists and the PCM compensates by adding fuel. When the average of the cells reach a predetermined high or low, a fuel trim DTC sets.

LUSEL SOL MON
Range: _______________________________ ON/OFF
Indicates the status of the torque converter lock-up.
  • ON when lock-up
  • OFF when no lock-up

LUSEL SOL OUT
Range: _______________________________ ON/OFF
Indicates the status of the lock-up select solenoid valve.
  • ON when selector lever is in “P” and “N” positions
  • When OFF, wait for at least 5 seconds with the selector lever in “R”, “D”, “S”, and “L” positions

M SHAFT SPD (RPM)
MAINSHAFT SPD (RPM)
Range: _______________________________ ON/OFF
Indicates the state of the transmission mainshaft speed sensor signal. It should read ON whenever the mainshaft is turning.

M/T SHIFT LOCK
Range: _______________________________ ON/OFF
Indicates the state of the M/T shift lock relay. It indicates ON when the ECM commands the shift lock relay to turn on.

M_DPFE
Range: _______________________________ actual
Indicates the EGR sensor input at the time of a misfire.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M_ENG</td>
<td></td>
<td>Indicates the engine RPM at the time of a misfire.</td>
</tr>
<tr>
<td>M_IAT</td>
<td></td>
<td>Indicates the intake air temperature (IAT) at the time of a misfire.</td>
</tr>
<tr>
<td>M_LOAD</td>
<td></td>
<td>Indicates the engine load at the time of a misfire.</td>
</tr>
<tr>
<td>M_PNP</td>
<td>PARK NEUTRAL</td>
<td>Indicates the park/neutral position (PNP) at the time of a misfire.</td>
</tr>
<tr>
<td>M_RUN</td>
<td></td>
<td>Indicates the engine running time at the time of a misfire.</td>
</tr>
<tr>
<td>M_SOAK</td>
<td></td>
<td>Indicates the engine-off soak time in minutes prior to a misfire.</td>
</tr>
<tr>
<td>M_TP</td>
<td></td>
<td>Indicates the throttle position at the time of a misfire.</td>
</tr>
<tr>
<td>M_TRIP</td>
<td></td>
<td>Indicates the number of trips since the time of a misfire.</td>
</tr>
<tr>
<td>M_VSS</td>
<td></td>
<td>Indicates the vehicle speed at the time of a misfire.</td>
</tr>
<tr>
<td>MAF (gm/Sec)</td>
<td></td>
<td>Indicates mass airflow (MAF), which is the amount of air entering the engine, expressed as grams-per-second. The value is determined by the MAF sensor signal.</td>
</tr>
<tr>
<td>MAF (g/s)</td>
<td></td>
<td>Indicates mass airflow (MAF), which is the amount of air entering the engine, expressed as grams-per-second. The value is determined by the MAF sensor signal.</td>
</tr>
</tbody>
</table>

- If value 2.7 to 3.7 g/s: Idling
- If value 8.8 to 9.8 g/s: 2,000 rpm
- If value approximately 0.0 g/s: Mass air flow meter power source circuit open; VG circuit open or short
- If value 160.0 g/s or more: E2G circuit open

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAF (Hz)</td>
<td></td>
<td>Indicates mass airflow (MAF), which is the amount of air entering the engine, expressed as hertz. The value is determined by the current needed to keep the hot wires of the MAF sensor at a constant temperature.</td>
</tr>
</tbody>
</table>
Data Parameters

**MAF (V)**

**MAF(V)**

Range: ______________________________________________________________ 0 to 5.00 V

Indicates mass airflow (MAF), which is the amount of air entering the engine, expressed as voltage. This is the MAF sensor signal, readings should increase along with throttle opening.

**MAF PERF TST**

Range: ______________________________________________________________ FAIL/PASS

Indicates mass airflow performance.

**MAF_FAULT**

Range: ______________________________________________________________ YES/NO

Indicates a mass airflow fault.

**MAIN RELAY**

Range: ______________________________________________________________ ON/OFF

Indicates the status of the main relay, which supplies power to the fuel tank internal solenoid valve and fuel pressure regulator shut-off solenoid value. Reads ON when energized.

**MAIN RELAY (FP)**

Range: ______________________________________________________________ ON/OFF

Indicates the status of the main relay for the fuel pump, reads ON when energized. The main relay contains two relays, this is the second of the 2 relays.

**MAINRLY**

Range: ______________________________________________________________ ON/OFF

Indicates the PCM control relay.

**MIL**

**MALFUNCTION INDICATOR LAMP**

**MIL**

**MIL STATUS**

Range: ______________________________________________________________ ON/OFF

Indicates the status of the malfunction indicator lamp (MIL).

**MAN VAC (kPa)(inHg)**

Range: ______________________________________________________________ 0 to 205 kPa or 0 to 60.7 inHg

Indicates the ECM calculated manifold vacuum based on manifold absolute pressure (MAP) sensor signal voltages. The reading should be:

- Close to 0 (inHg or kPa) with the engine off and the manifold close to atmospheric pressure at sea level.
- High on an engine running at idle.

The ECM compares the barometric (BARO) pressure reading taken from the MAP sensor before startup to the MAP voltage while the engine is running to determine intake manifold vacuum.

**MANIFOLD ABSOLUTE PRESSURE SENSOR**

Range: ______________________________________________________________ variable

Indicates the manifold absolute pressure (MAP) sensor that detects the intake manifold pressure and converts it into voltage and sends it to the ECM. The MAP sensor data is used along with other sensor inputs to determine basic Fuel-injection timing.
**MAP**

**MAP SENSOR**

Range: _________________________ 0 to 255 kPa, 0 to 75.3 inHg or 0 to 1913 mmHG

Indicates the ECM calculated a manifold absolute pressure (MAP), which is based on the MAP sensor signal voltage. When MAP is displayed in kPa, the reading should be approximately 100 to 102 with the engine off and manifold pressure is close to atmospheric pressure at sea level. When the engine is running and manifold vacuum is high, the kPa reading drops. On a turbocharged engine, the reading rises above 100 as boost is applied.

When MAP is displayed as inches of mercury (inHg or "Hg), the reading should be about 29.9 with the engine off and the manifold close to atmospheric pressure at sea level. When the engine is running with high manifold vacuum, the MAP reading in drops. On a turbocharged engine, the reading rises above 30 as boost is applied.

<table>
<thead>
<tr>
<th>Voltage</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAP (kPa)</td>
<td>70</td>
<td>60</td>
</tr>
<tr>
<td>MAP (&quot;Hg)</td>
<td>21</td>
<td>18</td>
</tr>
<tr>
<td>MAP (mmHG)</td>
<td>533</td>
<td>457</td>
</tr>
</tbody>
</table>

Table 18-5 *MAP voltage to pressure relationship*

Compare the MAP voltage and MAP pressure readings displayed on the scan tool. Pressure should be high when voltage is high, low when voltage is low. If the readings appear abnormal for the apparent engine load, the sensor signal to the ECM may be inaccurate or the ECM calculations may be incorrect for some reason.

**MAP (V)**

Range: _________________________ 0 to 5.12 V

Indicates the MAP sensor signal voltage. Voltage varies with manifold pressure, it should be:

- Low when absolute pressure is low (high manifold vacuum).
- High when absolute pressure is high (low manifold vacuum).

**MAP(Hz)**

Range: _________________________ see below

Indicates the manifold absolute pressure (MAP) sensor outputs frequency signal, which is relative to intake manifold vacuum. The MAP sensor frequency increases as intake manifold vacuum decreases.

MAP(Hz) reads as follows:

- 80 Hz at 101.6 kPa (30 inHg) of manifold vacuum.
- 159 Hz at zero manifold vacuum.

The PCM uses the MAP signal to determine engine load and regulate the air-fuel ratio, ignition timing, and EGR flow and to compensate for altitude.

**MAP SOL V**

Range: _________________________ ON/OFF

Indicates the boost sensor solenoid valve status.
MAP/BARO SOL
MAP/BARO SOLENOID
Range: __________________________________________________ MAP/BARO
Indicates the state of the MAP/BARO solenoid valve, which applies intake manifold vacuum or barometric (atmospheric) pressure to the sensing port of the absolute pressure sensor. Compare to the ABSOL PRES(V) absolute pressure voltage as follows:
- MAP displays if the ABSOL PRES(V) parameter shows MAP voltage.
- BARO displays if the ABSOL PRES(V) parameter shows BARO voltage.

MAP/BARO SOL
Range: __________________________________________________________ ON/OFF
Indicates the state of the MAP/BARO solenoid status.

MAP/BARO("Hg)
Range: __________________________________________________________ see below
Indicates the barometric pressure, which is calculated by the PCM based on the frequency of the barometric pressure (BP) sensor signal.
This parameter reads as follows:
- 30.1 inHg at sea level.
- 23 inHg at 7,000 feet.

MAP/BARO(V)
Range: __________________________________________________________ 2.6 to 4.6 V
Indicates the barometric pressure as voltage and should read as follows:
- 4.6 V at sea level.
- 2.6 V at an elevation of 10,000 feet.

MAP_FAULT
Range: __________________________________________________________ YES/NO
Indicates the manifold absolute pressure sensor status.

MAT (°C)
Range: __________________________________________________________ –40 to 199°C or –40 to 389°F
Indicates the ECM calculated manifold air temperature (MAT), the temperature of the intake air charge. A thermistor-type temperature sensor installed in the intake manifold is usually used to measure intake air temperature, the ECM converts MAT sensor voltage to an air temperature reading.
The MAT reading should be close to ambient air temperature on a cold engine, and should rise steadily as the engine warms. High-temperature MAT readings may differ greatly from vehicle to vehicle because of the underhood temperature variations and hot-soak conditions.

MAX ENG SPD (RPM)
Range: __________________________________________________________ 0 to engine max.
Indicates the maximum highest engine speed the engine has ever achieved.

MC DWL (*)
Range: __________________________________________________________ 0 to 60°
Indicates the duty cycle, or on-time, of the mixture control (MC) solenoid on a carbureted engine. It usually is based on a 6-cylinder dwell scale of 0 to 60 degrees, expect:
- A low dwell reading when the ECM is commanding a rich mixture.
- A high dwell reading when the ECM is commanding a lean mixture.
On a 4-cylinder (90°) scale, the midpoint of the dwell range is 45°, which indicates a 50% duty cycle. On a 6-cylinder scale, the midpoint of the range is 30°, which indicates a 50% duty cycle.

**MCM STANDBY**

Range: ________________________________ OK/NG

Indicates the MCM standby status and the status of motor ECM. When OK, the MOT ECM works to control assist and regenerative power of the IMA motor.

**MFC**

Range: ________________________________ ON/OFF

Indicates the medium fan control status.

**MFC_FAULT**

Range: ________________________________ YES/NO

Indicates a medium fan control fault.

**MFCYLM**

**MISFIRED CYL**

Range: ________________________________ not available

Indicates random (B) engine misfire information.

**MFPINS**

Range: ________________________________ not available

Indicates engine misfires. This is the latched MFPLS signal low period when the ECM detects misfires. 1 LSB = 16 microseconds.

**MFPLSRF**

**MFPLSR**

Range: ________________________________ LOW/HIGH

Indicates the status of the front (F) or rear (R) misfire pulse. This is the misfire pulse signal from the 2VI unit to the ECM.

**MFPMAX**

Range: ________________________________ not available

Indicates engine misfires. It displays the maximum data of MFPINS in microseconds.

**MIL DIST**

Range: ________________________________ actual distance

Indicates how far the vehicle has traveled with the MIL turned on.

**MIL ON RUN DIST**

Range: ________ Min.: 0 mile, Max.: 110,950 mile or Min.: 0 km, Max.: 65,535 km

Indicates the distance the vehicle has been driven since the malfunction indicator lamp (MIL) was switched on by the PCM. The display reads 0 unless the MIL has been commanded on. Once activated, the accumulated kilometers or miles display. When the PCM memory is cleared, or if 40 warm-up cycles occur without the MIL setting conditions reoccurring, the display resets.

**MIL ON RUN TIME**

Range: ________________________________ 0 to 65,535 sec

Indicates the time lapse since the MIL was triggered by a DTC being set.

**MIL ON RUN TIME (MIN)**

Range: ________________________________ Min.: 0 minute, Max.: 65,535 minutes

Indicates running time from MIL command ON, after DTC detected.
**MIL REQ by DTC**  
Range: __________________________________________________________ YES/NO  
Indicates YES only when the MIL is requested as a result of an A or B type DTC. If the MIL is illuminated for another reason, such as transmission DTCs, NO will display. DTC types A and B are emissions related to DTCs that will update freeze frame/failure records. The difference between type A and type B are as follows:
- A type A DTC will illuminate the MIL when the diagnostic runs and fails.
- A type B DTC will illuminate the MIL on the second consecutive ignition cycle that the diagnostic runs and fails.

**MILFault**  
Range: __________________________________________________________ ON/OFF  
Indicates whether a fault has occurred in the MIL circuit.

**MISFIRE**  
MISFire  
Range: __________________________________________________________ YES/NO  
Indicates the accumulated misfires for CSF method.

**MISFIRE CMPL**  
Range: __________________________________________________________ COMPLETE/INCOMPLETE  
Indicates the misfire monitor.

**MISFIRE CYCLES**  
Range: __________________________________________________________ 0 to 100  
Indicates the number of engine cycles that were analyzed for misfire data. This is a count of the misfire tests during 200 crankshaft revolutions.

**MISFIRE CYCLE (COUNTS)**  
MISS CYCLE  
Range: __________________________________________________________ 0 to 2000  
Indicates the misfire cycle counter. This counts the number of TDC occurrences in each 1000 engine rotations. It returns to zero at 2000 counts with a 4-cylinder engine, and returns to zero at 3000 counts on a 6-cylinder engine.

**MISFIRE CYL 1**  
**MISFIRE CYL 2**  
**MISFIRE CYL 3**  
**MISFIRE CYL 4**  
**MISFIRE CYL 5**  
**MISFIRE CYL 6**  
**MISFIRE CYL 7**  
**MISFIRE CYL 8**  
Range: __________________________________________________________ 0 to 255  
Indicates the number of possible misfires detected on each cylinder during the last 200 cylinder firing events. These readings normally display some activity, but the activity should be fairly equal for all cylinders.

**MISFIRE ENA**  
Range: __________________________________________________________ UNABLE/ENABLE  
Indicates the misfire monitor.
MISFIRE LOAD (g/sec)
Range: ___________________________________________ Min.: 0 g/rev, Max.: 3.98 g/rev
Indicates engine load for first misfire range: 0 g/rev: Misfire 0.

MISFIRE MARGIN (%)
Range: ___________________________________________ –100 to 99.22%
Indicates the misfire detecting margin used during monitoring. A reading of 30% is normal.

MISFIRE MONITOR
Range: ___________________________________________ NOT AVAILABLE/AVAILABLE
Indicates the misfire monitor status.

MISFIRE RPM
Range: ___________________________________________ Min.: 0 rpm, Max.: 6,375 rpm
Indicates engine RPM for first misfire range: 0 rpm: Misfire 0.

MISFIRE RPM
Range: ___________________________________________ 0 to 6375
Indicates the engine RPM at the time the last misfire code set.

MISFIRE TEST
Range: ___________________________________________ COMPL/INCMPL
Indicates check mode result for misfire monitor.

MISS HISTORY 1
MISS HISTORY 2
MISS HISTORY 3
MISS HISTORY 4
MISS HISTORY 5
MISS HISTORY 6
MISS HISTORY 7
MISS HISTORY 8
Range: ___________________________________________ 0 to 65535
Indicates the total number of misfires detected on each cylinder. These parameters do not update or show any activity until a misfire DTC (P0300) becomes active, then they update every 200 cylinder firing events.

MMODE
Range: ___________________________________________ ON/OFF
Indicates whether the transmission is in Manual mode (pertains to the Slap-Shift).
- ON when in manual shift gate position (neutral)
- OFF when in position other than the above

MOT BATT TEMP (°)
Range: ___________________________________________ –30 to 60°C or –22 to 140°F
Indicates the motor battery, or battery module, temperature.

MOT ECM SIGNAL
Range: ___________________________________________ OK/NG
Indicates the state of the motor ECM signal. This shows the status of the communication link between the FI ECM and the MOT ECM.

MOTOR DUTY (%)
Range: ___________________________________________ 0 to 100%
Indicates the duty cycle of the TACM output signal to the motor.
**MOTOR POS (V)**
Range: ________________________________ 0.0 to 5.0 V

Indicates a feedback signal from the idle speed control motor position sensor on vehicles with a SOHC Mitsubishi engine. The sensor is a variable resistor with a pin that rests on the idle speed control servo plunger. As the plunger extends, output voltage and idle speed increase. As the plunger retracts, voltage and idle speed decrease.

**MOTTQLMTX (kgfm)**
Range: ________________________________ 0 to 5 kgfm

Indicates the state of the MOTTQLMTX.

**MOUNT CTRL SOL**
**MT CTRL SOL**
Range: ________________________________ ON/OFF

Indicates the state of the mount control solenoid valve. The valve is turned ON to decrease the engine vibration at idle.

**MP_LRN**
Range: ________________________________ YES/NO

Indicates the learned misfire correction profile status.

**MTSW**
Range: ________________________________ AT/MT

Indicates the manual transmission/automatic transmission discrimination signal.

**NCRKMF**
Range: ________________________________ not available

Indicates the crankshaft sensor for misfire detection noise counter.

**ND WHL SPD**
Range: ________________________________ 0 to 158 mph or 0 to 255 kph

Indicates the non-drive (ND) wheel speed as seen by the electronic brake traction control module (EBTCM).

**NLVL**
**NLVL-1**
**NLVL-2**
**NLVLAD**
Range: ________________________________ not available

Indicates the engine base noise level.

**NLVLAD**
Range: ________________________________ not available

Indicates the knock sensor signal for KCX type detection.

**N SWITCH**
Range: ________________________________ ON/OFF

Indicates the status of park/neutral switch.

**NEUT_SW(MTX)**
Range: ________________________________ ON/OFF

Indicates the clutch pedal position switch/neutral switch circuit status.
NO. OF MISFIRES
Range: ___________________________________________________________ 0 to 255
Indicates the total number of cylinder firing events detected as misfires during the last 200 crankshaft revolutions.

NON A/C
Range: __________________________________________________________ ON/OFF
Indicates the A/C installed confirm signal.

NON MMODE
Range: __________________________________________________________ ON/OFF
Indicates whether the transmission is "not" in Manual mode (pertains to the Slap-Shift).
• OFF when in manual shift gate position (neutral, + side, – side)
• ON when in position other than the above

NP SWITCH
Range: __________________________________________________________ ON/OFF
Indicates the state of the neutral position switch on a manual transmission. It reads ON (electrically closed) with the shift lever in neutral position.

NSX
Range: __________________________________________________________ ON/OFF
Indicates the state of the NSX, it reads OFF when the clutch pedal is depressed.

NTRBCD
Range: __________________________________________________________ not available
Indicates the total number of DTCs that the ECM stores.

NUMKEYS
Range: __________________________________________________________ actual
Indicates the number of keys stored.
Indicates the exhaust oxygen sensor (O2S) signal voltage. The O2S is the primary sensor that indicates whether the engine is running rich or lean. The voltage signal typically ranges from 0 V to 1 V (0 to 1000 millivolts - mV).

A high signal indicates a rich exhaust; a low signal indicates a lean exhaust. In normal operation, the O2S voltage ranges from 100 to 1000 mV. The O2S must be hot (above 500°F or 260°C), and the system in closed loop before the ECM responds to the sensor signal.

When displayed, O2(mV) is always shown in the center of the top line. The O2S voltage also is shown as EXHAUST O2(mV) in the data list for some functional tests and special data list displays.

Some OBD-I engines have separate oxygen sensors for the front and rear banks. The front O2S voltage is displayed as O2 #2(mV), and the rear O2S voltage is shown as O2 #1(mV).

B1 and B2 refer to banks 1 and 2. Bank 1 is always the bank containing the number 1 cylinder. O2S suffix S1 or UPSTM indicates a pre-catalyst O2S, while suffix S2 or DNSTM indicates a post-catalyst O2S.

O2S prefixes F and R refer to the front and rear cylinder banks on a transverse engine.

During closed loop operation oxygen sensors should range from 100 mV to 900 mV. A lean condition causes both sensors to read below 400 mV, while a rich condition causes readings above 600 mV. At 2500 RPM O2S readings should switch between high and low at least six-to-ten times every ten seconds.
Data Parameters

Engine Parameters

O2 B1-S1 HTR(%)  
O2 B1-S2 HTR(%)  
O2 B2-S1 HTR(%)  
O2 B2-S2 HTR(%)  

Range: ________________________________ 0 to 100%

Indicates the commanded duty cycle of the heater control circuits for oxygen sensors on bank 1 and bank 2.

- The higher the percent, the more the heater circuit ON time resulting in a higher heater temperature.
- The lower the percent, the less time the heater circuit is ON resulting in lower heater temperatures.

O2 B1S1 HTR(ma)  
O2 B1S2 HTR(ma)  
O2 B2S1 HTR(ma)  
O2 B2S2 HTR(ma)  

Range: ________________________________ not available

Indicates the current of the heated oxygen sensor (HO2S) heater circuit. B1 and B2 refer to banks 1 and 2. Bank 1 is always the bank containing the number 1 cylinder. S1 indicates a pre-catalyst O2S, S2 indicates a post-catalyst O2S.

O2 CROSSCOUNTS  

Range: ________________________________ 0 to 255

Indicates the number of times the O2S voltage crossed from the lean region (below 450 mV) to the rich region (above 450 mV) within the last second. The reading indicates how well the O2S is responding to changes in fuel metering and exhaust oxygen content. It does not indicate how well the sensor is operating.

On some engines, the O2S may cool off at idle, and the system may go to open loop. In this case, the sensor does not provide a varying voltage to the ECM, and the reading is 0. Run the engine at fast idle to warm the sensor, return to closed loop, and restore the reading.

O2 HEATER  
O2 HEATER B1-S1  
O2 HEATER B1-S2  
O2 HEATER B1-S3  
O2 HEATER B2-S1  
O2 HEATER B2-S2  
O2S HEATER S1  

OXOGEN SENSOR HEATER  

Range: ________________________________ ON/OFF

Indicates the O2S heater status, it reads ON when the heater is on, usually at idle with a cold exhaust. B1 and B2 refer to banks 1 and 2. Bank 1 is always the bank containing the number 1 cylinder. S1 indicates a pre-catalyst O2S, S2 indicates a post-catalyst O2S and S3 indicates sensor 3. The parameter O2 HEATER refers to that O2S in the B1-S1 position.

O2 MON  
O2 MON B1-S2  
O2 MON B2-S1  
O2 MON B2-S2  

Range: ________________________________ RICH/LEAN

Indicates whether a particular O2S senses a rich or lean condition with the engine running in closed-loop. Should read:
• RICH when the PCM is shortening the fuel injector pulse width to lean the mixture.
• LEAN when the PCM is lengthening the pulse width to enrich the mixture.

B1 and B2 refer to banks 1 and 2. Bank 1 is always the bank containing the number 1 cylinder. S1 indicates a pre-catalyst O2S, and S2 indicates a post-catalyst O2S. The parameter O2 MON refers to the O2S in the B1-S1 position.

O2B1-S1 HTR CMD
O2B1-S2 HTR CMD
O2B2-S1 HTR CMD
O2B2-S2 HTR CMD

Range:_________________________________________________________ YES/NO

Indicates the commanded state of the heater control circuit for oxygen sensors on banks 1 and 2. The read as follows:
• YES when the sensor heater command is on.
• NO when the sensor heater command is off.

O2OEVAP

Range:__________________________________________________________ actual

Indicates that the EVAP purge leak check monitor has competed.

O2S (A/FS) HTR CMPL

Range:__________________________________________________________ COMPLETE/INCOMPLETE

Indicates the O2S (A/FS) heater monitor.

O2S (A/FS) HTR ENA

Range:__________________________________________________________ UNABLE/ENABLE

Indicates the O2S (A/FS) heater monitor.

O2S (A/FS) MONITOR

Range:__________________________________________________________ COMPLETE/INCOMPLETE

Indicates the O2S (A/FS) monitor.

O2S (A/FS) MONITOR

Range:__________________________________________________________ NOT AVAILABLE/AVAILABLE

Indicates the O2S (A/FS) monitor.

O2S11 (mV)
O2S12 (mV)
O2S21 (mV)
O2S22 (mV)

Range:__________________________________________________________ 0 to 1800

O2S11 (V)
O2S12 (V)
O2S21 (V)
O2S22 (V)

Range:__________________________________________________________ not available

Indicates the exhaust oxygen sensor (O2S) signal voltage. The O2S is the primary sensor that indicates whether the engine is running rich or lean. The voltage signal typically ranges from 0 to 1000 millivolts (mV).

A high millivolt signal indicates a rich exhaust; a low signal indicates a lean exhaust. In normal operation, O2S voltage ranges from 100 to 1000 mV. An O2S must be hot (above 500°F), and the PCM must be operating in closed loop before the PCM responds to the sensor signal.

The 2 digits after O2S identify the sensor location:
• O2S11—The upstream sensor for bank 1
• O2S12—The downstream sensor for bank 1
• O2S21—The upstream sensor for bank 2
• O2S22—The downstream sensor for bank 2.

**O2S11_FAULT**  
**O2S21_FAULT**  
**Range:** ________________________________________________________ **YES/NO**  
Indicates a heated exhaust oxygen sensor fault.

The 2 digits after O2S identify the sensor location:
• O2S11—The upstream sensor for bank 1
• O2S21—The upstream sensor for bank 2

**OBDSID**  
**Range:** ________________________________________________________ **not available**  
Indicates the on-board system identification.

**OCT ADJ**  
**Range:** ________________________________________________________ **OPEN/CLSD**  
Indicates the octane adjust status.

**OD INHIBIT**  
**Range:** ________________________________________________________ **ON/OFF**  
Indicates the overdrive cancel switch/hold switch status.

**OD OFF LIGHT**  
**Range:** ________________________________________________________ **ON/OFF**  
Indicates the transmission control indicator light.

**OIL LIFE (%)**  
**Range:** ________________________________________________________ **0 to 100%**  
Indicates the ECM calculated current oil life remaining as a percentage based on mileage, driving conditions, temperature, and load conditions.

**OIL PRES**  
**Range:** ________________________________________________________ **0 to 999 kPa or 0 to 147 psi**  
Indicates the engine oil pressure on some vehicles. This may be a calculated value derived from an oil pressure voltage signal.

**OIL PRESS(V)**  
**Range:** ________________________________________________________ **0 to 5.0 V**  
Indicates engine oil pressure as a voltage.

**OPEN MALFUNC**  
**OPN MALFUNC**  
**Range:** ________________________________________________________ **ON/OFF**  
Indicates an open side malfunction.

**OPSC**  
**Range:** ________________________________________________________ **actual**  
Indicates the oil pressure switch control counter.
OSFMFLG  
Range: __________________________________________________________ YES/NO  
Indicates the output shaft speed failure mode.

OutShftSp (RPM)  
Range: ___________________________________________________ 0 to vehicle max.  
Indicates a PCM calculated RPM value for the transmission output shaft. The output shaft speed sensor (OSS) is a voltage-generating magnetic pickup. The PCM converts the voltage signal of the OSS to an RPM value.

OXS1 TEST  
Range: ________________________________________________________ COMPL/INCOMPL  
Indicates check mode result for HO2S (bank 1).

OXS2 TEST  
Range: ________________________________________________________ COMPL/INCOMPL  
Indicates check mode result for HO2S (bank 2).

OVER ENG TM (S)  
Range: ________________________________________________________ actual time  
Indicates the total time the engine was operated over the established RPM limit in seconds.

P/N SWITCH  
Range: ________________________________________________________ ON/OFF  
Indicates the park/neutral switch status.

P/S SIGNAL  
Range: ________________________________________________________ OFF/ON  
Indicates the steering wheel has been turned (moved) since the ignition key was turned on. This usually remains on during the entire key on drive cycle.

P/S PRESS SW  
PSP_SW  
Range: ________________________________________________________ ON/OFF  
Indicates the power steering pressure switch.

PARK/NEU POS  
ParkNeuPos  
Range: ________________________________________________________ P-N or -R-DL  
Indicates whether an automatic transmission is in park or neutral or in one of the drive ranges. It should read:
  • P-N- if the transmission is in either park or neutral.
  • -R-DL if the transmission is in any forward gear or reverse.
The park/neutral switch is closed in park or neutral and open in any forward gear or reverse.

PART LOAD  
Range: ________________________________________________________ not available  
Indicates part load. Monitors the O2S and it will set a code; Rich or Lean.

PCM IN VTD FAIL  
Range: ________________________________________________________ YES/NO  
Indicates the ECM received a good password from the passlock module, the vehicle has started, and a failure has occurred. The ECM continues to enable fuel.
PCM RESET
Range: ____________________________________________________________ YES/NO
Indicates the internal PCM reset status, it reads YES only when an internal PCM reset occurred
and NO under normal operating conditions.

PDSW
Range: ____________________________________________________________ ON/OFF
Indicates the status of the variable capacity A/C compressor pressure switch.

PFINH
Range: ____________________________________________________________ LOW/HIGH
Indicates the status of the output voltage level of the PFINH line.

PNP
Range: ____________________________________________________________ ON/OFF
Indicates the clutch pedal position switch/neutral switch circuit status.

PNP SWITCH
Range: ____________________________________________________________ P-N/GEAR
Indicates the status of the park/neutral position (PNP) switch on an automatic transmission. With
the shift lever is in “P” or “N” position, the reading is P-N. If the selector is in any other position,
the reading is GEAR.

POS COUNT
Range: ____________________________________________________________ 0 to 255
Indicates the number of cogs on the flywheel, an intact flywheel should have 180 cogs. The
crankshaft position sensor is used to determine this value.

PRES UP VSV
Range: ____________________________________________________________ ON/OFF
Indicates the ECM command status for the vacuum switching valve (VSV) that controls the
pressure up valve. This valve diverts intake manifold vacuum from the fuel pressure regulator,
causing fuel rail pressure to rise.

PRESS R SOL
Range: ____________________________________________________________ ON/OFF
Indicates the status of the pressure regulator cutoff solenoid valve. Vacuum to the fuel pressure
regulator is cut to prevent fuel percolation and make hot restart easier.

PRI PRESS (MPa)
Range: ____________________________ 0.3 to 0.9 MPa
Indicates the status of the solenoid that regulates Primary Transmission Line Pressure.

PRI SPEED (rpm)
Range: ____________________________ variable
Indicates the primary pulley speed. Display value approximately matches engine speed.

PRNDL SW
Range: ____________________________________________________________ see below
Indicates the gear presently selected according to the PRNDL switch.

Readings for most models are LOW, 2ND, 3RD, 4TH, and P/N. On some vehicles, it may be D1,
D2, D3, D4, NEUT, REV, and PARK. If the transmission is between gears or the switch sends an
invalid signal,???? displays.
PROM ID
Range: _________________________________________________________ 0 to 99999
Indicates the identification numbers of the programmable read-only memory (PROM) installed in
the ECM. The PROM is a replaceable electronic device that contains the operating program and
calibration values for a specific vehicle, engine, and accessory package combination. PROMs
are often revised and new PROMs are issued to cure a driveability problem or otherwise improve
operation. Because PROMs are interchangeable, it is possible for the wrong or outdated PROM
to be installed.

The PROM ID may be a 2-, 3-, 4-, or 5-digit number, depending on year and model. Compare the
PROM ID to the manufacturer's specifications to determine if the correct PROM is installed.

Some service manuals refer to the PROM as the MEMCAL because it contains both memory
and calibration functions.

PSMOTTRQ
PSSOC
PSTBAT
PSVBATPT
Range: __________________________________________________________ ON/OFF
Indicates the IMA power saving information when an individual voltage of the BCM is out of
suitable range. Reads ON when in power save mode.

PSVBATAL
Range: __________________________________________________________ ON/OFF
Indicates the IMA power saving information when all voltage of the BCM is out of range. It reads
ON when in power save mode.

PULSE CAL ST
PULSER CAL STATUS
Range: ___________________________________________________________ 1/0
Indicates the CRK pulser learn calculation status, which is used for misfire detection. It reads 1 if
ECM is under calculation (the ECM is calculating the pulser tolerance compensation value).

PULSER F/B LEARN
Range: __________________________________________________________ variable
Indicates the status of the CRK pulser feedback learn condition. It reads OK or COMPLETED if
this learning is completed, NG or NOT COMPLETED if not.

To run the learn program, test drive the vehicle on a level road, decelerate (with the throttle fully
closed) from an engine speed of 5000 rpm to 3000 rpm with the 1st gear (a/t.m/t).

PURGE CUT SOL
Range: __________________________________________________________ ON/OFF
Indicates the canister drain cut valve control signal.

PURGE CUT VSV
Range: __________________________________________________________ ON/OFF
Indicates the PCM command for the vacuum switching valve (VSV) that closes the evaporative
emissions (EVAP) purge valve. If the EVAP system operates properly, ON means the system has
stopped purging.

PURGE DENSITY
Range: _________________________________________________________–50 to 350
Displays the evaporative purge density during system operation. Normal range is –40 to 0 at idle.
**PURGE DUTY(%)**
Range: ____________________________ 0 to 100%
Indicates the evaporative emission canister purge valve duty cycle.

**PURGE FLOW(%)**
Range: ____________________________ 0 to 102.4%
Indicates the presence of purge flow from the canister to the engine. Percent reading should increase as purge flow increases.

**PURGE VOL (STPS)**
Range: ____________________________ 0 to 65
Indicates the position of the purge volume control valve motor as a step count. The valve regulates the amount of airflow through the EVAP canister during purge.
As the stepper-motor count increases, canister airflow increases. During heavy load, expect a high stepper-motor count; during warm idle expect a low count.

**QCKMIL**
Range: ____________________________ ON/OFF
Indicates the status of the quick MIL. If two trip or driving cycle is canceled, then the MIL turns on and a DTC is stored once failure is detected. Mode ON.

**QXREF**
Range: ____________________________ not available
Indicates the status of the learned QIDL at IDLE.

**R FUEL LEVEL (V)**
Range: ____________________________ 0 to 5.0 V
Indicates the fuel level in the right tank as voltage and reads as follows:
- About 0.8 V = empty tank
- About 2.5 V = full tank

**R SWITCH**
Range: ____________________________ ON/OFF
Indicates the transmission R range switch.

**R WIND DEF SW**
Range: ____________________________ ON/OFF
Indicates the rear defrost switch status.

**RAD FAN**
Range: ____________________________ ON/OFF
Indicates the fan control signal.

**RE CVS VALVE**
Range: ____________________________ ON/OFF
Indicates the status of the return signal of the evaporative canister vent shut solenoid valve. It reads ON when the circuit is normal and the solenoid valve is on.

**RE VTEC SOL**
**REL VTEC SOL**
Range: ____________________________ ON/OFF
Indicates the status of the VTS return signal, it reads ON when the circuit is normal and VTS is on. An OFF reading indicates a circuit problem.
RE VTEC SOL2
Range: __________________________________________________________ ON/OFF
Indicates the status of the VTEC solenoid valve 2 signal, it reads ON when the circuit is normal and VTS2 is on. An OFF reading indicates a circuit problem.

REAR O2 HEATERS
Range: __________________________________________________________ ON/OFF
Indicates the rear (downstream) exhaust gas oxygen sensor heater status.

REDUCED POWER
Range: __________________________________________________________ ACTIVE/INACTIVE
Indicates whether the PCM is receiving a signal from the TAC module that a throttle actuator control system fault is occurring, it reads:
• ACTIVE if a fault occurs and the PCM limits the engine power
• INACTIVE under normal operating conditions

REDUCE TORQ 1
Range: __________________________________________________________ ON/OFF
Indicates the reduce torque signal 1 status.

REDUCE TORQ 2
Range: __________________________________________________________ ON/OFF
Indicates the reduce torque signal 2 status.

REF 1(V)
Range: __________________________________________________________ 0 to 5.0 V
Indicates the voltage sensed on the 5-volt reference 1 circuit at the control module.

REF 1(V) STATUS
Range: __________________________________________________________ PASS/FAIL
No definition is available for this parameter at this time.

REF 2(V)
Range: __________________________________________________________ 0 to 5.0 V
Indicates the voltage sensed on the 5-volt reference 2 circuit at the control module.

REF 2(V) STATUS
Range: __________________________________________________________ PASS/FAIL
No additional information is available for this parameter.

REL TP (%)
REL TP SENSOR (%)(*)
Range: __________________________________________________________ 0 to 100% or 0 to 180°
Indicates the status of the relative throttle position sensor on a drive by wire (DBW) system. The reading is the ECM calculated throttle opening as percent or degrees, it should increase as the throttle opens.

RELIEF VALVE SOL
Range: __________________________________________________________ ON/OFF
Indicates the status of the relief valve solenoid. To avoid the abnormal pressure rising and surge noise, the ECM controls the solenoid valve to ON (open).

REQ TORQUE
Range: __________________________________________________________ 0 to 100%
Indicates the amount of torque that is requested by the PCM as a percentage.
**RESTART FAN**
Range: ____________________________ ON/OFF
Indicates the status of the restart fan control, which runs to remove heat from the engine compartment after the engine shuts down. It reads ON when the main fan is running.

**RETARD ACTION**
Range: ____________________________ NO/YES/FAIL
Indicates the retard action taken by the ECM, it reads:
- NO (range) = No retarding
- YES (range) = Retarding
- FAIL (range) = Retard impossible

**RETARD REQUEST**
Range: ____________________________ NO/YES/FAIL
Displays the retard request from the traction control system (TCS) control unit status, it reads:
- NO = No retard requesting
- YES = Retard requesting
- FAIL = TCS system failure

**REV SELECTED**
Range: ____________________________ ON/OFF
Indicates the transmission Reverse range switch.

**REVERSE LOCK SOL**
Range: ____________________________ ON/OFF
Indicates the status of the reverse select lock solenoid. When turned ON, it is impossible to select “Reverse Gear”.

**RO2FT1(%)**
Range: ____________________________ –35 to 35%
Indicates the rear O2S fuel trim, bank 1 status.

**RO2FT2(%)**
Range: ____________________________ –35 to 35%
Indicates the rear O2S fuel trim, bank 2 status.

**RPHRSTR**
Range: ____________________________ LOW/HIGH
Indicates the status of the rear peakhold reset. The 2VI sensor peakhold voltage is reset by this peakhold reset signal from the ECM.

**RPM**
Range: ____________________________ actual
**RPM COARSE**
Range: ____________________________ 0 to 7968 rpm
**RPM FINE**
Range: ____________________________ 0 to 1992 rpm
Indicates the engine speed.

**RPMDES**
Range: ____________________________ 0 to engine max.
Indicates desired engine speed as calculated by the PCM for base idle. This reading should always be close to actual idle RPM.
Rr ACM SOL CURRENT
Range: ____________________________ variable
Indicates the output current to the rear ACM control module as amperes.

Rr ACM SOL MAX CURRENT
Range: ____________________________ variable
Indicates the maximum current output to the rear ACM control module for the current ignition cycle as amperes.

Rr ACM SOL MIN CURRENT
Range: ____________________________ variable
Indicates the minimum current output to the rear ACM control module for the current ignition cycle as amperes.

S SWITCH
Range: ____________________________ ON/OFF
Indicates the transmission S range switch.

S/C RELAY
Range: ____________________________ ON/OFF
Indicates the ECM command to the magnetic clutch relay for the supercharger. The relay should be energized and the clutch engaged when the reading is ON.

S/C SOLENOID
Range: ____________________________ ON/OFF
Indicates the ECM command status of the speed control (S/C) (cruise) solenoid. It reads ON when the solenoid is energized and that the vehicle cruise control is engaged.

S/C TARGET
Range: ____________________________ 0 to vehicle max.
Indicates the speed at which the cruise control is set by the driver.

S/C VAC SOL
S/C VENT SOL
Range: ____________________________ OPEN/CLSD
Indicates the ECM output commands to the speed control (S/C) vacuum and vent solenoids, which regulate the cruise control servo. The readings are ON whenever the solenoids are energized to increase or to vent vacuum.

The S/C VAC SOL and S/C VENT SOL readings usually have the following relationships with throttle position control:

Table 18-6 Vent and vacuum solenoid relationships

<table>
<thead>
<tr>
<th>S/C Vacuum Solenoid</th>
<th>S/C Vent Solenoid</th>
<th>Throttle Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td>Accelerate</td>
</tr>
<tr>
<td>ON or OFF</td>
<td>ON</td>
<td>Decelerate</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>Steady</td>
</tr>
</tbody>
</table>

SC_ACT_SW
Range: ____________________________ ON/OFF
Indicates the speed control actuator switch on.
SC_SET_LMP
Range: __________________________________________________________ ON/OFF
Indicates the speed control set indicator.

SCCS
SCCSS(V)
Range: _______________________________________________________ 0 to 10.00 V
Indicates the speed control command switch (SCCS) voltage.

SEC PRESS (MPa)
Range: _____________________________________________________ 0.5 to 0.9 MPa
Indicates the status of the solenoid that regulates Secondary Transmission Line Pressure.

SEC SPEED (rpm)
Range: __________________________________________________________ variable
Indicates the secondary pulley speed. Display value approximately matches speedometer.

SEGRP(%)  SEGRP DES(%)
Range: _________________________________________________________ 0 to 100%
Indicates the EGR valve stepping motor position.
Indicates the EGR motor position desired.

SELTESTDTC
Range: ____________________________________________________________ actual
Indicates the diagnostic trouble codes.

SET LAMP
Range: __________________________________________________________ ON/OFF
Indicates the status of the cruise control indicator light on the instrument panel.

SET VHCL SPD
Range: ___________________________________________________ 0 to vehicle max.
Indicates the selected cruise control speed.

SFTCMD (H)
Range: ______________________________________________________ not available
Indicates the status of the SFT command, which determines whether the ECM is in functional test mode.

SFTRIM 1 (%)  SFTRIM 2 (%)
Range: ________________________________________________________ –25 to 35%
Indicates if the PCM is commanding a rich or a lean short-term fuel mixture correction.

Readings range from -25% to +35%, with 000% as the midpoint. A number above zero indicates a PCM command for a short-term rich mixture correction. A number below zero indicates the PCM is commanding a short-term lean mixture.

The ST FUEL number leads the long-term fuel (LT FUEL) number. When a pattern or trend of short-term corrections to fuel-metering occur, long-term fuel (LT FUEL) responds with a similar correction.
Compare ST FUEL numbers to injector on-time. Numbers above zero indicate increased on-time, below zero indicates decreased on-time. The ST FUEL corrections operate only in closed loop. In open loop, it goes to a fixed value.

**SHIFT A/1(%)**
- **Range:** 0 to 100%
- Indicates the shift solenoid A/1.

**SHIFT B/2(%)**
- **Range:** 0 to 100%
- Indicates the shift solenoid B/2.

**SHIFT C/3(%)**
- **Range:** 0 to 100%
- Indicates the shift solenoid C/3.

**SHIFT SOL A**
- **Range:** ON/OFF
- Indicates the status of shift solenoid 1

**SHIFT SOL B**
- **Range:** ON/OFF
- Indicates the status of shift solenoid 2

**SHIFT SOL C**
- **Range:** ON/OFF
- Indicates the status of shift solenoid 3

**SHIFT SOL D**
- **Range:** ON/OFF
- Indicates the status of shift solenoid 4

**SHIFT SOL E**
- **Range:** ON/OFF
- Indicates the status of shift solenoid 5

**SHIFT INDICATOR**
- **Range:** ON/OFF
- Indicates the status of the shift up indicator light on the instrument panel. It is turned ON when the ECM judges that driving conditions request shift up for fuel economy.

**SHIFT/CLUTCH SW**
- **Range:** ON/OFF
- Indicates the status of the cruise A/T shift position. Reading should be ON (switch electrically closed) when the A/T shift position switch indicates D3 or D4.

**ShiftSol1**
**ShiftSol2**
**ShiftSol3**
**ShiftSol4**
- **Range:** ON/OFF
- Indicates the PCM commands for the 1, 2, and 3 shift solenoids, it reads ON when the PCM has commanded the shift solenoid to energize.
ShiftSol1Fault
ShiftSol2Fault
ShiftSol3Fault
ShiftSol4Fault
  Range: __________________________________________________________ ON/OFF
Indicates whether the PCM detects a fault in the shift solenoid circuits, it reads YES only when a fault is present.

SHRTFT1(%)  
  Range: __________________________________________________________ –35 to 35%
Indicates the status of the short term fuel trim 1.

SHRTFT2(%)  
  Range: __________________________________________________________ –35 to 35%
Indicates the status of the short term fuel trim 2.

SHRTFT11(%)  
  Range: __________________________________________________________ –35 to 35%
Indicates the status of the short term fuel trim bank 1, sensor 1.

SHRTFT12(%)  
  Range: __________________________________________________________ –35 to 35%
Indicates the status of the short term fuel trim bank 1, sensor 2.

SHRTFT21(%)  
  Range: __________________________________________________________ –35 to 35%
Indicates the status of the short term fuel trim bank 2, sensor 1.

SHRTFT22(%)  
  Range: __________________________________________________________ –35 to 35%
Indicates the status of the short term fuel trim bank 2, sensor 2.

SLIP REV (rpm)  
  Range: __________________________________________________________ variable
Indicates the difference between the engine speed and the primary pulley speed.

SMCOIL A  
  Range: __________________________________________________________ ON/OFF
Indicates the step motor coil “A” energizing status.

SMCOIL B  
  Range: __________________________________________________________ ON/OFF
Indicates the step motor coil “B” energizing status.

SMCOIL C  
  Range: __________________________________________________________ ON/OFF
Indicates the step motor coil “C” energizing status.

SMCOIL D  
  Range: __________________________________________________________ ON/OFF
Indicates the step motor coil “D” energizing status.

SO2S B2 H CUR (mA)  
  Range: __________________________________________________________ variable
Indicates the amount of current the ECM is applying to the bank 2 sensor 2 oxygen sensor heater circuit.
SO2S H CUR (mA)
Range: ___________________________ ______ variable
Indicates the amount of current the ECM is applying to the bank 1 sensor 2 oxygen sensor heater circuit.

SOAK TIME (min)
Range: ___________________________ ______ actual time
Indicates the soak time, time since the engine last ran, in minutes.

SOC (%)
Range: ___________________________ 0 to 100%
Indicates the battery charge status, which is the remaining capacity of the battery module.

SOL V
Range: ___________________________ ON/OFF
Indicates the status of the cold start solenoid. The solenoid should be ON when engine coolant temperature (ETC) is above 95°C, intake air temperature (IAT) is above 80°C and the engine has been running for about 1, it should be OFF at all other times.

SOLMON1
Range: ___________________________ 0.0 A / 0.6 to 0.7 A
Indicates the torque converter clutch solenoid valve monitor current.

SOLMON2
Range: ___________________________ 0.8 A / 0.3 to 0.6 A
Indicates the pressure control solenoid valve A (line pressure solenoid valve) monitor current.

SOLMON3
Range: ___________________________ 0.6 to 0.7 A / 0.4 to 0.6 A
Shows the pressure control solenoid valve B (secondary pressure solenoid valve) monitor current as amperage.

SPARK ADV(*)
SPK ADV("BTDC")
SPRKADV(*)
Range: ___________________________ –25 to 50°
Indicates the spark advance status.

SPD (NC)
SPD (NC0)
SPD (NC2)
SPD (NC3)
Range: ___________________________ 0 to 12750 RPM
Indicates the RPM of the trans internal direct clutch (Main, Number 2, or Number 3 clutch drum) assemblies.

SPD (NT)
Range: ___________________________ 0 to 12750 RPM
Indicates the RPM of the trans input shaft.

SPD(SP2) KPH
SPD(SP2) MPH
Range: ___________________________ 0 to 255 KPH or 0 to 158 MPH
Indicates the transmission output shaft speed in KPH or MPH.
SPD TEST
  Range: __________________________________________________ COMPL/INCOMPL
Indicates the status of the CHECK MODE vehicle speed sensor test.

SRC_CAN
  Range: _________________________________________________ ENABLE/DISABLE
Indicates is the starter motor relay is enabled.

ST ALPHA (%)  
ST ALPHA B2 (%)
  Range: _________________________________________________________ 0 to 200%
Indicates whether the ECM is commanding a rich or a lean mixture as part of the short-term fuel metering correction strategy. On a V-type engine, ST ALPHA is the bank 1 value and ST ALPHA B2 is bank 2. The value changes in response to changing patterns of the long-term fuel trim corrections.

Short-term fuel trim ranges from 0% to 200% with 100% as the midpoint. At 100% the PCM is not adjusting the injector pulse width or the engine is running in a fail-safe mode. At readings above 100%, the engine is running lean while the PCM is commanding a short-term rich mixture correction. At a reading below 100%, the engine is running rich while the PCM is commanding a short-term lean mixture correction.

ST FUEL TRIM (COUNTS)  
ST FUEL TRIM B1 (COUNTS)  
ST FUEL TRIM B2 (COUNTS)
  Range: ___________________________________________________________0 to 255
Indicates the short-term fuel trim correction as a step count. If the oxygen sensor voltage indicates a lean mixture, the step count increases and the ECM commands a longer fuel injector pulse width. Bank 1 (B1) contains cylinder #1.

ST TRIM (%)  
ST TRIM B1 (%)  
ST TRIM B2 (%)  
ST TRIM-1 (%)  
ST TRIM-2 (%)  
TRIM B1-S1 (%)  
TRIM B1-S2 (%)  
TRIM B2-S1 (%)  
TRIM B2-S2 (%)
  Range: ___________________________________________________________–25 to 25%, –100 to 100% or 0 to 200%
Indicates the short-term fuel trim correction as a percentage. The short term fuel trim represents a short term correction to fuel delivery by the PCM in response to the amount of time the oxygen sensor (O2S) voltage spends above or below the 450 mV threshold.

Trim number prefixes B1 and B2 correlate to banks 1 and 2. Bank 1 is always the bank that contains the number 1 cylinder. TRIM number suffix S1 indicates a pre-catalyst O2S input, while suffix S2 indicates a post-catalyst O2S input.

Short-term fuel trim ranges from –100% to +100%, –25% to +25%, or 0 to 200% depending on the vehicle. Depending on which scale is used, zero or 100 percent serves as the midpoint. A number above the midpoint indicates the PCM is commanding a long-term rich mixture correction. A number the midpoint indicates the PCM is commanding a lean mixture.

Under certain conditions such as an extended idle and a high ambient temperature, the canister purge may cause the short term fuel trim to read in the negative range during normal operation. The fuel trim values at maximum may indicate an excessively rich or lean system.
Short-term fuel trim leads the long-term trim (LT TRIM). When a pattern or trend of short-term corrections to fuel-metering occur, LT TRIM responds with a similar correction.

Compare ST TRIM readings to injector on-time. Numbers above zero indicate increased on-time, while numbers below zero indicate decreased on-time. LT TRIM corrections operate only in closed loop. In open loop they revert to a fixed value.

**ST TRM AVG1 (%)**
**ST TRM AVG2 (%)**

Range: _________________________________________________________ 0 to 100%

Indicates the average of all long term fuel trim cells as percentage. The short term fuel trim cells are rated, for the amount of which they are used.

For example, an idle cell is rated higher than a wide open cell. If a fueling malfunction occurs in the idle cell and the wide open cell, the average would be more affected by the idle cell than the wide open cell.

A low value indicates that the fuel system is rich and fuel delivery is being reduced. A high value indicates that a lean condition exists and the PCM compensates by adding fuel. When the average of the cells reach a predetermined high or low, a fuel trim DTC sets.

ST1

Range: __________________________________________________________ OFF/ON

Indicates the status of the ignition switch starter signal. ON indicates cranking.

**STA SIGNAL**

**STARTER**
**STARTER SIG**

Range: __________________________________________________________ ON/OFF

Indicates whether the starter is engaged, it reads ON when the engine is cranking. The ECM increases fuel-injection volume during engine cranking.

**START CLNT (°)**
**START ETC: (°)**

Range: _________________________________________ –40 to 199°C or –40 to 389°F

Indicates the engine coolant temperature (ETC) at startup.

On some vehicles, the ECM checks the engine coolant temperature (ECT) sensor reading at the moment the ECM is turned on. The ECM then stores this reading in memory until the next time the engine is stopped and restarted. If the engine has not run for several hours, the coolant temperature may be close to ambient air temperature. It will be much higher on a hot restart.

Compare the START CLNT reading to the coolant temperature reading immediately after startup. With a cold engine the two readings should be equal. The coolant temperature reading should rise as the engine warms up. The START CLNT reading should not. If both readings stay the same, there is a problem in the sensor circuit.

**START ENRICH**

**WARMUP ENRICH**

Range: __________________________________________________________ ON/OFF

Indicates the ECM control status (mode) of the fuel injection system. During start or warm-up mode, the ECM monitors ignition, coolant and air temperature, airflow, throttle position, and O2S data to control injection pulse-width, timing, and idle speed.

**START IAT (°)**

Range: _________________________________________ –40 to 199°C or –40 to 389°F

Indicates the intake air temperature (IAT) at start up when the ignition switch is turned on.
START RPM
Range: ______________________________________________________ not available
Indicates the engine speed when the starter is engaged.

STARTER CONTROL
STARTER CTRL
Range: ______________________________________________________ ON/OFF
Indicates the status of the starter control. It reads ON when the starter cut relay is turned on, which allows the starter motor to engage.

STARTER RELAY
Range: ______________________________________________________ ON/OFF
Indicates the state of the starter relay, it reads ON with the starter engaged.

STARTER SWITCH
STARTER SWT
Range: ______________________________________________________ ON/OFF
Indicates the status of the starter motor switch, it reads ON with the starter engaged.

STOP LAMP SW
Range: ______________________________________________________ ON/OFF
Indicates the state of the stop lamp switch, it reads ON when the brake pedal is depressed and OFF when released.

SUB BRAKE SWITCH
Range: ______________________________________________________ ON/OFF
Indicates the status of the idle stop sub brake switch, it reads ON when idle is stopping.

SVSM
SVSOUT
SVSP
Range: ______________________________________________________ 12V/0V
Indicates the voltage applied by the ECU to the SVS terminals.

SWITCH STATE
Range: ______________________________________________________ HIGH/LOW
Indicates the position of a specific actuator switch when conducting certain functional tests. A circuit is generally LOW when actuated.

SYS GUARD
Range: ______________________________________________________ ON/OFF
Indicates the system guard.

SYS GUARD
Range: ______________________________________________________ OFF/ON
Indicates the status of the ETCS system guard.

SYSFAIL
Range: ______________________________________________________ variable
Indicates a count of system failures, a count is recorded when a DTC is set.

TAC MTR CMD(%)
Range: ______________________________________________________ 0 to 100%
Indicates the required duty cycle to maintain a desired throttle position. The scan tool will display a higher value if more effort is required to move the throttle to the desired position, such as
physical resistance. The scan tool will display a lower value if less effort is required to move the throttle to the desired position.

**TAC/PCM COMM FLT**
- **Range:** __________________________________________________________ OK/FLT

Indicates the communication status between the TAC Module and the PCM, it reads:
- OK under normal operating conditions
- FLT if a failure is detected

**TACHO GAUGE**
- **Range:** __________________________________________________________ actual

Indicates the tachometer. Displays the engine rpm.

**TACM RELAY**
- **Range:** __________________________________________________________ OK/FLT

Indicates the status of the throttle actual control relay, which supplies power to the TAC module. It reads ON when the relay is energized.

**TANK BYP VSV**
- **Range:** __________________________________________________________ ON/OFF

Indicates the status of the tank bypass vacuum switching valve for active test support data.

**TANK PRES(V)**
- **Range:** __________________________________________________________ 0.0 to 5.0 V

Indicates the output signal of the fuel tank pressure sensor as voltage. When tank pressure equals atmospheric pressure, the reading is about 1.3 to 1.7 V. The higher the voltage, the greater the pressure.

**TANK PRES**
- **Range:** __________________________________________________________ variable

Indicates the difference between fuel tank pressure, or vacuum, and the outside air pressure.

**TANK TEMP (°)**
- **Range:** __________________________________________________________ –30 to 224°C or –22 to 435°F

Indicates the fuel temperature within the fuel tank. The PCM uses this parameter to accurately test and monitor the evaporative emissions system.

**TARG LINE**
- **Range:** __________________________________________________________ variable

Indicates the target modifier pressure/target pressure control solenoid pressure status.

**TARGET ENG SPD**
- **Range:** __________________________________________________________ variable

Indicates the desired rpm.

**TARGET TH VALVE**
- **TARGET TH VLV (ETCS)(°)**
- **Range:** __________________________________________________________ 0 to 180°

Indicates the target throttle valve position which is the valve position the ECM is attempting to maintain. The ECM calculates the target angle from the accelerator position sensor input and the driving conditions.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TARGIDL (RPM)</strong></td>
<td></td>
<td>Indicates the target idle, which is the idle speed the ECM is attempting to maintain.</td>
</tr>
<tr>
<td><strong>TAT TERMINAL</strong></td>
<td>ON/OFF</td>
<td>Indicates the DLC tat terminal.</td>
</tr>
<tr>
<td><strong>TC/TE1</strong></td>
<td>ON/OFF</td>
<td>Indicates the connection status of the TC/TE1 terminals of the DLC-3 (OBD-II) connector.</td>
</tr>
<tr>
<td><strong>TC-SDL</strong></td>
<td>ON/OFF or YES/NO</td>
<td>Indicates the status of the transaction control serial data link.</td>
</tr>
<tr>
<td><strong>TCC (%)</strong></td>
<td>0 to 100%</td>
<td>Indicates the duty cycle of the pulse-width-modulated (PWM) signal output to the torque converter clutch (TCC) solenoid. Reads 0% with TCC closed (TCC not applied). Reads 100% with the TCC fully open (TCC applied).</td>
</tr>
<tr>
<td><strong>TCC COMMAND</strong></td>
<td>ON/OFF</td>
<td>Indicates the torque converter clutch (modulated) status.</td>
</tr>
<tr>
<td><strong>TCC SOL(%)</strong></td>
<td>0 to 100%</td>
<td>Indicates the torque converter clutch control solenoid.</td>
</tr>
<tr>
<td><strong>TCC/CC BRAKE SW</strong></td>
<td>OPEN/CLSD</td>
<td>Indicates the current state of the torque converter clutch (TCC)/cruise brake pedal switch. This is used to control stop lamps and as a redundant cruise control disengagement.</td>
</tr>
<tr>
<td><strong>TCCFault</strong></td>
<td>YES/NO</td>
<td>Indicates the presence of a PCM detected fault in the torque converter clutch circuit. Reads YES only when a fault is present.</td>
</tr>
<tr>
<td><strong>TCCMACT (RPM)</strong></td>
<td>0 to vehicle max.</td>
<td>Indicates a PCM calculated value of torque converter slippage. The value is derived by subtracting the turbine speed from the engine RPM when the TCC is applied (TCC parameter reads 95% or greater).</td>
</tr>
<tr>
<td><strong>TCILFault</strong></td>
<td>YES/NO</td>
<td>Indicates whether a fault has occurred in the Transmission Control Indicator Lamp circuit.</td>
</tr>
<tr>
<td><strong>TCINH</strong></td>
<td>LOW/HIGH</td>
<td>Indicates the status of the traction control inhibitor signal.</td>
</tr>
</tbody>
</table>
### TCS FUEL-CUT
**Range:** _______________ ON/OFF

Indicates the fuel cut control request from the TCS control unit to the ECM, which results from wheel slippage being detected by the TCS. The request is to reduce engine power in order to restore traction.

### TCS INH
**Range:** _______________ ON/OFF

Indicates the torque reduction inhibit signal (traction control system) status.

### TCS-PGM-FI
**Range:** _______________ ON/OFF or YES/NO

Indicates the status of the traction control serial data link.

### TCS STANDBY
**Range:** _______________ LOW/HI

Indicates a request from the TCS control unit to the ECM to reduce engine power in order to restore traction, which results from wheel slippage being detected by the TCS. It reads LOW when wheel slip is detected.

### TEMP GAUGE
**Range:** _______________ –40 to 399°F or –40 to 199°C

Indicates the temperature gauge.

### TEN TERMINAL TEST
**Range:** _______________ ON/OFF

Indicates the TEN terminal (data link connector) status.

### TGT VLV TMNG(*)
**Range:** _______________ ON/OFF

Indicates the target valve timing status.

### THIDLL (*)
**Range:** _______________ 0 to 180°

Indicates the ECM learned throttle position as degrees of throttle opening.

### THROTL IDL POS
**Range:** _______________ ON/OFF

Indicates whether or not throttle position sensor detecting idle. ON: Idling.

### THROTL POS (%)
**Range:** _______________ Min.: 0 %, Max.: 100 %

Indicates the throttle position. 10 to 22 %: Idling. Calculated value based on VTA1.

### THROTL MTR OPN DUTY(%) 
**Range:** _______________ 0 to 100%

Indicates the ETCS throttle sensor opener position value Number 1. The normal value range is 0 to 40% when idling. When the accelerator pedal is depressed, the duty cycle increases.

### THROTL MTR CLSD DUTY(%) 
**Range:** _______________ 0 to 100%

Indicates the ETCS throttle sensor opener position value Number 1. The normal value range is 0 to 40% when idling. When the accelerator pedal is released quickly, the duty cycle increases.
Data Parameters

**THROTL POS (%)**

Range: _____________________________________________ Min.: 0 %, Max.: 100 %

Indicates the throttle sensor position. Recognition value for throttle opening angle on ECM.

- 0 %: Accelerator pedal released
- 64 to 96 %: Accelerator pedal fully depressed

**THROTL SSR #1 AD (V)**

Range: _____________________________________________ Min.: 0 V, Max.: 4.98 V

Indicates throttle sensor opener position Number 1 (AD): 0.6 to 0.9 V.

**THROTTLE (°)**
**THROTTLE (%)**
**THROTTLE POS**
**TP SENSOR (%)**
**TP (%)**
**TPS (%)**
**TPS1 (%)**
**TPS2 (%)**

Range: _____________________________________________ 0 to 180° or 0 to 100%

Indicates the ECM calculated throttle opening as degrees or percent based on input from the throttle position (TP) sensor signal voltage.

Some vehicles display these values as degrees. A reading of 82° or more indicates wide-open throttle. Closed-throttle readings vary because of the idle speed control (ISC) motor position and throttle body adjustments.

When a percentage displays, a reading of 0% indicates a closed throttle and 100% indicates a wide-open throttle. A percentage usually displays on a system with an autoranging TP sensor. The ECM resets the 0 to 100% range in relation to TP sensor voltage as new minimum and maximum TP sensor voltages are sensed by the system.

**THROTTLE MTR**

Range: _____________________________________________ ON/OFF

Indicates whether or not throttle actuator control permitted: ON: Idling, read value with engine switch on. (IG) (Do not start engine).

**THROTTLE MTR (%)**

Range: _____________________________________________ Min.: 0 %, Max.: 100 %

Indicates throttle actuator. 0.5 to 40 %: Idling.

**THROTTLE MTR AMPS**

Range: _________________________ Min.: 0 A, Max.: 19.92 A or Min.: 0 A, Max.: 80 A

Indicates throttle actuator current. 0 to 3.0 A: Idling.
THROTTLE POSITION SENSOR (V)
TP (V)
TPS (ECM)
TPS (ETS)
TPS (V)
MIN. TPS (V)
TPS 1 (V)
TPS 2 (V)
TPS1 (V)
TPS2 (V)
Range: _________________________________ 0 to 5.0 V
Indicates the throttle position (TP) sensor signal voltage, which determines throttle opening, a 1
or 2 in the name indicates the vehicle uses more than one TP sensor. Readings should be:
• Low voltage at closed throttle
• High voltage at wide-open throttle

The full range of the TP sensor voltage readings available to the ECM is 0 to about 5.1 V and
typical readings are as follows:
• 0.5V, closed throttle, engine at idle
• 4.0V, full throttle, engine under heavy acceleration

The MIN TPS voltage is the base throttle position value used at idle.

THROTTLE SW
Range: ___________________________________________ CLSD/OPEN
Indicates the position of the throttle switch inside the idle speed control (ISC) motor:
• CLSD indicates the throttle is closed and the engine should be at idle speed (TP sensor
  should be less than 20°).
• OPEN indicates the engine is off idle (TP sensor should be more than 20°).

THROTTLE VLV (°)
Range: ________________________________________________ 0 to 180°
Indicates the status of the throttle valve position (ETCS), which is the relative throttle valve angle
controlled by the TACV module.

ThrPosMODE
Range: ____________________________________________ see below
Indicates the throttle closed position as calculated by the PCM based on the throttle position (TP)
sensor signal. It should read C/T (closed throttle) at idle and during deceleration, P/T (part
throttle) at cruise or during moderate acceleration, and WOT (Wide-Open Throttle) at de-choke
on crank, A/C cutout, or during maximum acceleration.

THRTL CMD VAL(V)
Range: ____________________________________________ 0.0 to 4.98 V
Indicates the ETCS commanded throttle position value.

THRTL CMND VAL
Range: ____________________________________________ Min.: 0 V, Max.: 4.9804 V
Indicates throttle position command value: 0.5 to 4.8 V.

THRTL LEARN VAL(V)
Range: ____________________________________________ 0.0 to 5.0 V
Indicates the ETCS throttle valve fully closed learned position value.
THRTL LEARN VAL(V)
Range: _________________________________________________ Min.: 0 V, Max.: 5 V
Indicates the throttle valve fully closed (learned value): 0.4 to 0.8 V.

THRTL MTR CLOSE (%)
Range: _________________________________________________ 0 to 100%
Indicates the ETCS throttle motor opening duty ratio. The normal value range is 0 to 40% when idling. When the accelerator pedal is released quickly, the duty cycle increases.

THRTL MTR CLOSE (%)
Range: _________________________________________________ Min.: 0 %, Max.: 100 %
Indicates throttle actuator closed duty ratio. 0 to 40 %: Idling. When accelerator pedal is released quickly, duty ratio increases.

THRTL MTR OPEN (%)
Range: _________________________________________________ Min.: 0 %, Max.: 100 %
Indicates throttle actuator opening duty ratio. 0 to 40 %: Idling. When accelerator pedal is depressed, duty ratio increases.

THRTL MTR OPN (%)
Range: _________________________________________________ 0 to 100%
Indicates the ETCS throttle motor opening duty ratio. The normal value range is 0 to 40% when idling. When the accelerator pedal is depressed, the duty cycle increases.

THRTL POS1 (V)
Range: _________________________________________________ Min.: 0 V, Max.: 5 V
Indicates throttle position Number 1.
- 0.5 to 1.2 V: Throttle fully closed
- 3.2 to 4.8 V: Throttle fully open

THRTL POS2 (%)
Range: _________________________________________________ Min.: 0 %, Max.: 100 %
Indicates the throttle sensor positioning #2. Calculated value based on VTA2.

THRTL POS2 (V)
Range: _________________________________________________ Min.: 0 V, Max.: 5 V
Indicates throttle position Number 2.
- 2.0 to 2.9 V: Throttle fully closed
- 3.2 to 4.8 V: Throttle fully open

THRTL RELAY
Range: _________________________________________________ ON/OFF
Indicates the status of the throttle relay.

THRTL REQ POS (V)
Range: _________________________________________________ –Min.: 0 V, Max.: 5 V
Indicates the throttle requirement position. 0.5 to 1.0 V: Idling.

THRTL REQ POS(V)
Range: _________________________________________________ 0.0 to 5.0 V
Indicates the ETCS throttle requirement position voltage. 0.5V to 1.0V at idle is normal.
THRTL SSR #1 AD(V)
Range: ________________________________ 0 to 4.98 V
Indicates the ETCS throttle sensor opener position value Number 1 (AD). The normal value range is 0.6V to 0.9V.

THRTL SSR #1 (V)
Range: ________________________________ 0 to 4.98 V
Indicates the ETCS throttle sensor opener position value Number 1. The normal value range is 0.6V to 0.9V.

THRTL SSR #2 (V)
Range: ________________________________ 0 to 4.98 V
Indicates the ETCS throttle sensor opener position value Number 2. The normal value range is 2.26V to 2.6V.

THRTL SSR #1 (V)
Range: ________________________________ Min.: 0 V, Max.: 4.9804 V
Indicates throttle sensor opener position. Typical readings are: 0.6 to 0.9 V.

THRTL SSR #2 (V)
Range: ________________________________ Min.: 0 V, Max.: 4.9804 V
Indicates throttle sensor opener position Number 2: 2.2 to 2.6 V.

THROTTLE SW
Range: ________________________________ ON/OFF
Indicates the throttle switch.

TIME
TIME ON
Range: ________________________________ 0 to 1092 minutes
Indicates a continuous record of engine running time as minutes and seconds. The value returns to zero whenever the engine is shut down, or if run time exceeds the maximum.

This feature can help to isolate intermittent driveability problems that may occur within a time period after vehicle startup or after reaching cruising speed, for example.

TIME DTC CLEAR
Range: ________________________________ Min.: 0 second, Max.: 65,535 seconds
Indicates time after DTC cleared: Equivalent to time after DTCs erased.

TIMESES
Range: ________________________________ actual
Indicates the time since engine start.

TMBLVL
Range: ________________________________ LOW/HIGH
Indicates the voltage level of the transmission signal (TMB) circuit.

TORQUE
Range: ________________________________ variable
Indicates the net engine torque.
**TP (%)**
**TP SENSOR (V)(%)**

Range: ________________________________ 0 to 100% or 0.0 to 5.0 V

Indicates the absolute throttle opening value as calculated by the ECM from the voltage input from the TP sensor. DBW = drive by wire.

Operating range (idle):
- 4% to 14% or 0.2V to 0.7V (Fully closed)
- 4% to 20% or 0.2V to 1.0V (DBW)

**TP 1&2 AGREE**
**TPS 1&2 AGREE**

Range: ________________________________ YES/NO

Indicates the results of a control module test that compares the signals from the throttle position (TP) sensors 1 and 2.

- YES indicates that TP sensors 1 and 2 voltages correspond to the same throttle position.
- NO indicates that TP sensors 1 and 2 voltages correspond to different throttle positions.

**TP A-B (°)**

Range: ________________________________ 0 to 180°

Indicates the correlation angle between TP sensor A and TP sensor B.

**TP R(%)**
**TP_REL(%)**

Range: ________________________________ not available

Indicates the relative throttle position.

**TP SENSOR-A (V)**
**TP SENSOR-B (V)**

Range: ________________________________ 0.0 to 5.0 V

Indicates throttle position sensor (A or B) signal voltage. The ECM/PCM compares the voltage from throttle position sensor A and throttle position sensor B to detect failures.

**TP SWITCH**

Range: ________________________________ ON/OFF

Indicates the status of the throttle position switch, it reads ON when the throttle is fully closed, and OFF at all other times.

**TP(V)**

Range: ________________________________ 0.0 to 5.0 V

Indicates the throttle position in voltage.

**TP_FAULT**

Range: ________________________________ YES/NO

Indicates a throttle position sensor fault.

**TP_MODE**

Range: ________________________________ not available

Indicates a throttle position status.

**TP=TPS (V)**

Range: ________________________________ 0.0 to 5.1 V

Indicates the throttle position (TP) sensor voltage signal, which is proportional to the throttle plate opening. Expect to see low voltage at closed throttle and high voltage at wide-open throttle. The
full range of TP voltage available to the PCM is 0 to approximately 5.1 volts. A typical TP voltage range might be about 0.5 volt at idle to 4.5 volts at wide-open throttle.

**TP1(%)**
- Range: ______________________________ 0 to 100%
  Indicates the status of throttle position sensor 1.

**TP1(V)**
- Range: ______________________________ 0.0 to 5.0 V
  Indicates the throttle position sensor 1 output voltage.

**TP2(%)**
- Range: ______________________________ 0 to 100%
  Indicates the status of throttle position sensor 2.

**TP2(V)**
- Range: ______________________________ 0.0 to 5.0 V
  Indicates the throttle position sensor 2 output voltage.

**TPS1 LRN MIN(V)**
- Range: ______________________________ 0.0 to 5.0 V
  Indicates the learned minimum voltage for TP sensor 1 as determined by the control module this ignition cycle.

**TPS2 LRN MIN(V)**
- Range: ______________________________ 0.0 to 5.0 V
  Indicates the learned minimum voltage for TP sensor 2 as determined by the control module this ignition cycle.

**TRACTION CTRL**
- Range: ______________________________ YES/NO
  Indicates whether the vehicle has a traction control system (TCS).

**TRACTION SIGNAL**
- Range: ______________________________ ON/OFF
  Indicates the status of the traction control system (TCS) and reads ON when TCS is on.

**TPCT**
- TPCT(V)
  - Range: ______________________________ 0.0 to 5.0 V
    Indicates the lowest closed throttle voltage.

**TPCT(V)**
- Range: ______________________________ not available
  Indicates the most recent throttle position (TP) sensor voltage at closed throttle (throttle position closed throttle).

**TPS(%)**
- Range: ______________________________ 0 to 100%
  Indicates the throttle position.

**TPS(V)**
- Range: ______________________________ 0.0 to 5.0 V
  Indicates the throttle position sensor signal voltage.
TQR/ECT
Range: ________________________ ON/OFF
Indicates the torque reduction execution signal.

TR_V
Range: ________________________ 0.0 to 1.5 V
Indicates the transmission signal return voltage measured at PCM pin 64. Voltage varies by what gear the transmission is operating in:

<table>
<thead>
<tr>
<th>Gear</th>
<th>Voltage*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park</td>
<td>0.0 V</td>
</tr>
<tr>
<td>Reverse</td>
<td>1.5 V</td>
</tr>
<tr>
<td>Neutral</td>
<td>1.5 V</td>
</tr>
<tr>
<td>Overdrive</td>
<td>1.5 V</td>
</tr>
<tr>
<td>Manual 2</td>
<td>0.0 V</td>
</tr>
<tr>
<td>Manual 1</td>
<td>0.0 V</td>
</tr>
</tbody>
</table>

Table 18-7 TR_V voltage

Readings may vary (+ or −) by 0.3V

TRIP
Range: ________________________ YES/NO
Indicates whether a trip has occurred. A trip is a complete ignition on, engine run, ignition off cycle that tests all components and systems on an OBD-II vehicle.

TRIP_CNT
TRIP_CNT
Range: ________________________ 0 to 255
Indicates the number of OBD-II drive cycles completed since the last DTC P1000 (monitor readiness) set.

TRIP_SW
Range: ________________________ ON/OFF
Indicates the status of the trip reset switch.

TrnCtrlIndLamp
Range: ________________________ ON/OFF
Indicates the status of the transmission control indicator lamp. It reads ON when “Overdrive Cancel” is requested and an indicator lamp is lit.

TrnCtrlSw
Range: ________________________ ON/OFF
Indicates the status of the transmission control switch (TCS). The switch is normally open and the value reads OFF. When the driver requests overdrive cancellation, the switch closes and the reading is ON.

TrnFluidTmp (V)
Range: ________________________ 0.0 to 5.0 V
Indicates the voltage signal from the transmission fluid temperature (TFT) sensor. A low voltage reading indicates a high fluid temperature, while a high voltage reading indicates a low fluid temperature.

TRVL AFTER MIL
Range: ________________________ actual distance
Indicates the distance traveled since the malfunction indicator lamp (MIL) was turned on.
TurbSpds (RPM)
   Range: __________________________________________________________ 0 to 8192
Indicates the speed of the transmission turbine shaft.

TWC TEMP
   Range: __________________________________________________________ 572 to 1949°F or 300 to 1065°C
Indicates the PCM calculated temperature of the catalytic converter, which is useful for determining if the catalyst monitor test has run.

UPLVR
   Range: __________________________________________________________ ON/OFF
Indicates the status of the gear shifter (Slap Shift).
   • ON when selector lever is + side
   • OFF when selector lever is other than the above

VAC CUT BYPASS
   Range: __________________________________________________________ ON/OFF
Indicates the PCM command to the vacuum cut bypass valve. It only reads ON when the valve is opened to perform an EVAP system leak-check.

VACUUM PMP
   Range: __________________________________________________________ ON/OFF
Indicates the key off status of the EVAP system pump.

VAF RESET SIG
   Range: __________________________________________________________ ON/OFF
Indicates the vane airflow (VAF) reset status. During warm engine idling the reading should be ON, at 2500RPM it should be OFF.

VAPOR PRES CALC
   Range: __________________________________________________________ –5.632 kPa to 715.264 kPa
Indicates the calculated fuel vapor pressure inside the fuel tank on monitored inputs from the vapor pressure sensor. With the fuel tank filler cap removed, a reading of 0 kPa is normal.

VAPOR PRES CALC
   Range: __________________________________________________________ Min.: –5.632 kPa, Max.: 7153264 kPa
Indicates the vapor pressure (calculated). 0 kPa: Fuel tank cap removed. Pressure inside fuel tank monitored by vapor pressure sensor.

VAPOR PRES VSV
   Range: __________________________________________________________ ON/OFF
Indicates the PCM command to the vacuum switching valve (VSV) used to actuate the vapor pressure valve. The vapor pressure valve lets the EVAP system detect and isolate leaks, it reads ON when the VSV opens the valve.

VAPOR PRESS TANK
   Range: __________________________________________________________ Min.: –4.125 kPa, Max.: 2.125 kPa
Indicates the pressure inside fuel tank monitored by vapor pressure sensor.
   • Vapor pressure 0 kPa: Fuel tank cap removed

VARI INTAKE VSV
   Range: __________________________________________________________ ON/OFF
Indicates the status of the vacuum switching valve (VSV) for intake runner control.
**VBAT(V)**
Range: ____________________________ 0 to 16.0 V
Indicates the battery positive voltage.

**VEH LOAD(%)**
Range: ____________________________ Min.: 0 %, Max.: 25700 %
Indicates the vehicle load: Actual vehicle load.

**VEH SPEED**
**VEHICLE SPEED**
Range: ____________________________ 0 to vehicle max.
Indicates vehicle speed, the value is calculated by the ECM, PCM, or TCM based on input pulses from the vehicle speed sensor (VSS).

The ECM uses vehicle speed primarily for torque converter clutch (TCC) engagement, although it also is an important value for electronic cruise control systems.

Manual transmission vehicles without cruise control and some automatic transmission vehicles without a TCC do not have a VSS. The scan tool may display a parameter for these models, but the reading will always be 0.

**VENT CONT VALVE**
Range: ____________________________ ON/OFF
Indicates the PCM command status to the EVAP canister control valve. It should read ON when the PCM has commanded the vent valve closed to prevent the canister from venting.

**VHCL SPD CUT**
Range: ____________________________ NON/CUT
Indicates the vehicle cruise condition.
- NON—Vehicle speed is maintained at the ASCD set speed
- CUT—Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off

**VIAS S/V**
Range: ____________________________ ON/OFF
Indicates the state of the variable induction air control system solenoid valve which controls the vacuum signal from the intake manifold and reads as follows:
- 1,800 to 3,600 RPM—ON
- All other conditions—OFF

**VPS SOL**
Range: ____________________________ ON/OFF
Indicates the PCM command status of the valve pulse system control solenoid valve. To reduce fuel consumption, the ECM commands the solenoid valve not to lift both intake and exhaust valves without controlling the ignition system during cruising and acceleration. It reads ON when the VSP is active, the ECM command is to not to lift the valve.

**VPS STATUS**
Range: ____________________________ ON/OFF
Indicates the status of the valve pause system. It reads ON when the valve action has been overridden by a PCM command.
VREF(V)
Range: ____________________________ 0.0 to 5.12 V
Indicates the reference voltage that system sensors operate on. Nominal reference voltage is 5.0 V. Depending on system calibration and charging system voltage, readings may vary a few tenths of a volt. Some models normally read about 6.5 V; verify with DVOM.

VRIS SOL VALVE
Range: ____________________________ ON/OFF
Indicates the variable resonance induction solenoid valve.

VRISV1
VRIS SOL VLV 1
Range: ____________________________ ON/OFF
Indicates the variable resonance induction solenoid valve 1.

VRISV2
VRIS SOL VLV 2
Range: ____________________________ ON/OFF
Indicates the variable resonance induction solenoid valve 2.

VSA REQ TH (°)
Range: ____________________________ 0 to 180°
Displays the throttle position in degrees as requested by the vehicle stability assist (VSA) control module.

VSS
Range: ____________________________ 0 to vehicle max.
Indicates vehicle speed as determined by ECM input pulses from the vehicle speed sensor (VSS). The ECM calculates the actual speed.

The ECM uses vehicle speed primarily for torque converter clutch (TCC) engagement, although it also is an important value for electronic cruise control systems.

Manual transmission vehicles without cruise control and some automatic transmission vehicles without a TCC do not have a VSS. The scan tool may display a parameter for these models, but the reading will always be 0.

VSS_FAULT
Range: ____________________________ YES/NO
Indicates a vehicle speed fault.

VT_ACT1(°)
VT_ACT2(°)
Range: ____________________________ variable
Indicates actual valve timing.

VT_DIFF1(°)
VT_DIFF2(°)
Range: ____________________________ variable
Indicates the difference between the target and the actual valve timing.

VT_DUTY1(%)  
Range: ____________________________ 0 to 100%
Indicates the camshaft position commanded duty cycle 1 status.
VT_DUTY2(%)  
Range: ____________________________ 0 to 100%  
Indicates the camshaft position commanded duty cycle 2 status.

VTC SOL DUTY (%)  
Range: ____________________________ 0 to 100%  
Indicates the duty cycle of the VTC control solenoid valve. It reflects the drive percentage required to make the CMP actuator achieve a target angle.

VTC STATUS  
Range: ____________________________ ON/OFF  
Indicates the status of the VTC system, it reads ON when the VTC system is active.

VTD AUTOLRN TMR  
Range: ____________________________ ON/OFF  
Indicates whether the vehicle theft deterrent (VTD) system is in learn mode and has not timed out (10 minutes). It reads ON during learn mode.

VTD F_DISUNTIL  
Range: ____________________________ ON/OFF  
Indicates ON if the vehicle theft deterrent (VTD) system has detected a fault with the ignition turned on and a valid theft deterrent DTC present until the ignition is turned off. The vehicle may be disabled on the next ignition cycle if the fault remains current. OFF will display if the system is OK and the theft deterrent system is inactive.

VTD FAIL ENABLD  
Range: ____________________________ YES/NO  
Indicates whether the PCM received the correct password from the passlock module and a failure has occurred. The PCM continues to enable fuel.

VTD FUEL  
Range: ____________________________ ON/OFF  
Indicates whether the vehicle theft deterrent (VTD) system is preventing fuel delivery, it reads:

- ON if the ECM has not received the correct password from the passlock module and is disabling the fuel system
- OFF during normal operation

VTD FUEL DISABL  
Range: ____________________________ ON/OFF  
Indicates whether the vehicle theft deterrent (VTD) system is preventing fuel delivery and reads as follows:

- ON only if the ECM has not received the correct password from the passlock module and is disabling the fuel system.
- OFF during normal operation.

VTD FUEL ENABLE  
Range: ____________________________ ON/OFF  
Indicates ON if the vehicle theft deterrent (VTD) system has detected a fault after the ignition has been turned on and a valid theft deterrent password has been received. The engine will continue to run until the ignition is turned off. The vehicle may be disabled on the next ignition cycle if a fault is detected and a valid password is not received. OFF will display if the system is OK and the theft deterrent system is inactive.
VTD PASSWORD OK
Range: __________________________________________________________ YES/NO
Indicates whether a valid vehicle theft deterrent (VTD) password was received.

VTEC INFORMATION
Range: __________________________________________________________ not available
Indicates the status of the variable valve timing system. When the VTEC valve shifts to high
valve, it has a possibility of sticking. This detects the failure with the knock sensor.

VTEC PRES SW
VTEC PRES SW B1
VTEC PRES SW B2
VTEC PS SW
Range: __________________________________________________________ ON/OFF
Indicates the state of the VTEC Oil pressure switch. When oil pressure is applied, the switch
changes from ON to OFF. The reading should be ON at low RPM.
A B1 and B2 in the parameter name indicates multiple switches used on a V-type engine. Bank 1
is the cylinder bank that contains cylinder 1.

VTEC SOL
VTEC SOL 1
VTEC SOL 2
VTEC SOL B1
VTEC SOL B2
Range: __________________________________________________________ ON/OFF
Indicates the state of the VTEC solenoid valve (Spool valve), it reads ON when the solenoid is
energized. The ECM opens the solenoid valve to change the actuation of the valve timing and lift
to improve performance. The change point depends on the engine load conditions.
Solenoid valve designations are:
• Solenoid 1 is used to adjust the Low-Mid change point.
• Solenoid 2 is used to adjust the Mid-High change point.
• B1 is the cylinder bank that contains cylinder 1.
• B2 is the cylinder bank that does not contains cylinder 1.

VVT AIM ANGL #1(\%)
Range: __________________________________________________________ 0 to 100\%
Indicates the variable valve timing (VVT) AIM (target) angle for the bank 1 intake cam. 0\% during
a requested intrusive operation at idle is considered normal.

VVT AIM ANGL #2(\%)
Range: __________________________________________________________ 0 to 100\%
Indicates the variable valve timing (VVT) AIM (target) angle for the bank 2 intake cam. 0\% during
a requested intrusive operation at idle is considered normal.

VVT CHNG ANGL#1 (°)
Range: __________________________________________________________ Min.: 0°FR, Max.: 60°FR
Indicates the variable valve timing (VVT) change angle (bank 1). 0° from rest: Idling.
Displacement angle during intrusive operation.
VVT CHNG ANGL#2 (°)
Range: _____________________________________________ Min.: 0°FR, Max.: 60°FR
Indicates the variable valve timing (VVT) change angle (bank 2). 0° from rest: Idling.
Displacement angle during intrusive operation.

VVT CHNG ANGL#1(°)
Range: ______________________________________ 0°FR to 60°FR
Indicates the variable valve timing (VVT) change angle FR (From Rest) for the bank 1 intake cam.
0 to 5° at idle during a requested intrusive operation is considered normal.

VVT CHNG ANGL#2(°)
Range: ______________________________________ 0°FR to 60°FR
Indicates the variable valve timing (VVT) change angle FR (From Rest) for the bank 2 intake cam.
0 to 5° at idle during a requested intrusive operation is considered normal.

VVT CONTROL
Range: __________________________________________ ON/OFF
Indicates the ECM command to the variable valve timing (VVT) system, which is used to advance or retard camshaft timing, it reads ON when VVT is active. The VVT uses a hydraulic motor to change camshaft gear position.

VVT CTRL B1
Range: __________________________________________ ON/OFF
Indicates the variable valve timing (VVT) control (bank 1) status.

VVT CTRL B2
Range: __________________________________________ ON/OFF
Indicates the variable valve timing (VVT) control (bank 2) status.

VVT EX CHG ANG1(°)
Range: ______________________________________ 0°FR to 60°FR
Indicates the variable valve timing (VVT) change angle FR (From Rest) bank 1 intake cam. 0 to 5° at idle during a requested intrusive operation is considered normal.

VVT EX CHG ANG1 (°)
Range: _____________________________________________ Min.: 0°FR, Max.: 60°FR
Indicates the variable valve timing (VVT) exhaust change angle (bank 1). 0° from rest: Idling.

VVT EX CHG ANG2(°)
Range: ______________________________________ 0°FR to 60°FR
Indicates the variable valve timing (VVT) change angle FR (From Rest) bank 2 intake cam. 0 to 5° at idle during a requested intrusive operation is considered normal.

VVT EX CHG ANG2 (°)
Range: _____________________________________________ Min.: 0°FR, Max.: 60°FR
Indicates the variable valve timing (VVT) exhaust change angle (bank 2). 0° from rest: Idling.

VVT EX HOLD B1(%)
Range: _____________________________________________ 0 to 100%
Indicates the variable valve timing (VVT) exhaust hold duty ratio learning value for the bank 1 exhaust cam. 30% to 70% at idle during a requested intrusive operation is considered normal.
**Data Parameters**

**VVT EX HOLD B2(%)**
Range: __________________________________________________________________ 0 to 100%
Indicates the variable valve timing (VVT) exhaust hold duty ratio learning value for the bank 2 exhaust cam. 30% to 70% at idle during a requested intrusive operation is considered normal.

**VVT EX OCV D B1(%)**
Range: __________________________________________________________________ 0 to 100%
Indicates the variable valve timing (VVT) OCV bank 1 exhaust cam commanded operation duty cycle. 10% to 50% during a requested intrusive operation at idle is considered normal.

**VVT EX OCV D B2(%)**
Range: __________________________________________________________________ 0 to 100%
Indicates the variable valve timing (VVT) OCV bank 2 exhaust cam commanded operation duty cycle. 10% to 50% during a requested intrusive operation at idle is considered normal.

**VVT OCV DUTY B1(%)**
Range: __________________________________________________________________ 0 to 100%
Indicates the variable valve timing (VVT) OCV bank 1 intake cam commanded operation duty cycle. 10% to 50% during a requested intrusive operation at idle is considered normal.

**VVT OCV DUTY B2(%)**
Range: __________________________________________________________________ 0 to 100%
Indicates the variable valve timing (VVT) OCV bank 2 intake cam commanded operation duty cycle. 10% to 50% during a requested intrusive operation at idle is considered normal.

**VVTL AIM ANGL#1 (%)**
Range: __________________________________________________________________ Min.: 0 %, Max.: 100 %
Indicates the variable valve timing (VVT) aim angle (bank 1). 0 %: Idling. VVT duty signal value during intrusive operation.

**VVTL AIM ANGL#2 (%)**
Range: __________________________________________________________________ Min.: 0 %, Max.: 100 %
Indicates the variable valve timing (VVT) aim angle (bank 2). 0 %: Idling. VVT duty signal value during intrusive operation.

**WAC_FAULT**
Range: __________________________________________________________________ YES/NO
Indicates a wide open throttle A/C cut-off fault.

**WAC=WOT A/C**
Range: __________________________________________________________________ ON/OFF
Indicates whether the PCM is preventing the A/C system from operating due to undesirable engine conditions. These include operation during engine cranking and wide-open throttle.

On most vehicles, OFF means that the PCM senses undesirable conditions and is currently preventing the A/C clutch from energizing. ON means the PCM is allowing A/C operation.

**VAPOR PRESS PUMP**
Range: __________________________________________________________________ Min.: 33.853 kPa, Max.: 125.596 kPa
Indicates the pressure inside fuel tank monitored by vapor pressure sensor.

**WARM UPS CYC DTC CLEAR**
Range: __________________________________________________________________ 0 to 255 counts
Indicates the warm-up cycle after DTC cleared: Number of warm-up cycles after DTC cleared.
**WARM-UPS W/O NON-EMISSION FAULTS**

Range: 0 to 255 counts

Indicates the number of warm-up cycles without a detected non-emission fault. The parameter will increment to 255, then resets to 0 unless a fault occurs.

- 0 displays if a fault occurs and remains until the fault is corrected.
- Clearing codes or disconnecting PCM power resets the counter to 0.

**WARM-UPS W/O EMISSION FAULTS**

Range: 0 to 255 counts

Indicates the number of warm-up cycles without a detected emission fault. The parameter will increment to 255, then resets to 0 unless a fault occurs.

- 0 displays if a fault occurs and remains until the fault is corrected.
- Clearing codes or disconnecting PCM power resets the counter to 0.

**WASTEGATE SOL**

Range: 0 to 100%

Indicates the drive percentage of the wastegate solenoid valve, which regulates turbocharger boost pressure.

**WIDE OPEN THROT**

Range: YES/NO

Indicates the status of the wide-open throttle switch, it reads YES when the throttle is completely open. The engine must be running for this parameter to change from NO to YES. With the key on and the engine off, a fully open throttle should produce a maximum throttle position (TP) sensor voltage indication; but this parameter should read NO.

**WOT SW**

Range: ON/OFF

Indicates the state of the wide-open throttle (WOT) switch parameter, which is calculated by the ECM. It reads ON only when the throttle plate is wide open.

**ZRDTY**

Range: ON/OFF

Indicates the status of the ZRDTY, which inhibits power supplied to the TACV motor. It reads ON when the power supply to the TACV motor has stopped.
Generic OBD-II Parameters

This section defines generic OBD-II parameters. To find the description of a specific parameter, locate the parameter name in the index and then go to the listed page.

**AAT(°)**

Range: ____________________________________________________________________________ variable

Indicates the ambient air temperature (AAT) as degrees. Data may be obtained directly from an AAT sensor or calculated by the ECM from other sensor signals.

**AIR**

**AIR STAT**

Range: _______________________________________________________________________________ NOT USED/UPS/DNS/OFF

Indicates the status of the secondary air injection system. Readings show how the air is being routed. Possible readings include upstream (UPS), downstream (DNS), and atmosphere (OFF).

**AIRFLOW(g/s)**

Range: ____________________________________________________________________________ variable

Indicates the PCM calculated mass airflow (MAF) based on the MAF sensor output. Readings are in grams-per-second, cubic-meters-per-hour, or kilograms-per-hour based. The MAF sensor is located between the air cleaner and the throttle body. The MAF sensor measures the mass air flowing to the engine. The PCM uses this value to calculate the injector pulse width needed for stoichiometry (air/fuel). MAF sensor readings should be low at idle and should increase as the throttle opens.

**APP D(%)**

**APP E(%)**

**APP F(%)**

Range: ____________________________________________________________________________ 0 to 100%

Indicates absolute accelerator pedal position. The output signal is a proportional percentage to the input voltage (when proportional) or 100% minus the proportional percentage (when inverse proportional).

**BARO(kPa)**

**BARO(inHg)**

Range: ____________________________________________________________________________ variable

Indicates barometric pressure. Readings may be obtained directly from a BARO or MAP sensor, or calculated by the ECM from other sensor signals.

On some systems, the BARO value is stored in ECM memory at “ignition key on” and also under certain driving conditions. Clearing the memory may result in inaccurate BARO values.

**CATEMP11(°)**

**CATEMP21(°)**

**CATEMP12(°)**

**CATEMP22(°)**

Range: ____________________________________________________________________________ variable

Indicates the temperature of the catalyst substrate for the indicated cylinder bank or oxygen sensor (O2S). For example, CATEMP11 is the reading from bank 1 sensor 1, which is the upstream O2S. CATEMP12 is the reading from bank 1 sensor 2, which is the downstream O2S. Readings may be obtained directly from a dedicated sensor or calculated by the ECM from other sensor signals.
CLR DIST (km) or (mi)
Range: \[0 \text{ to } 65535\]
Indicates the distance accumulated since the diagnostic trouble codes were cleared using a scan tool or possibly when the battery was disconnected. If the distance exceeds 65,535 km (40,722 mi) traveled, then the value will remain at 65,535 km and will not reset to zero. This is used for Inspection/Maintenance information purpose.

COOLANT(*)
Range: \[ -40 \text{ to } 199^\circ \text{C or } -40 \text{ to } 389^\circ \text{F} \]
Indicates engine coolant temperature (ECT), which is supplied to the PCM by the ECT sensor. The ECT sensor is a thermistor installed in the engine coolant passages. The PCM converts ECT sensor voltage signals to temperature readings.

Typical readings with a fully warmed engine running at idle are 185° to 220°F (85° to 105°C). A reading of -40°C or -40°F may indicate an open in the sensor or the sensor circuit. A reading above 185°C or 366°F may indicate a short in the sensor or the sensor circuit.

ECT(*)
Range: \[ -40 \text{ to } 199^\circ \text{C or } -40 \text{ to } 389^\circ \text{F} \]
Indicates engine coolant temperature (ECT). Readings are typically supplied directly to the PCM by the ECT sensor. On some models the ECM calculates the reading based on a cylinder head temperature (CHT) or engine oil temperature (EOT) sensor signal.

Typical readings for a fully warmed engine running at idle are 185° to 220°F (85° to 105°C). A reading of -40°C or -40°F may indicate an open in the sensor or the sensor circuit. A reading above 185°C or 366°F may indicate a short in the sensor or the sensor circuit.

EGR ERR(%)
Range: \[ -100 \text{ to } 99.22\% \]
Indicates exhaust gas recirculation (EGR) error rate as a percentage. The EGR system control and feedback devices differ, therefore an actual or commanded status cannot be shown. The value is calculated as actual EGR minus commanded EGR multiplied by commanded EGR.

For example: 5% - 10% = -5%, multiplied by 10% = -50%.

EGR PCT(%)
Range: \[ 0 \text{ to } 100\% \]
Indicates the opening of the exhaust gas recirculation (EGR) valve as a percentage. A reading of 0% indicates the valve is closed (no EGR flow), a 100% reading indicates the valve is fully open (maximum EGR flow).

ENGINE RPM
Range: \[ 0 \text{ to engine max.} \]
Indicates the engine speed, which is computed internally by the PCM based on reference pulses from the ignition system or a crankshaft sensor.

EQ RAT
Range: \[ \text{variable ratio} \]
Indicates the air/fuel (A/F) ratio as commanded by the ECM. To obtain the actual A/F ratio, multiply the stoichiometric A/F ratio (14.7:1) by the displayed value. A conventional oxygen sensor (O2S) displays EQ RAT only when the engine is operating in open loop. A value of 1.0 displays when running in closed loop. A wide range, or linear, O2S displays the EQ RAT in both open and closed loop.
Indicates the air/fuel (A/F) ratio as commanded by the ECM for each oxygen sensor (O2S) on vehicles that use linear, or wide-ratio, oxygen sensors. For example, EQ RAT11 displays the ratio for bank 1 sensor 1 (upstream O2S), and EQ RAT12 is the ratio for bank 1 sensor 2 (downstream O2S). To calculate the actual A/F ratio, multiply the stoichiometric A/F ratio (14.7:1) by the displayed value.

Indicates the evaporative emission (EVAP) purge control valve opening as a percentage. A reading of 0% indicates the valve is closed (no purge flow), and a 100% reading indicates the purge valve is fully open (maximum purge flow).

Indicates the evaporative emissions (EVAP) system vapor pressure, which is obtained from a fuel pressure sensor in the tank or in the evaporative system vapor line.

Indicates the amount of fuel in the tank as a percentage of tank capacity. A 0% reading indicates an empty fuel tank and 100% indicates a full tank. Readings may be taken directly from a sensor or calculated by the ECM from other sensor signals.

Indicates fuel rail pressure relative to atmospheric pressure. Displayed pressure should be the same as an actual gauge reading taken at the fuel rail.

Indicates the actual pressure in the fuel rail.

Indicates the fuel system operating status for bank 1 and bank 2. Displayed values are:

- OL = Open loop (not all conditions were met to allow closed loop)
- CL = Closed loop (oxygen sensor is supplying feedback for fuel control)
• OL DRV = Open loop due to driving conditions (rapid accelerations or decelerations)
• OL FLT = Open loop due to a fault in the system
• CL FLT = Closed loop but failure with one or more oxygen sensors (one sensor may be controlling fuel delivery)

During open loop, the PCM ignores the main O2S signal. The PCM uses main O2S feedback to correct fuel injection duration during closed loop. On a cold engine, OL should display until a reliable feedback signal is received from the O2S. On a warm engine running either at idle or at 2500 RPM with no load CL should display.

Power enrichment during hard acceleration or deceleration during fuel cutoff should cause an OL DRV reading. An OL FLT reading indicates the system is operating in open loop due to a detected failure. A CL FLT reading indicates a failure has been detected by at least one O2S, but the system is still capable of maintaining closed loop operation.

\[ \text{IAT}^\circ \]
\[ \text{Range: } \text{variable } ^\circ \text{C or } ^\circ \text{F} \]
Indicates the temperature of the intake air entering the engine. Readings may be taken directly from an intake air temperature (IAT) sensor, typically installed in the air cleaner, or calculated by the ECM based on input from other sensors. The PCM converts the sensor voltage to temperature readings.

\[ \text{IGN TIMING}^\circ \]
\[ \text{Range: } \text{variable } \]
Indicates the degrees of ignition timing advance or retard. If timing is retarded, a minus (-) sign appears with the reading.

\[ \text{INTAKE AIR}^\circ \]
\[ \text{Range: } \text{variable } ^\circ \text{C or } ^\circ \text{F} \]
Indicates the temperature of the intake air. The intake air temperature (IAT) sensor is a thermistor, typically installed in the air cleaner. A 5-volt reference is applied to the sensor. As temperature increases, sensor resistance decreases, providing the voltage signal to the PCM. The PCM converts the sensor voltage to temperature readings.

The engine control module uses the temperature parameter to control the amount of injected fuel, based on the density of the incoming air.

\[ \text{LOAD}() \]
\[ \text{Range: } 0 \text{ to } 100\% \]
Indicates the relative engine load. The PCM calculates this value by dividing the actual manifold airflow volume by the maximum possible manifold airflow volume. A high number indicates a heavy load, a low number a lighter load.

\[ \text{LOAD ABS}() \]
\[ \text{Range: } 0 \text{ to } 25700\% \]
Indicates the pumping efficiency of the engine expressed as a percentage. The PCM calculates this value based on the mass of the air entering the cylinders on the intake stroke. High numbers indicate heavy loads, low numbers indicate lighter loads. Readings reflect the volumetric efficiency of the engine at wide open throttle.

\[ \text{LOAD PCT}() \]
\[ \text{Range: } 0 \text{ to } 100\% \]
Indicates the relative engine load. The value is determined by dividing the actual manifold airflow volume by the maximum possible manifold airflow volume for gas engines. Actual fuel flow is substituted for manifold airflow volume for diesel engines. For all engines, compensation factors
for pressure and temperature are also used in the calculation. A high number indicates a heavy load, a low number a lighter load.

LONG FT3(%)  
LONG FT2(%)  
LONG FT1(%)  
LONG FT4(%)  

Range: ____________________________________________________ –100 to 99.22%

Indicates the long term fuel trim (FT) for each of the fuel banks on the engine. Displayed values represent the operation and long term correction of the fuel mixture on the vehicle, with 0% as the midpoint. Numbers above zero indicate the PCM is commanding a long term rich mixture correction, which increases fuel injector duration. Numbers below zero indicate the PCM is commanding a lean mixture, which decreases fuel injector duration. A reading of -100% indicates the maximum lean mixture and 99.22% indicates the maximum rich mixture.

The LONG FT numbers follow short term trim (SHRTFT) numbers to make long term fuel metering corrections, in response to a pattern of short term corrections.

LT TRIM B1(%)  
LT TRIM B2(%)  

Range: ____________________________________________________–25 to +25%

Indicates the operation and long term correction of the fuel mixture for bank 1 and bank 2. The midpoint of the range is 0%. Numbers above zero indicate the PCM is commanding a rich fuel mixture correction. Numbers below zero indicate the PCM is commanding a lean fuel mixture correction.

The LT TRIM numbers follow the short-term trim (ST TRIM) numbers to make long-term fuel metering corrections, in response to a pattern of short term corrections.

Compare LT TRIM numbers to injector on-time. Numbers above zero indicate increased on-time, while numbers below zero indicate decreased on-time. LT TRIM corrections operate only in closed loop. In open loop they revert to a fixed value.

MAF(g/s)  

Range: _____________________________________________________ 0 to 655.35 g/s

Indicates the flow rate of the intake air entering the engine. The display shows airflow volume as grams-per-second. Readings may be taken directly from the mass airflow (MAF) sensor, or calculated by the PCM based on input from other sensors.

MAP  

Range: _____________________________________________________ 0 to 205 kPa or 0 to 60.7 inHg

Indicates the PCM calculated manifold absolute pressure (MAP) based on the MAP sensor voltage signal. When MAP is displayed in kPa, the reading should be approximately 100 to 102 kPa with the engine off and the manifold close to atmospheric pressure at sea level. When the engine is running manifold vacuum increases and the kPa reading drops. The higher the manifold vacuum, the lower the kPa reading. On a turbocharged engine, the kPa reading should rise above 100 as boost is applied.

When MAP is displayed in inHg, the reading should be about 29.9 inHg with the engine off and the manifold close to atmospheric pressure at sea level. When the engine is running with high manifold vacuum, the MAP reading in inHg drops. On a turbocharged engine, the reading rises above 30 as boost is applied.
### MIL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range: ON/OFF</th>
</tr>
</thead>
</table>

Indicates the PCM command to the malfunction indicator lamp (MIL) on the instrument panel. Readings should correspond to the actual state of the MIL. Suspect a MIL circuit problem if the value does not match the MIL condition.

### MIL DIST

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range: 0 to 65535 mi or km</th>
</tr>
</thead>
</table>

Indicates the distance the vehicle has been driven since the malfunction indicator lamp (MIL) was switched on by the PCM. The display reads 0 unless the MIL has been commanded on. Once activated, the accumulated kilometers or miles display. When PCM memory is cleared, or if 40 warm-up cycles occur without the MIL setting conditions reoccurring, the display resets to 0.

### O2 B1-S1(mV)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range: 0 to 1800 mV</th>
</tr>
</thead>
</table>

Indicates the oxygen sensor (O2S) signal as millivolts (mV). The O2S is the primary sensor that indicates whether the engine is running rich or lean. The O2S generates a voltage signal that ranges from 0 to 1000 mV. A high millivolt signal indicates a rich exhaust; a low signal indicates a lean exhaust. In normal operation, the oxygen sensor voltage ranges from 100 to 1000 mV. The sensor must be hot (above 500°F/260°C), and the system must be in closed loop before the PCM corrects the fuel mixture in response to the O2S signal.

The prefixes B1 and B2 correlate to the O2S for banks 1 and 2. Bank 1 is always the bank that contains number 1, or the first cylinder in the firing order. Suffix S1 indicates a pre-catalyst oxygen sensor, while suffix S2 indicates a post-catalyst sensor.

During closed loop operation, the sensor signals should range from 100 mV to 900 mV. A lean condition causes both sensors to read below 400 mV, while a rich condition causes readings above 600 mV. At 2500 RPM readings should switch between high and low at least six-to-ten times every ten seconds.

### O2S11(V)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range: 0.0 to 1.0</th>
</tr>
</thead>
</table>

Indicates the signal voltage for each oxygen sensor (O2S) on the vehicle. For example, O2S11 is the signal for bank 1 sensor 1 (upstream), and O2S12 is for bank 1 sensor 2 (downstream).

An O2S generates a voltage signal ranging from 0 to 1 volt or a little over 1 volt. A high signal (above 0.45V) indicates a rich condition; a low signal (below 0.45V) indicates a lean condition.
The O2S must be hot (above 500°F/260°C), and the system must be operating in closed loop before the PCM corrects the fuel mixture in response to the O2S signal.

O2S11(mA)  O2S12(mA)  O2S13(mA)  O2S14(mA)  O2S21(mA)  O2S22(mA)  O2S23(mA)  O2S24(mA)  O2S31(mA)  O2S32(mA)  O2S41(mA)  O2S42(mA)

Range: _______________________________________________________–128 to +128

Indicates the current for each oxygen sensor (O2S) in milliampere (mA). For example, O2S11 shows the signal for bank 1 sensor 1 (upstream). O2S12 is the signal for bank 1 sensor 2 (downstream). The mA reading applies only to linear or wide-range sensors.

PTO STAT

Range: __________________________________________________________ ON/OFF

Indicates the operating status of the power take off (PTO). The reading is OFF when PTO is off, and ON when PTO is on.

RPM

Range: ___________________________________________________ 0 to engine max.

Indicates the engine speed in revolutions per minute. The RPM value is computed internally by the PCM based on signals from the ignition system or a crankshaft sensor.

RUNTM(SEC)

Range: _________________________________________________ 0 to 65535 seconds

Indicates the engine running time since startup in seconds. The counter stops if the engine stalls. It resets when power is applied to the PCM or the ignition key cycles.

SHRTFT1(%)  SHRTFT2(%)  SHRTFT3(%)  SHRTFT4(%)  

Range: _____________________________________________________ –100 to +100%

Indicates the operation and short-term correction of the fuel mixture on the vehicle with 0% as the midpoint. Values above zero indicate a short-term rich mixture correction command from the PCM, which increases fuel injector duration. Values below zero indicate a lean mixture command from the PCM, which decreases fuel injector duration.

The SHRTFT corrections lead the long-term trim (LONGFT) numbers. When a pattern or trend of short-term corrections to fuel-metering occur, the LONGFT parameters respond with a similar correction.
SHRTFT11(\%)
SHRTFT12(\%)
SHRTFT13(\%)
SHRTFT14(\%)
SHRTFT21(\%)
SHRTFT22(\%)
SHRTFT23(\%)
SHRTFT24(\%)
SHRTFT31(\%)
SHRTFT32(\%)
SHRTFT41(\%)
SHRTFT42(\%)

Range: \[\text{________________________} \quad -100 \text{ to } +100\%\]

Indicates the short-term fuel trim for each oxygen sensor (O2S) used. For example, SHRTFT11
shows the signal for bank 1 sensor 1 (upstream) and SHRTFT12 is the signal for bank 1 sensor 2
(downstream). Displayed values represent the operation and short-term correction of the fuel
mixture, with 0\% as the midpoint. Values above zero indicate a rich mixture correction command
from the PCM. Values below zero indicate a lean mixture command from the PCM.

SPARKADV(°)

Range: \[\text{________________________} \quad -64 \text{ to } +63.5\]

Indicates the ignition spark advance applied to cylinder #1 by the PCM. The PCM calculates the
advance required based on input from various sensors. The displayed value is in addition to
base timing. A positive value indicates the PCM is commanding timing advance, a negative
value indicates the PCM is commanding timing retard.

ST TRIM B1(\%)
ST TRIM B2(\%)
ST TRIM(\%)

Range: \[\text{________________________} \quad -20 \text{ to } +20\%\]

Indicates the operation and short-term correction of fuel-metering. The ST TRIM number range
from -20\% to +20\% with 000\% as the midpoint. A number above zero percent indicates that the
PCM has commanded a short-term rich mixture correction. A number below zero percent
indicates the PCM is commanding a lean mixture.

The ST TRIM numbers lead the long-term trim (LT TRIM) numbers. When a pattern or trend of
short-term corrections to fuel-metering occur, LT TRIM responds with a similar correction.

Compare ST TRIM to injector on-time. A number above zero indicates increased on-time, while
those below zero indicate decreased on-time. LT TRIM corrections operate only in closed loop.

TAC PCT(\%)

Range: \[\text{________________________} \quad 0 \text{ to } 100\%\]

Indicates the throttle actuator control (TAC) status as a percentage of total throttle opening. A
reading of 0\% indicates a fully closed throttle, and 100\% indicates a wide open throttle.

THROTTLE(\%)

Range: \[\text{________________________} \quad 0 \text{ to } 100\%\]

Indicates the PCM calculated throttle opening based on the throttle position (TP) sensor voltage.
A reading of 0\% indicates a fully closed throttle, and 100\% indicates a wide open throttle.
Closed-throttle readings vary because of the idle speed control (ISC) motor position and throttle
body adjustments.
### Data Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP(%)</td>
<td></td>
<td>Indicates the PCM calculated absolute throttle position (TP) of the TP sensors. The display shows the sensor output signal in proportion to the input signal as a percentage.</td>
</tr>
<tr>
<td>TP B(%)</td>
<td></td>
<td>Indicates the relative, or learned, position of the throttle position (TP) sensor. The display shows the PCM calculated TP based on adaptive strategy as a percentage.</td>
</tr>
<tr>
<td>TP C(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range:</td>
<td>0 to 100%</td>
<td></td>
</tr>
<tr>
<td>TRIM B1-S1(%)</td>
<td></td>
<td>Indicates the operation and short-term correction of the fuel-metering based on oxygen sensor (O2S) signals. The TRIM numbers indicate whether the PCM is commanding a rich or a lean mixture in response to inputs from O2S B1-S1 and B2-S1.</td>
</tr>
<tr>
<td>TRIM B2-S3(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRIM B1-S4(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRIM B2-S4(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRIM B2-S1(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRIM B1-S2(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRIM B2-S2(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRIM B1-S3(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range:</td>
<td>-100 to +99.2%</td>
<td></td>
</tr>
<tr>
<td>VEH SPEED(MPH)</td>
<td></td>
<td>Indicates the PCM calculated vehicle speed based on the vehicle speed sensor (VSS) signal.</td>
</tr>
<tr>
<td>VEH SPEED(KPH)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range:</td>
<td>0 to vehicle max.</td>
<td></td>
</tr>
<tr>
<td>VPWR(V)</td>
<td></td>
<td>Indicates the vehicle power (VPWR) applied to the ECM as voltage. Readings vary and do not always equal battery voltage.</td>
</tr>
<tr>
<td>Range:</td>
<td>variable</td>
<td></td>
</tr>
<tr>
<td>VSS(KPH)</td>
<td></td>
<td>Indicates the vehicle speed. Readings are calculated by the PCM based on input from the vehicle speed sensor (VSS), or from input from other sensors.</td>
</tr>
<tr>
<td>VSS(MPH)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range:</td>
<td>0 to vehicle max.</td>
<td></td>
</tr>
<tr>
<td>WARM UPS</td>
<td></td>
<td>Shows the number of warm-up cycles since a DTC set. A valid warm-up cycle is when engine coolant temperature (ECT) is at least 40°F (22°C) at startup and reaches at least 160°F (70°C) for a gas engine, or 140°F (60°C) for a diesel engine. The value resets when DTCs are cleared.</td>
</tr>
<tr>
<td>Range:</td>
<td>0 to 255</td>
<td></td>
</tr>
</tbody>
</table>
Hybrid HV ECU and Battery System Parameters

+\text{B VOLTS}  
\text{Range: } 
\text{Min.: 0 V, Max.: 65.535 V} 

Constant: Auxiliary battery voltage +/– 3 V.

\#CODES  
\text{Range: } 
\text{Min.: 0, Max.: 127} 

Indicates the number of emission related powertrain DTCs.

A/C CONSMPT PWR (KW)  
\text{Range: } 
\text{Min.: 0 kW, Max.: 5 Kw} 

Indicates the A/C consumption power.

AUX. BATT V  
\text{Range: } 
\text{0 to 25.4 V} 

Equivalent to auxiliary battery voltage

ACCEL DEG (%)  
\text{Range: } 
\text{Min.: 0\%, Max.: 100\%} 

Indicates accelerator pedal depressed angle, accelerator pedal depressed: Changes with accelerator pedal pressure.

ACCEL POS1(\%)  
\text{Range: } 
\text{Min.: 0\%, Max.: 100\%} 

Indicates the Number 1 accelerator pedal position sensor. Changes as accelerator pedal moves.

ACCEL POS2(\%)  
\text{Range: } 
\text{Min.: 0\%, Max.: 100\%} 

Indicates the Number 2 accelerator pedal position sensor. Changes as accelerator pedal moves.

AMBIENT TEMP  
\text{Range: } 
\text{Min.: -40\degree\text{C}, Max.: 215\degree\text{C}} 

Indicates the ambient air temperature with Power switch ON (IG): Same as ambient air temperature.

BATT INSIDE AIR  
\text{Range: } 
\text{–327.68 \degree\text{C} to 327.67 \degree\text{C}} 

Indicates the temperature of ambient intake air to battery pack. Undisturbed for 1 day: Same as ambient air temperature.

BATTERY BLOCK MAX(V)  
\text{Range: } 
\text{Min.:–327.68 V, Max.: 327.67 V} 

Indicates the battery block maximum voltage.

• SOC 55 to 60\%: 23 V or less

BATTERY BLOCK MINIMUM(V)  
\text{Range: } 
\text{Min.:–327.68 V, Max.: 327.67 V} 

Indicates the battery block minimum voltage.

• SOC 50 to 60\%: 12 V or more

BATTERY BLOCK(V) V01 to V14  
\text{Range: } 
\text{Min.:–327.68 V, Max.: 327.67 V} 

Indicates the battery block voltage.

• SOC 60\%: 12 to 20 V
BATTERY SOC
Range: ________________________________ 0% to 100%
Indicates the battery state of charge.

BATTERY TEMPERATURE 1 to 3
Range: ________________________________ Min.:–327.68°C, Max.: 327.67°C
Indicates the temperature of the HV battery. Undisturbed for 1 day: Same as ambient air.

CHECK MODE
Range: ________________________________ ON/OFF
Indicates the check mode.

CONVERTER TEMP
Range: ________________________________ Min.:−50°C, Max.: 205°C
Indicates boost converter temperature.
- Undisturbed for 1 day at 25°C (77°F): 25°C (77°F)
- Street driving: 25 to 60°C (77 to 140°F)
- If the value is −50°C (−58°F): +B short in sensor circuit
- If the value is 205°C (401°F): Open or GND short in sensor circuit

COOLANT TEMP
Range: ________________________________ Min.:−40°C, Max.: 140°C
Indicates the engine coolant temperature.
- After warming up: 80 to 100°C (176 to 212°F)
- If the value is −40°C (−40°F): Open in sensor circuit
- If the value is 140°C (284°F): Short in sensor circuit

COOLING FAN SPD
Range: ________________________________ Min.: 0, Max.: 6
Indicates the battery blower motor actuation mode.
- Stopped: 0
- Low to High speed actuation: 1 to 6

CURRENT DTC
Range: ________________________________ Min.: 0, Max.: 255
Indicates the number of current DTCs.

DELTA SOC
Range: ________________________________ 0% to 100%
Indicates the difference between maximum and minimum values of SOC. READY light ON, engine stopped, and no electrical load: 0 to 60%.

DISCHARGE RQST SOC (W)
Range: ________________________________ Min.:−20,480 W, Max.: 20,320 W
Indicates discharge request to adjust SOC.
- Uniform on-board charging: −4,400 W
- Usually: 0 W

DIST DTC CLEAR
Range: ________________________________ Min.: 0 km, Max.: 65,535 km
Indicates the drive distance after clearing DTCs.
DTC
Range: ___________________________________________________ Min.: 0, Max.: 255
Indicates the number of stored DTCs.

DRIVE CONDITION
Range: ___________________________________________________ MG1/MG2
Indicates the driving condition.
- MG1 load: MG1
- MG2 load: MG2

DRIVE CONDITION ID
Range: ___________________________________________________ Min.: 0, Max.: 6
Indicates the drive condition ID.
- Engine stopped: 0
- Engine about to be stopped: 1
- Engine about to be started: 2
- Engine operated or operating: 3
- Generating or loading movement: 4
- ????: 6
- Revving up with P position: 6

DRIVING MILEAGE
Range: ___________________________________________________ 0 km to 65,535 km
Indicates the accumulated driving mileage after the malfunction occurrence.

ECU CTRL MODE
Range: ___________________________________________________ Min.: 0, Max.: 4
Indicates the ECU control mode.

ECU TYPE
Range: ___________________________________________________ HV ECU/EV ECU
Indicates the type of ECU.

ENG RUN TIME
Range: ___________________________________________________ Min.: 0 s, Max.: 65,535 s
Indicates the elapsed time after starting engine that key cycle.

ENG STOP RQST
Range: ___________________________________________________ NO/YES
Indicates the engine stop request.
- Requesting stop: YES

ENG WARM UP RQST
Range: ___________________________________________________ NO/YES
Indicates the engine warm-up request.
- Requesting engine warm-up: YES

ENGINE SPD (RPM)
Range: ___________________________________________________ Min.: 0 rpm, Max.: 8,000 rpm
Idling*: 950 to 1,050 rpm.
HISTORY DTC
Range: ___________________________________________ Min.: 0, Max.: 255
Indicates the number of history DTCs.

HV BATT CH RQST
Range: ___________________________________________ NO/YES
Indicates the HV battery charging request.
• Requesting HV battery charging: YES

IB BATTERY
Range: ___________________________________________ –327.68 A to 327.67 A
Indicates the current value of the battery pack:
• Soon after a full-load acceleration with the engine stopped: Maximum 140 A (room temperature)
• When shifting into N position, 1 second has elapsed after engine started with P position, engine stopped, head light ON, A/C fan high, and READY light ON: Maximum 30 A.

IDLING REQUEST
Range: ___________________________________________ NO/YES
Indicates the engine idling request.
• Requesting idle: YES

INTAKE AIR
Min.: –40°C, Max.: 140°C
Indicates the intake air temperature. Constant: Same as ambient air temperature.

INTERNAL RESISTANCE(OHMS) R01-R14
Min.: 0 ?, Max.: 0.255 ?
Indicates the internal resistance of each battery block. Always: 0.01 to 0.1 ?

MAX BAT BLOCK #
Range: _______________________________ 0 to 13
Indicates the battery block number with maximum voltage, one of the numbers 0 to 13.

MG1 INVERT TEMP
Min.: –50°C, Max.: 205°C
Indicates MG1 inverter temperature.
• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F)
• Street driving: 25 to 80°C (77 to 176°F)
• If the value is –50°C (~58°F): +B short in sensor circuit
• If the value is 205°C (401°F): Open or GND short in sensor circuit

MG1 REV (RPM)
Min.: –16,383 rpm, Max.: 16,383 rpm
Indicates MG1 revolutions, in RPM.

MG1 TORQ (N-m)
Min.: –500 Nm, Max.: 500 Nm
Indicates MG1 torque, in Newton Meters.
MG1 TORQ EXEC VAL (N-m)
Range: _________________________________________ Min.:–512 Nm, Max.: 508 Nm
Indicates MG1 torque execution value when 1 second has elapsed after the engine was started automatically with READY light ON, engine stopped, A/C fan Hi, headlight ON and the P position: Less than +/-20% of MG1 TORQ.

MG2 INVERT TEMP
Range: ___________________________________________ Min.:–50°C, Max.: 205°C
Indicates MG2 inverter temperature.
- Undisturbed for 1 day at 25°C (77°F): 25°C (77°F)
- Street driving: 25 to 80°C (77 to 176°F)
- If the value is –50°C (~58°F): +B short in sensor circuit
- If the value is 205°C (401°F): Open or GND short in sensor circuit

MG2 REV (RPM)
Range: _________________________________________ Min.:–16,383 rpm, Max.: 16,383 rpm
Indicates MG2 revolutions, in RPM.

MG2 TORQ (N-m)
Range: ___________________________________________ Min.:–500 Nm, Max.: 500 Nm
Indicates MG2 torque, in Newton Meters.

MG2 TORQ EXEC VAL (N-m)
Range: ___________________________________________ Min.:–512 Nm, Max.: 508 Nm
Indicates MG2 torque execution value after full-load acceleration with READY light ON and engine stopped: Less than +/-20% of MG2 TORQ.

MIL ON RUN DIST
Range: ___________________________________________ Min.: 0 km, Max.: 65,535 km
Indicates the drive distance after malfunction occurrence.

MIL ON RUN TIME
Range: ___________________________________________ Min.: 0 min, Max.: 65,535 min
Indicates the elapsed time after starting engine with MIL ON.

MIL STATUS
MIL Status
MIL status
Range: ___________________________________________ ON/OFF
Indicates the malfunction indicator lamp (MIL) status.
- Constant ON: repair in accordance with detected DTCs

MIN BAT BLOCK #
Range: ___________________________________________ 0 to 13
Indicates the battery block number with minimum voltage, one of the numbers 0 to 13.

M SHIFT SENSOR (V)
Range: ___________________________________________ Min.: 0 V, Max.: 5 V
Indicates the output voltage of the shift position sensor (main).
- Selector lever in home position: 2.0 to 3.0 V
- Shifting into R position: 4.0 to 4.8 V
- Shifting into B or D position: 0.2 to 1.0 V
MCYL CTRL POWER (N-m)
Range: __________________________________________ Min.: –512 Nm, Max.: 508 Nm
Indicates braking torque that is equivalent to the master cylinder hydraulic pressure. Brake pedal depressed: Changes with brake pedal pressure.

MOTOR1 TEMP
Range: __________________________________________ Min.: –50°C, Max.: 205°C
Indicates MG2 motor temperature.

• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F)
• Street driving: 25 to 80°C (77 to 176°F)
• If the value is –50°C (–58°F): Open or +B short in sensor circuit
• If the value is 205°C (401°F): GND short in sensor circuit

MOTOR2 TEMP
Range: __________________________________________ Min.: –50°C, Max.: 205°C
Indicates transaxle fluid temperature.

• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F)
• Street driving: 25 to 80°C (77 to 176°F)
• If the value is –50°C (–58°F): Open or +B short in sensor circuit
• If the value is 205°C (401°F): GND short in sensor circuit

NUMBER OF BATT BLOCK
Range: __________________________________________ Min.: 0, Max.: 255
Indicates the number of battery blocks, always: 14.

OBD CERT
Range: __________________________________________ Min.: –50°C, Max.: 205°C
Indicates compliance regulation OBD2 (CARB).

POWER RQST (W)
Range: __________________________________________ Min.: 0 W, Max.: 320,000 W
Indicates the engine power output request value in Watts.

PWR RESOURCE VB (V)
Range: __________________________________________ Min.: 0 V, Max.: 510 V
Indicates the HV battery voltage. READY light ON and P position: 150 to 300 V.

PWR RESOURCE IB (AMP)
Range: __________________________________________ Min.: –256 A, Max.: 254 A
Indicates the HV battery current.

RAISING PRES RATIO (%)
Range: __________________________________________ Min.: 0%, Max.: 100%
Indicates the boost ratio, the pre-boost voltage and post-boost voltage are equal: 0 to 10%.

REGEN EXEC TORQ (N-m)
Range: __________________________________________ Min.: 0 Nm, Max.: 186 Nm
Indicates regenerative brake execution torque.

REGEN REQUEST TORQ (N-m)
Range: __________________________________________ Min.: 0 Nm, Max.: 186 Nm
Indicates regenerative brake request torque. Vehicle speed 30 km/h (19 mph) and master cylinder hydraulic pressure –200 Nm: Changes with brake pedal pressure.
S SHIFT SENSOR (V)
Range: _________________________________________________ Min.: 0 V, Max.: 5 V
Indicates the output voltage of the shift position sensor (sub).
• Selector lever in home position: 2.0 to 3.0 V
• Shifting into R position: 4.0 to 4.8 V
• Shifting into B or D position: 0.2 to 1.0 V

SBLW RQST
Range: __________________________________________________________ ON/OFF
Indicates the battery blower motor stop control request (standby blower).

SHIFT POSITION
Range: _____________________________________________________ P, R, N, D or B
Indicates the shift position: P, R, N, D or B.

SHORT WAVE HIGH
Range: _________________________________________________ Min.: 0 V, Max.: 5 V
Indicates the waveform voltage in leak detection circuit in battery ECU.
• READY light is left ON for 2 minutes, and the pre-boost voltage and the post-boost voltage are equal: 4 V or more

SM SHIFT SENSOR (V)
Range: _________________________________________________ Min.: 0 V, Max.: 5 V
Indicates the output voltage of the select position sensor (main).
• Selector lever in home position: 0.5 to 2.0 V
• Shifting into R, N or D position: 3.0 to 4.85 V

SOC (%)
Range: _______________________________________________ Min.: 0%, Max.: 100%
Indicates the battery state of charge. Constant: 0 to 100%.

SS SHIFT SENSOR (V)
Range: _________________________________________________ Min.: 0 V, Max.: 5 V
Indicates the output voltage of the select position sensor (sub).
• Selector lever in home position: 0.5 to 2.0 V
• Shifting into R, N or D position: 3.0 to 4.85 V

TARGET ENG SPD (RPM)
Range: _________________________________________ Min.: 0 rpm, Max.: 8,000 rpm
Indicates the target engine speed.

TIME DTC CLEAR(MIN)
Range: _________________________________________ Min.: 0 min, Max.: 65,535 min
Indicates the elapsed time after clearing DTCs.
VEHICLE SPD
Range: _______________________________________ Min.: 0 km/h, Max.: 255 km/h
Indicates the vehicle speed.
• Vehicle stopped: 0 km/h (0 mph)

VEHICLE SPD
Range: _______________________________________ Min.:–256 km/h, Max.: 254 km/h
Indicates resolver vehicle speed. Driving at 40 km/h (25 mph): 40 km/h (25 mph).

VH (V)
Range: ________________________________________ Min.: 0 V, Max.: 765 V
Indicates high voltage after it is boosted. Engine revved up with the transmission in Park position: HV battery voltage to 500 V.
• If the value is 0 V: Open or GND short in sensor circuit
• If the value is 765 V: +B short in sensor circuit

VL (V)
Range: ________________________________________ Min.: 0 V, Max.: 510 V
Indicates high voltage before it is boosted. Power switch ON (READY): Practically the same as the HV battery voltage.
• If the value is 0 V: Open or GND short in sensor circuit
• If the value is 510 V: +B short in sensor circuit

VMF FAN VOLTAGE
Range: ________________________________________ Min.:–25.6 V, Max.: 25.4 V
Indicates the battery blower motor monitoring voltage.
• Fan mode 1 with READY light ON and P position: 9.5 to 11.5 V

WARM UPS CYC DTC CLEAR
Range: ________________________________________ Min.: 0, Max.: 255
Indicates the number of times engine is warmed up after clearing DTCs. One cycle, MIL OFF, engine coolant temperature increases from below 22°C (71.6°F) before starting the engine to above 70°C (158°F) after starting the engine. Increments once per warm up cycle.

WIN
Range: ________________________________________ Min.:–64 kW, Max.: 0 kW –25 kW or more
Indicates the charge control wattage sent from battery ECU to the hybrid vehicle control ECU.

WIN CTRL POWER (W)
Range: ________________________________________ Min.:–40,800 W, Max.: 0 W
Indicates the charge control power value. Normal is –25,000 W or more.

WOUT
Range: ________________________________________ Min.: 0 kW, Max.: 63.5 Kw
Indicates the discharge control wattage which is sent from battery ECU to hybrid vehicle control ECU, 21 kW or less.

WOUT CTRL POWER (W)
Range: ________________________________________ Min.: 0 W, Max.: 81,600 W
Indicates the discharge control power value. Normal is 21,000 W or less.
OBD-II Readiness Monitors

This section defines generic OBD-II readiness monitor parameters. To find the description of a specific parameter, locate the parameter name in the index and then go to the listed page.

**A/C REFRIG**
- Range: _____________________________________________ READY/NOT DONE/N/A
- No description available.

**AIR**
- Range: _____________________________________________ READY/NOT DONE/N/A
- Indicates and monitors the function of the secondary air system, and tests the ability of the AIR system to inject air into the exhaust. This monitor relies on O2S feedback to determine the presence of air flow. Inputs from the ECT, IAT, and CKP sensors, and the O2S monitor are required to enable the AIR monitor.

**CAT**
- Range: _____________________________________________ READY/NOT DONE/N/A
- Indicates when the catalytic converter has fallen below a minimum level of effectiveness. Inputs from the ECT, IAT, and TP sensors are required to enable this monitor. Some vehicles may also require CKP and VSS inputs. When this monitor is READY, it relies mainly on inputs from the oxygen sensors.

**COMPONENTS**
- Range: _____________________________________________ READY/NOT DONE/N/A
- Indicates when a malfunction occurs in any PCM input or output circuit that is not exclusively monitored by another monitor system. A malfunction can be a short, an open, or an out-of-range value. This monitor is enabled shortly after the engine is started. However, some individual components may not immediately be available for monitoring.

**EGR SYS**
- Range: _____________________________________________ READY/NOT DONE/N/A
- Indicates the EGR system. Tests the integrity and flow characteristics of the EGR system. This monitor is enabled during EGR system operation, after certain base engine operating conditions are satisfied. Inputs from the ECT, IAT, TP, and CKP sensors are required to enable the EGR monitor.

**EVAP SYS**
- Range: _____________________________________________ READY/NOT DONE/N/A
- Indicates the EVAP system. Checks the function of EVAP components and the ability of the system to flow fuel vapor (hydrocarbons) to the engine. The sequence of events required to enable this monitor vary, depending on the EVAP system components.

**FUEL SYS**
- Range: _____________________________________________ READY/NOT DONE/N/A
- Indicates and monitors the adaptive fuel control system and determines when a learned value exceeds a specified threshold. Inputs from the ECT, IAT, and MAF or MAP sensors are required to enable this monitor.

**HEATED CAT**
- Range: _____________________________________________ READY/NOT DONE/N/A
- No description available.
MISFIRE
Range: _____________________________________________ READY/NOT DONE/N/A
Indicates and monitors engine misfire and designates by DTC the specific cylinder in which a misfire occurs. Misfire is a lack of combustion. Which may be due to an absence of spark, poor fuel metering, poor compression, or any other cause. Typically, inputs from the ECT, MAF, and CKP sensors are required to enable this monitor.

O2 SENSOR
Range: _____________________________________________ READY/NOT DONE/N/A
Indicates and monitors oxygen sensor switching frequency for degradation and circuit operation.

O2 HEATER
Range: _____________________________________________ READY/NOT DONE/N/A
Indicates and monitors the oxygen sensor heater circuit for proper operation when heated oxygen sensors are used.
Occupant Classification (OCC) Parameters

This section defines parameters available from the airbag or supplemental restraint system Occupant Classification (OCC) systems. To find the description of a specific parameter, locate the parameter name in the index and then go to the listed page.

**PASSENGER CLASS**

Range: ____________________________________________________________ OFF/CRS/CHILD/AF05/AM50

Indicates the passenger classification weight based measurement.

- If the value is CRS: child restraint system is active
- If the value is CHILD: under 80 lbs
- If the value is AF05: 80 lbs to 120 lbs
- If the value is AM50: above 120 lbs

**SENS RANGE INF**

Range: ___________________________________________________________ OK/NG

Indicates the status of the sensor range information.

**FL SENS RANGE**
**FR SENS RANGE**
**RL SENS RANGE**
**RR SENS RANGE**

Range: ____________________________________________________________ OK/MAX/MIN

Indicates the relative weight input to seat sensor.

- OK sensor range is –38 lbs to +60 lbs
- MAX is above +60 lbs
- MIN is lower than –38 lbs

**FL SENS VOLTS**
**FR SENS VOLTS**
**RL SENS VOLTS**
**RR SENS VOLTS**

Range: ___________________________________________________________ 0 V to 19.8 V

Indicates the sensor volts. Normal range is 0 V to 4.7 V.

**FL SENS WEIGHT(lbs)**
**FR SENS WEIGHT(lbs)**
**RL SENS WEIGHT(lbs)**
**RR SENS WEIGHT(lbs)**

Range: ____________________________________________________________ –38(lbs) to +82(lbs)

Indicates the relative weight input to seat sensor. Normal range is –38 lbs to +82 lbs.

**TOTAL WEIGHT(lbs)**

Range: ____________________________________________________________ –150(lbs) to +283(lbs)

Indicates the relative weight input to seat sensor. Normal range is –150 lbs to +283 lbs.

**D BUCKLE SW**

Range: ____________________________________________________________ ON/OFF/NG

Indicates the driver buckle switch status.

**P BUCKLE SW**

Range: ____________________________________________________________ ON/OFF/NG

Indicates the passenger buckle switch status.
Instrument Panel Cluster (IPC) Parameters

This section defines data parameters available from the instrument panel cluster (IPC) assemblies that have the ability to communicate with a scan tool via the DLC connector. To find the description of a specific parameter, locate the parameter name in the index and then go to the listed page.

**ABS LAMP**
Range: __________________________________________________________ OFF/ON
Indicates the state of the antilock brake system (ABS) indicator lamp as commanded by the instrument panel cluster (IPC).

**ABS_WARN**
Range: __________________________________________________________ OFF/ON
Antilock brake system (ABS) indicator lamp warning.

**AIR BAG LAMP**
Range: __________________________________________________________ OFF/ON
Indicates the state of the airbag system or supplemental inflatable restraint system (SIR) indicator lamp as commanded by the instrument panel cluster (IPC).

**BATTERY LAMP**
Range: __________________________________________________________ OFF/ON
Indicates the state of the battery indicator/charging system lamp as commanded by the instrument panel cluster (IPC).

**BATTERY VOLTS**
Range: __________________________________________________________ 0.00 to 19.0
Indicates the voltage measured at the battery positive voltage circuit of the instrument panel cluster (IPC).

**BRAKE LAMP**
Range: __________________________________________________________ OFF/ON
Indicates the state of the brake system indicator lamp as commanded by the instrument panel cluster (IPC). This lamp will also illuminate indicating that the parking brake is applied.

**BRAKE_WARN**
Range: __________________________________________________________ OFF/ON
Brake system warning.

**CHECK GAUGES LAMP**
Range: __________________________________________________________ OFF/ON
Indicates the state of the cruise control system indicator lamp as commanded by the instrument panel cluster (IPC).

**CCNT**
Range: __________________________________________________________ actual
Diagnostic trouble code count.

**CRUISE CONTROL**
Range: __________________________________________________________ OFF/ON
Indicates the state of the cruise control system indicator lamp as commanded by the instrument panel cluster (IPC).
DIC FUEL INFO SWITCH  
Range: _________________________________ OFF/ON  
Indicates the state of the fuel button of the driver information center (DIC) switch as monitored by 
the instrument panel cluster (IPC). A closed switch is displayed as ON.

DIC PERSONALIZATION SW  
Range: _________________________________ OFF/ON  
Indicates the state of the personalization button of the driver information center (DIC) switch as 
monitored by the instrument panel cluster (IPC). A closed switch is displayed as ON.

DIC SELECT SWITCH  
Range: _________________________________ OFF/ON  
Indicates the state of the select button of the driver information center (DIC) switch as monitored 
by the instrument panel cluster (IPC). A closed switch is displayed as ON.

DIC TRIP INFO SWITCH  
Range: _________________________________ OFF/ON  
Indicates the state of the trip information button of the driver information center (DIC) switch as 
monitored by the instrument panel cluster (IPC). A closed switch is displayed as ON.

DISPLAY COOLANT TEMP  
Range: _________________________________ 100 to 260°F or 38 to 128°C  
Indicates the displayed coolant temperature gauge value in the instrument panel cluster (IPC). 
This value may differ slightly from the monitored coolant temperature.

DISPLAYED FUEL LEVEL (%)  
Range: _________________________________ 0 to 100%  
Indicates the displayed fuel level gauge value in the instrument panel cluster (IPC). This value 
may differ slightly from the monitored fuel level.

DISPLAYED ODOMETER  
Range: _________________________________ 0 to 999999 MI or 0 to 999999 KM  
Indicates the displayed odometer value in the instrument panel cluster (IPC).

DR_BUKL  
Range: _________________________________ BUCKLED/UNBUCKLED  
Indicates the status of the driver’s seat belt buckle.

DISPLAYED OIL PRESSURE  
Range: _________________________________ 0 to 99 psi or 0 to 682 kPa  
Indicates the displayed oil pressure gauge value in the instrument panel cluster (IPC). This value 
may differ slightly from the monitored oil pressure.

DRAJLMP_IC  
Range: _________________________________ OFF/ON  
Driver door ajar lamp status.

DRIV_DR  
Range: _________________________________ OFF/ON  
Driver door ajar switch status.
ENGINE RPM
Range: 0 to 9999
Indicates engine RPM. The powertrain control module (PCM) computes the engine RPM. The instrument panel cluster (IPC) monitors the engine RPM circuit from the PCM. Engine RPM should remain close to the desired idle under various engine loads with the engine idling.

Fuel Gauge
FUEL_LEVEL(%)
Range: 0 to 100%
Indicates the amount of fuel in the tank as a percentage.

GATE or CARGO DOOR AJAR
Range: OFF/ON
Indicates the state of the lift gate switch as monitored by the instrument panel cluster (IPC). When the lift gate or cargo door is opened, the lift-gate switch closes. A closed switch is displayed as ON.

HD_LMP_SW
Range: OFF/ON
Head lamp switch.

HIGH BEAM LAMP
Range: OFF/ON
Indicates the state of the headlamp high beam indicator lamp as commanded by the instrument panel cluster (IPC).

IGN. CYCLES SINCE LAST DTC
Range: 0 to 50
Indicates 0 to 50. The IPC counts the number of times the ignition is cycled since the current DTC was set.

IGN_KEY
Range: IN/OUT
Indicates ignition key.

IGNITION 1 (V)
Range: 0.00 to 19.0
Indicates voltage measured on the ignition 1 voltage circuit of the instrument panel cluster (IPC).

INST_VBAT
Range: 0 to 16 V
Instrument cluster module voltage.

LEFT TURN SIGNAL
Range: OFF/ON
Indicates the left turn signal supply voltage circuit as monitored by the instrument panel cluster (IPC). An active turn signal will toggle the parameter between OFF and ON.

Light Rheostat
Range: 0 to 255
Indicates the position of the lighting control rheostat.
LOW FUEL LAMP
Range: ___________________________ OFF/ON
Indicates the state of the low fuel warning indicator lamp as commanded by the instrument panel cluster (IPC).

LOW WASHER FLUID
Range: ___________________________ OPEN/CLSD
Indicates the state of the low washer fluid switch input as monitored by the instrument panel cluster (IPC). A closed switch indicates the fluid level is low and is displayed as CLSD.

MONITORED COOLANT TEMP
Range: ___________________________ 40 to 419°F or 40 to 215°C
Indicates the instrument panel cluster (IPC) monitored coolant temperature data as provided by the PCM via serial data communication. This value may differ slightly from the displayed coolant temperature.

MONITORED FUEL LEVEL (%)
Range: ___________________________ 0 to 100%
Indicates the instrument panel cluster (IPC) monitored fuel level as provided by the PCM via serial data communication. This value may differ slightly from the displayed fuel level.

MONITORED OIL PRESSURE
Range: ___________________________ 0 to 99 psi or 0 to 682 kPa
Indicates the instrument panel cluster (IPC) monitored oil pressure as provided by the PCM via serial data communication. This value may differ slightly from the displayed oil pressure.

ODOMETR
Range: ___________________________ actual
Indicates the odometer reading.

Odo/Trip Sw
Range: ___________________________ ON/OFF
Indicates the status of the odometer trip switch.

OIL P_L_IC
Range: ___________________________ OFF/ON
Oil pressure low indicator status.

P_DR
Range: ___________________________ CLSD/AJAR
Passenger door status.

PRNDL DISPLAY
Range: _______________ PARK, REVERSE, NEUTRAL, DRIVE, 3RD, 2ND, 1ST, INVALID
Indicates the state of the PRNDL switch as commanded by the instrument panel cluster (IPC). INVALID indicates an invalid value.

PRNDL STATE
Range: ___________________________ INV, PARK, REV, NEUT, DRV, 3RD, 2ND, 1ST, INV
Indicates the state of the PRNDL switch as commanded by the instrument panel cluster (IPC). INV indicates an invalid value.
RIGHT TURN SIGNAL
Range: __________________________________________________________ OFF/ON
Indicates the right turn signal supply voltage circuit as monitored by the instrument panel cluster (IPC). An active turn signal will toggle the parameter between OFF and ON.

SBLTLMP_IC
SEAT BELT LAMP
Range: __________________________________________________________ OFF/ON
Indicates the state of the seat belt/fasten seat belt indicator lamp as commanded by the instrument panel cluster (IPC).

SECURITY LAMP
Range: __________________________________________________________ OFF/ON
Indicates the state of the security system indicator lamp as commanded by the instrument panel cluster (IPC).

SELTESTDTC
Range: __________________________________________________________ actual
Indicates the number of trouble codes set due to diagnostic test.

SERVICE 4WD
Range: __________________________________________________________ OFF/ON
Indicates the state of the serviced 4WD system indicator lamp as commanded by the instrument panel cluster (IPC).

Speed Meter
Range: __________________________________________________________ 0 to 158 MPH or 0 to 255 KPH
Indicates the vehicle speed. The display should match the reading on the speedometer.

Tacho Meter
Range: __________________________________________________________ 0 to 12,750 RPM
Indicates the engine speed. The display should match the tachometer reading, if equipped.

Tail Cancel
Range: __________________________________________________________ ON/OFF
Indicates the status of the cancel link between the tail lamps and the dimming rheostat.

TRIP_SW
Range: __________________________________________________________ actual
Trip/odometer switch.

TRIP ODOMETER A
Range: __________________________________________________________ MI/KM
Indicates trip odometer A. The instrument panel cluster (IPC) calculates trip odometer A information from the vehicle speed data received from the PCM.

TRIP ODOMETER B
Range: __________________________________________________________ MI/KM
Indicates trip odometer B. The instrument panel cluster (IPC) calculates trip odometer B information from the vehicle speed data received from the PCM.

TRIP RESET SWITCH
Range: __________________________________________________________ INACTIVE/ACTIVE
Indicates the state of the trip reset button of the driver information center (DIC) switch as monitored by the instrument panel cluster (IPC). A closed switch is displayed as ACTIVE.
UPSHIFT LAMP
Range: __________________________________________________________ OFF/ON
Indicates the state of the upshift indicator lamp as commanded by the instrument panel cluster (IPC). This parameter may not be valid if the vehicle is equipped with an automatic transmission.

VEHICLE SPEED
Range: ________________________________________ 0 to 155 MPH or 0 to 255 KPH
Indicates the vehicle speed sensor. The powertrain control module (PCM) monitors the voltage at the signal circuit of the vehicle speed sensor. The voltage is proportional to the vehicle speed, The PCM computes the vehicle speed. The instrument panel cluster (IPC) monitors the vehicle speed signal circuit from the PCM.
Tire Pressure Monitor Parameters

This section defines data parameters that are available from the tire pressure monitor electronic control module (ECM). This section applies only to models with a stand alone tire pressure monitor ECM. Parameters for systems incorporated into the body control module (BCM) are defined in the BCM section.

2nd Tire
  Range: _________________________________________________________ see below

Indicates the number of second tire identifications to be registered. Possible readings are: INV (invalid), 4, or 5.

Batt Volt 1
Batt Volt 2
Batt Volt 3
Batt Volt 4
Batt Volt 5
  Range: _______________________________________________________ OVER/LESS

Indicates the status, either over or less than battery voltage, of the voltage signal for each of the monitored tires.

Ini Threshold 1(gauge)
Ini Threshold 2(gauge)
Ini Threshold 3(gauge)
Ini Threshold 4(gauge)
Ini Threshold 5(gauge)
  Range: __________________________________________ 0 to 637.5 kPa or 0 to 92.2 psi

Indicates the initial threshold of low-pressure for each of the monitored tires.

Initial Switch
  Range: ________________________________________________________ ON/OFF

Indicates the on/off status of the initialization switch.

Initial Switch Info
  Range: ________________________________________________________ WITH/WITHOUT

Indicates the initialization switch setting information.

Main Tire
  Range: _________________________________________________________ see below

Indicates the number of main tire identifications to be registered. Possible readings are: INV (invalid), 4, or 5.

Mode Status
  Range: _________________________________________________________ NORM/TEST

Indicates the tire pressure warning mode status.

Regit ID 1 Code
Regit ID 2 Code
Regit ID 3 Code
Regit ID 4 Code
Regit ID 5 Code
  Range: ________________________________________________ 0 to 9 and A to F

Indicates the register identification for each of the monitored tires.
Select Switch
Range: _________________________________________________________ MAIN/2ND
Indicates the status of the initialization switch.

Select Switch Info
Range: _____________________________________________________ WITH/WITHOUT
Indicates the select switch setting information.

Tire Press 1(gauge)
Tire Press 2(gauge)
Tire Press 3(gauge)
Tire Press 4(gauge)
Tire Press 5(gauge)
Range: ________________________________________ 0 to 637.5 kPa or 0 to 92.9 psi
Indicates the inflation pressure for each of the monitored tires.

Tire Temp 1
Tire Temp 2
Tire Temp 3
Tire Temp 4
Tire Temp 5
Range: ___________________________________________ –40 to 215°C or –40 to 419°F
Indicates the temperature for each of the monitored tires.

Trans Status
Range: ______________________________________________________ FINISH/NOW
Displays the status of the transmission identification code.
Transfer Case Parameters

This section provides parameter descriptions for electronic transfer cases on four-wheel drive (4WD) and all-wheel drive (AWD) vehicles. To find the description of a specific parameter, locate the parameter name in the index and then go to the listed page.

2WD HIGH LAMP
Range: __________________________________________________________ ON/OFF
Indicates the transfer case shift control module command status to the 2WD high indicator lamp on the instrument panel.

4WDHGLMP_4X4M
Range: __________________________________________________________OFF,OFF-FAIL,ON,ON–B+
Indicates the high indicator lamp.

2WD HIGH LAMP
Range: __________________________________________________________ ON/OFF
Indicates the transfer case shift control module command status to the 2WD high indicator lamp on the instrument panel.

4WDINP_SW_4X4M
Range: __________________________________________________________OFF,OFF-FAIL,ON,ON–B+
Indicates the 4WD switch status.

4WD LOW ACTV
Range: __________________________________________________________ YES/NO
Indicates whether 4WD LOW is the current commanded mode in which the automatic transfer case (ATC) is operating.

4WD LOW LAMP
Range: __________________________________________________________ ON/OFF
Indicates the transfer case shift control module command status to the 4WD low indicator lamp on the instrument panel.

4WDLLOWLMP_4X4M
Range: __________________________________________________________OFF,OFF-FAIL,ON,ON–B+
Indicates the four-wheel drive LOW warning indicator.

ATC SLIP (RPM)
SLIPPAGE (RPM)
Range: __________________________________________________________ ON/OFF
Indicates whether slip has been detected by the transfer case shift control module.

AUTO 4WD LAMP
Range: __________________________________________________________ ON/OFF
Indicates the transfer case shift control module command status to the Auto 4WD indicator lamp on the instrument panel.

BOO
Range: __________________________________________________________ ON/OFF
Indicates the brake ON/OFF.

COPENPLAT_4X4M
Range: __________ERROR,A,B,AB,C,AC,BC,ABC,D,AD,BD,ABD,CD,ACD,BCD,ABCD
Indicates the currently open contact plates.
CUR SLIP ADAPTS
Range: ________________________________________________________ 0 to 65,025
No information is currently available for this parameter.

ENCODER GEAR
Range: ________________________________________________________see below
Indicates the mode the transfer case is currently operating in, readings are:
• INVLD, invalid signal
• NEUT, neutral
• 2WD, two-wheel drive
• 4WD-L, four-wheel drive low
• 4WD-H, four-wheel drive high
• AUTO-4, automatic four-wheel drive
• 2WD-L, two-wheel drive low

ENCODER RETURN VOLTAGE
Range: ________________________________________________________ 0.0 to 7.5 V
Indicates the feedback voltage measured by the transfer case shift control module at the encoder signal return.

ENCODER SUPPLY VOLTAGE
Range: ________________________________________________________ 0.0 to 7.5 V
Indicates the voltage supplied to the transfer case shift control module.

F AXLE REQ
Range: ________________________________________________________ ON/OFF
Indicates the front axle switch request from the transfer case shift control module.

F AXLE SW LCKD
Range: ________________________________________________________ YES/NO
Indicates the state of the front axle switch. It reads YES if the switch is in the locked position to enabled 4WD operation.

F PROSHAFT (RPM)
R PROSHAFT (RPM)
Range: ________________________________________________________ 0 to 8192 RPM
Indicates the speed of the front or rear propshaft as calculated by the transfer case shift control module.

IGN CYCLE DTC
Range: ________________________________________________________ actual count
Indicates how many ignition cycles have occurred since the last current DTC set.

LOW_LAMP
Range: ________________________________________________________ ON/OFF
Indicates the 4WD low indicator status.

MODE SW SELECTED
Range: ________________________________________________________see below
Indicates the current position of the transfer case shift control switch, readings are:
• INVLD, invalid signal
• NEUT, neutral
• 2WD, two-wheel drive
• 4WD-L, four-wheel drive low
• 4WD-H, four-wheel drive high
• AUTO-4, automatic four-wheel drive
• 2WD-L, two-wheel drive low

**MODE SW RETURN VOLTAGE**

Range: 0.0 to 5.0 V

Indicates the feedback signal (return voltage) from the transfer case shift control switch.

**MOTOR A (mA)**
**MOTOR B (mA)**

Range: variable

Indicates the current applied to the transfer case motors (A or B) in milliamperes. Readings are positive when the motors are driven forward, and negative (-) when driven in reverse.

**MTR_CCW**

Range: ON/OFF

Indicates the counterclockwise shift motor driver output state.

**MTR_CW**

Range: ON/OFF

Indicates the clockwise shift motor driver output state.

**NEUT LIGHT**

Range: ON/OFF

Indicates the transfer case shift control module command status to the Neutral indicator lamp on the instrument panel.

**NSAFETYSW_4X4M**

Range: ON/OFF

Indicates the neutral safety switch.

**PLATE_A**

Range: ON/OFF

Indicates the transfer case contact plate switch A.

**PLATE_B**

Range: ON/OFF

Indicates the transfer case contact plate switch B.

**PLATE_C**

Range: ON/OFF

Indicates the transfer case contact plate switch C.

**PLATE_D**

Range: ON/OFF

Indicates the transfer case contact plate switch D.

**PLATE_PWR**

Range: OFF, OFF-FAIL, ON, ON-B+

Indicates the contact plate power.
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<th>Parameter</th>
<th>Description</th>
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<td>Indicates the transmission transfer counterclockwise motor output.</td>
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<td><strong>SHMOTCLOC_4X4M</strong></td>
<td>Indicates the clockwise shift relay coil status.</td>
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<td><strong>SLIP ADPT DC (%)</strong></td>
<td>Indicates the duty cycle of the signal being applied to the automatic transfer case motor.</td>
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<td><strong>SOFTWARE ID</strong></td>
<td>Indicates whether the current calibration ID number is valid.</td>
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<tr>
<td><strong>SVC 4WD LAMP</strong></td>
<td>Indicates the transfer case shift control module command status to the Service 4WD indicator lamp on the instrument panel.</td>
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<tr>
<td><strong>VBATT</strong></td>
<td>Indicates battery positive voltage.</td>
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<tr>
<td><strong>VSS_4X4M</strong></td>
<td>Indicates vehicle speed.</td>
</tr>
<tr>
<td><strong>XFER CASE LCKD</strong></td>
<td>Indicates the state of the transfer case. It reads YES when locked to enabled 4WD operation.</td>
</tr>
</tbody>
</table>
Transmission Parameters

This section defines transmission data parameters available from the powertrain control module (PCM) or the transmission control module (TCM). To find the description of a specific parameter, locate the parameter name in the index and then go to the listed page.

NOTE:
Many transmissions are not the same from vehicle to vehicle, and some gear switch signals may not be active. A parameter for an inactive signal always reads ON or YES on the tool.

1 INDICATOR
Range: __________________________________________________________ ON/OFF
Indicates the status of the 1 indicator lamp on the instrument panel. It should only read ON when the 1 position lamp is lighted.

1 POS SWITCH
Range: __________________________________________________________ ON/OFF
Indicates whether the contacts to the 1st gear position switch are closed or open. Reads ON when the switch contacts are closed and the vehicle is in 1st gear.

1-2 ERROR(SEC)
2-3 ERROR(SEC)
3-4 ERROR(SEC)
Range: __________________________________________________________ variable
Indicates the difference between the desired shift time and the actual shift time. A positive number indicates a firm or fast shift, where the actual shift time was shorter than the desired shift time. A negative number indicates a soft or slow shift, where the actual shift time was longer than the desired shift time. This value is only accurate if the shift was adaptable.

1-2 SHIFT (SEC)
2-3 SHIFT (SEC)
3-4 SHIFT (SEC)
Range: __________________________________________________________ variable
Indicates the actual time of the last adaptable 1–2, 2–3 or 3–4 shift. The shift time is based on the gear ratio change after the commanded 1–2, 2–3 or 3–4 shift.

1-2 SOLENOID
2-3 SOLENOID
Range: __________________________________________________________ ON/OFF
Indicates the PCM commanded valve state of the 1–2 and 2–3 solenoids. All the shift solenoids are normally closed. This means that no fluid passes through when the solenoid is commanded OFF. When commanded ON, the solenoid opens and allows fluid to flow.

As shown in Table 18-8, the solenoid ON and OFF states match certain gear positions. Check the factory manual for a chart for the specific transmission being serviced.

Table 18-8 1-2 and 2-3 solenoid parameter readings

<table>
<thead>
<tr>
<th>1-2 Solenoid</th>
<th>2-3 Solenoid</th>
<th>Gear</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>ON</td>
<td>1st</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>2nd</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>3rd</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>4th</td>
</tr>
<tr>
<td>Parameter</td>
<td>Range</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>1-2 SOL CKT STATUS</strong></td>
<td></td>
<td>Indicates the status of the solenoid valve driver feedback voltage signal circuit:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• OPEN/SHORTED displays if the voltage is low when the solenoid is commanded off.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SHORT TO VOLTS display if the voltage is high when the solenoid is commanded on.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• OK displays if no circuit fault is present.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• INDETERMINATE displays if the control module cannot determine the circuit status or an invalid signal was received.</td>
</tr>
<tr>
<td><strong>2 INDICATOR</strong></td>
<td></td>
<td>Indicates the status of the 2 indicator lamp on the instrument panel. It should only read ON when the 2 position lamp is lighted.</td>
</tr>
<tr>
<td><strong>2ND SELECTED</strong></td>
<td></td>
<td>Indicates whether the contacts to the 2nd gear position switch are closed or open. Reads ON when the switch contacts are closed and the vehicle is in 2nd gear.</td>
</tr>
<tr>
<td><strong>2-3T_CCS</strong></td>
<td></td>
<td>Indicates the coast clutch solenoid.</td>
</tr>
<tr>
<td><strong>2-4 BRK PRS SW</strong></td>
<td></td>
<td>Indicates the 2–4 brake pressure switch.</td>
</tr>
<tr>
<td><strong>2-4 BRK SOL(%)</strong></td>
<td></td>
<td>Indicates the 2–4 brake solenoid.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>24B(%)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Indicates the 2–4 brake solenoid.</td>
</tr>
<tr>
<td><strong>2ND GEAR</strong></td>
<td></td>
<td>Indicates the gear commanded by the module.</td>
</tr>
<tr>
<td><strong>2nd PRESSURE SWITCH</strong></td>
<td></td>
<td>Indicates the status of the 2nd gear pressure switch. Reads ON when the transmission is operating in 2nd gear, it reads OFF at all other times.</td>
</tr>
</tbody>
</table>
3-2 DWNSHIFT SOL
Range: ____________________________ ON/OFF
Indicates the PCM commanded valve state of the 3–2 downshift solenoid. The solenoid commanded state is based on transmission temperature and will change states during a 3–2 downshift to regulate the appropriate pressure. The commanded state of the solenoid should change with an increase of throttle at approximately 30 MPH (48 MPH).

3-2 TIME
Range: ____________________________ ON/OFF
Indicates the 3–2 timing solenoid valve.

3-2 TIMING SOL
Range: ____________________________ ON/OFF
Indicates the 3–2 timing solenoid valve.

3RD GEAR
Range: ____________________________ actual
Indicates the gear commanded by the module.

3rd PRESSURE SWITCH
3rd PRESSURE SWT
Range: ____________________________ ON/OFF
Indicates the status of the 3rd gear pressure switch. Reads ON when the transmission is operating in 3rd gear, it reads OFF at all other times.

4-3 DOWNSHIFT
Range: ____________________________ YES/NO
Indicates whether the ECM has recognized the 4-3 downshift, it reads ON during a recognized a 4-3 downshift, which should unlock the torque converter clutch on some models. When ON, related parameters should be:
• 4-3 DOWNSHIFT reads YES
• TCC COMMAND reads OFF.

4TH GEAR
Range: ____________________________ actual
Indicates the gear commanded by the module.

4th PRESSURE SWITCH
4th PRESSURE SWT
Range: ____________________________ ON/OFF
Indicates the status of the 4th gear pressure switch. Reads ON when the transmission is operating in 4th gear, it reads OFF at all other times.

4WDCPWMOU
Range: ____________________________ ON/OFF/FAIL/B+
Indicates the 4WD clutch PWM status.

4WDCPWMST
Range: ____________________________ variable
Indicates the 4WD clutch PWM status.

4WDMODE_L
Range: ____________________________ ON/OFF
Indicates the 4x4 low mode.
5TH GEAR
Range: ________________________________________________ actual
Indicates the gear commanded by the module.

A/C ENABLED
Range: _________________________________ ON/OFF
Indicates the air conditioning switch.

A/T 1 SWITCH
A/T 1 SWT
Range: ________________________________________________ ON/OFF
Indicates the status of the A/T 1 position switch. Reads ON only when the shift selector lever is in the 1 position.

A/T 2 SWITCH
A/T 2 SWT
Range: ________________________________________________ ON/OFF
Indicates the status of the A/T 2 position switch. Reads ON only when the shift selector lever is in the 2 position.

A/T 2-1 SWITCH
A/T 2-1 SWT
Range: ________________________________________________ ON/OFF
Indicates the status of the A/T 2–1 position switch. Reads ON when the shift selector lever is in either the 1 or 2 position.

A/T C.P.C. SOL VLV A ACTUAL
A/T C.P.C. SOL VLV B ACTUAL
A/T C.P.C. SOL VLV C ACTUAL
SOL A ACT
SOL B ACT
SOL C ACT
Range: ________________________________ not available
Indicates the actual current being applied to clutch pressure control solenoid valves A, B, and C in amperes.

A/T C.P.C. SOL VLV A COMMAND
A/T C.P.C. SOL VLV B COMMAND
A/T C.P.C. SOL VLV C COMMAND
SOL A CMD
SOL B CMD
SOL C CMD
Range: ________________________________ not available
Indicates the TCM commanded current being applied to the clutch pressure control solenoid valve A in amperes.

A/T D SWITCH
A/T D SWT
Range: ________________________________________________ ON/OFF
Indicates the status of the A/T D position switch. Reads ON only when the shift selector lever is in the D position.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| **A/T D3 SWITCH** | A/T D3 SWT  
Range: ON/OFF | Indicates the status of the A/T D3 position switch. Reads ON only when the shift selector lever is in the D3 position. |
| **A/T D4 SWITCH** | A/T D4 SWT  
Range: ON/OFF | Indicates the status of the A/T D4 position switch. Reads ON only when the shift selector lever is in the D4 position. |
| **A/T D5 SWITCH** | A/T D5 SWT  
Range: ON/OFF | Indicates the status of the A/T D5 position switch. Reads ON only when the shift selector lever is in the D5 position. |
| **A/T N SWITCH** | A/T N SWT  
Range: ON/OFF | Indicates the status of the A/T N position switch. Reads ON only when the shift selector lever is in the N position. |
| **A/T NP SWITCH** | Range: ON/OFF | Indicates the status of the A/T NP position switch. Reads ON when the shift selector lever is in either the N or P position. |
| **A/T P SWITCH** | A/T P SWT  
Range: ON/OFF | Indicates the status of the A/T P position switch. Reads ON only when the shift selector lever is in the P position. |
| **A/T R SWITCH** | A/T R SWT  
Range: ON/OFF | Indicates the status of the A/T R position switch. Reads ON only when the shift selector lever is in the R position. |
| **A/T SHIFT SOL VLV A**  
**A/T SHIFT SOL VLV B**  
**A/T SHIFT SOL VLV C**  
**A/T SHIFT SOL VLV D**  
**A/T SHIFT SOL VLV E**  
**SHIFT SOL A**  
**SHIFT SOL B**  
**SHIFT SOL C**  
**SHIFT SOL D**  
**SHIFT SOL E** | Range: ON/OFF | Indicates the status of the automatic transmission shift solenoid valves A, B, C, D, and E. Reads ON when the indicated solenoid valve is energized to charge the fluid line. |
A/T T.C.C. SOL VLV
A/T T.C.C. SOL VLV A
Range: __________________________________________________________ ON/OFF
Indicates the status of the torque converter clutch solenoid valve. Reads ON when the TCC solenoid valve is energized. When the solenoid valve is energized, modulator pressure and lockup are controlled electronically.

ABS_ACTIV
Range: __________________________________________________________ ON/OFF
No additional information is available for this parameter.

ACCEL SWITCH
Range: __________________________________________________________ ON/OFF
Indicates the position of the accelerator pedal. The transmission control module (TCM) uses this parameter to determine gear engagement when the vehicle is stopped. It reads:
• ON with the vehicle stopped and the pedal completely released, causing the TCM to engage 2nd gear (“creep” mode).
• OFF when the vehicle is stopped and the pedal is depressed, causing the TCM to engage 1st gear

ACCS=A/C
Range: __________________________________________________________ ON/OFF
Indicates the air conditioning status.

ACT VLV TMNG(°)
Range: __________________________________________________________ variable
Indicates the actual valve timing.

AFSA
AFSB
Range: __________________________________________________________ LOW/HIGH
Indicates an ECM request to the PGM-FI ECM to retard the ignition timing in order to reduce shift shock during gear changes. Normal reading is LOW. A HIGH reading indicates that an ignition timing retard request signal has been sent, simultaneously the FAS parameter should read LOW.

AP SENSOR (V)
AP SENSOR (A)
AP SENSOR (B)
AP SENSOR1 V
AP SENSOR2 V
AP SENSOR A VOLT
AP SENSOR B VOLT
Range: __________________________________________________________ 0.0 to 5.0 V
Indicates the accelerator pedal position (APP) as voltage, it should read:
• About 0.35–0.95 V at idle
• Above 4.0 V at wide open throttle
The displayed value should increase smoothly as the accelerator moves from closed to WOT. Some models use multiple APP sensors, the ECM only requires information from one sensor, the others serve as a fail safe.

AP SENSOR DEG (°)
Range: __________________________________________________________ 0 to 180°
Indicates the accelerator pedal position (APP) as a percentage, it normally reads:
Data Parameters

- 0° at idle
- 180° at wide open throttle (WOT)

The displayed value should increase smoothly as the accelerator moves from closed to WOT. Some models use multiple APP sensors, the ECM only requires information from one sensor, the others serve as a fail safe.

ASCD CRUISE
Range: ____________________________________________ ON/OFF
Indicates whether the automatic speed control (cruise) has been activated, it reads ON when cruise control is on.

AT OD CANCEL
Range: ____________________________________________ ON/OFF
Indicates the status of the overdrive switch, reads ON when the cancel switch is on. With a manual transmission, this parameter always reads OFF.

ATF INDICATOR
ATF SENSOR
ATF TEMP SENSOR (°)
FLUID TEMP (°)
TRANS FLUID (°)
TRANS TEMP (°)
TFT (°)
Range: ________________________________ –58 to 340°F or –50 to 170°C
Indicates the temperature of the automatic transmission fluid (ATF), which is calculated by the TCM based on the signal voltage of a thermistor-type temperature sensor.

ATF TEMP SENSOR (V)
FLUID TEMP (V)
Range: ________________________________ 0.0 to 5.0 V
Indicates the signal voltage of the automatic transmission fluid (ATF) temperature sensor.

ATF TEMP INDICATOR
Range: ____________________________________________ ON/OFF
Indicates the status of the automatic transmission fluid (ATF) overheat indicator lamp. Normal reading is OFF. It reads ON, and the lamp is lit, only when the ATF exceeds the maximum recommended temperature.

BARO
BARO(V)
Range: ________________________________ 2.6 to 4.6 V
Indicates barometric pressure as voltage and should read as follows:
- 4.6 V at sea level
- 2.6 V at an elevation of 10,000 feet

BATT(V)
Range: ________________________________ 0 to 16 V
Indicates the battery voltage.

BLOWR FAN SW
Range: ____________________________________________ ON/OFF
Indicates the blower motor.
Data Parameters

BOO

BrakeOnOff

Range: __________________________________________________________ ON/OFF

Indicates the brake on and off.

BRAKE SW

Range: __________________________________________________________ ON/OFF

Indicates the brake switch input status.

CALC TPS(%) (Calculates TPS)

Range: _________________________________________________________ 0 to 100%

Indicates a calculated value determined by the accelerator pedal position and the actual throttle position. The parameter represents the driver’s intended request for torque or acceleration and is used to optimize transmission controls.

- 0% represents an idle or coast request.
- 100% represents a request for wide open throttle (WOT)

CASEGND(V)

Range: ___________________________________________________ –16.0 V to 16.0 V

Indicates the case ground.

CCS_FAULT

Range: __________________________________________________________ YES/NO

Indicates the coast clutch solenoid status.

CLCH_SOL(%)

Range: _________________________________________________________ 0 to 100%

Indicates the (PWM) output control command #1.

CoastClSol(mA)

Range: ______________________________________________________ not available

Indicates the coast clutch solenoid in milli-amps.

CoastClutchSol

Range: __________________________________________________________ ON/OFF

Indicates the coast clutch solenoid.

COUNTERSHAFT SPEED (km.h)(MPH)

Range: ___________________________________________________ 0 to vehicle max.

Indicates the vehicle speed based on the countershaft speed, which is determined by the signal of the counterspeed sensor.

COUNTERSHAFT SPEED (RPM)

Range: ___________________________________________________ 0 to vehicle max.

Indicates the rotational speed of the countershaft, which is based on the signal form the counterspeed sensor.

CPP_SW

Range: ______________________________________________________ DEPRESSED/RELEASED

Indicates the clutch pedal position switch.
CURRENT GEAR
Range: __________________________ 1ST, 2ND, 3RD, 4TH, or CREEP
Indicates the gear the transmission is currently operating in.
On some models, a "1" value can be either reverse, drive, or first gear. If the transmission is between gears "CREEP" or "?????" may display, "?????" can also indicate an invalid signal is being received.

D INDICATOR
Range: __________________________ ON/OFF
Indicates the status of the D indicator lamp on the instrument panel. It should only read ON when the D position lamp is lighted.

D POS SWITCH
Range: __________________________ ON/OFF
Indicates the status of the drive position switch. It reads ON when the switch contacts are closed and the vehicle is in drive.

D SWITCH
Range: __________________________ actual
Indicates the transmission D range switch.

D3 INDICATOR
Range: __________________________ ON/OFF
Indicates the status of the D3 indicator lamp on the instrument panel. It should only read ON when the D3 position lamp is lighted.

D3 SWITCH
Range: __________________________ ON/OFF
Indicates the status of the D3 switch. It reads ON only when the shift selector lever is in the D3 position.

D4/D5/D INDICATOR
D4/5 INDICATOR
Range: __________________________ ON/OFF
Indicates the status of the highest drive position lamp (D, D4, or D5) on the instrument panel. It should only read ON when the lamp is lighted.

When the shift lever is shifted to the highest D position, the D4/D5/D indicator reads ON.

D5 SWITCH
Range: __________________________ ON/OFF
Indicates the status of the D5 switch. It reads ON only when the shift selector lever is in the D5 position.

DCCSV DC (%)
Range: __________________________ 0 to 100.0%
Indicates the TCM calculated damper clutch control solenoid valve (DCCSV) slip rate. An RPM value is the speed difference between the input and output vanes of the torque converter. A percentage is the duty cycle of the pulse-width-modulated (PWM) signal being applied to the solenoid. This solenoid applies hydraulic pressure to the torque converter.
### DFT ERROR CODE (XX)

**Range:** __________________________ see below

Indicates the cause of a direct function test (DFT) error as a hex value:

- $00$: Not under testing (NOT TST)
- $01$: Oil temperature too low (EOT LO)
- $02$: Oil temperature too high (EOT HI)
- $03$: Engine speed too low (RPM LO)
- $04$: Engine speed too high (RPM HI)
- $05$: Wrong throttle condition (TPS)
- $06$: Throttle position too low (TPS LO)
- $07$: Throttle position too high (TPS HI)
- $08$: Wrong vehicle speed condition (VSS)
- $09$: Vehicle speed too low (VSS LO)
- $0A$: Vehicle speed to high.
- $0B$: Brake switch off (BOO OFF)
- $0C$: Brake switch on. (BOO ON)
- $0D$: Wrong shift lever position (MLP POS)
- $20$: Any failure is detected “Failure”
- $21$: No main shaft speed signal (M-Shaft)
- $22$: 2nd gear oil pressure malfunction 2nd GR.
- $23$: 3rd gear oil pressure malfunction 3rd GR.
- $24$: 4th gear oil pressure malfunction 4th GR.
- $FF$: Unknown error (ERROR)

### DFT MONITOR (XX)

**Range:** __________________________ see below

Indicates the direct function test (DFT) monitor as a hex value:

- $00$: Normal (NORMAL)
- $01$: Under test operation (TESTING)
- $04$: Complete (COMPLETE)
- $0E$: Test aborted (TESTER command) (ABORTED)
- $0F$: Test aborted (Wrong condition) (ABORTED)

### DFT RESULT (XX)

**Range:** __________________________ see below

Indicates the direct function test (DFT) results as a hex value:

- $00$: Normal (NORMAL)
- $02$: Solenoid malfunction (SOLENOID)
- $20$: 3rd gear oil pressure switch malfunction (3rd GEAR)
- $30$: 4th gear oil pressure switch malfunction condition (4th GEAR)
DOWNSHIFT REQ 1
DOWNSHIFT REQ 2
DOWNSHIFT REQUEST 1
DOWNSHIFT REQUEST 2
Range: ___________________________________________________________ ON/OFF
Indicates whether a downshift has been requested in order to maintain vehicle speed while
cruise control is on. Reads ON when the TCM requests a downshift.

DOWNSHIFT SWITCH
DOWNSHIFT SWT
DWN_SW
Range: ___________________________________________________________ ON/OFF
Indicates the status of the downshift switch, which is determined by the shift selector lever
position, it reads ON if the selector is moved to a lower range.

DRIVE Count
DRIVECNT
DTC
DTC_CNT
Range: ___________________________________________________________ 0 to 255
Indicates the valid drive counter.

DRIVE POSITION
Range: ___________________________________________________________ ON/OFF
Indicates the status of the drive position switch. It reads ON only when the shift selector lever is
in any forward position, reads OFF in P, R, or N.

DRV_SW
Range: ___________________________________________________________ ON/OFF
Indicates the drive switch.

DWN_SW
Range: ___________________________________________________________ ON/OFF
Indicates the downshift switch.

ECL (%)
Range: ___________________________________________________________ 95 to 105%
Indicates the status of the clutch slip ratio as a percentage. Check after warm up in D4 range at
a steady cruise speed.

ECT(V)
Range: ___________________________________________________________ 0.0 to 5.0 V
Indicates the engine coolant temperature voltage.

ECT_TCM
Range: ___________________________________________________________ 0.0 to 5.0 V
Indicates the (ECT) transmission control module.

ElecPrsCtrl
EPC
Range: ___________________________________________________________ 0 to 100%
Indicates the electronic pressure control.
EPC(V)
Range: ____________________________________________________ 0.0 to 5.0 V
Indicates the electronic pressure control voltage.

ENGINE SPEED (RPM)
Range: ____________________________________________________ 0 to engine max.
Indicates engine speed as converted from the crankshaft position (CKP) sensor. The value of each 50 RPM is displayed.

ENGINE SPEED2 (RPM)
Range: ____________________________________________________ 0 to engine max.
Indicates engine speed as converted from the crankshaft position (CKP) sensor. The value of each RPM is displayed.

ESTIMAT SPD RAT
Range: ____________________________________________________ variable
Indicates the estimated turbine speed divided by the transmission output speed (gear ratio). Estimated turbine speed is calculated from engine speed and engine torque.

ETR (%)
Range: ____________________________________________________ 0 to 100%
Indicates the electric control lock-up clutch slip ratio. A 100% reading indicates the lock-up clutch is fully engaged.

FAS
Range: ____________________________________________________ LOW/HIGH
Indicates an ECM request to the PGM-FI ECM to retard the ignition timing in order to reduce shift shock during gear changes. Normally reads HIGH. A LOW reading means an ignition timing retard request signal has been sent, the AFSA or AFSB parameter should also read LOW.

FAT TERMINAL
Range: ____________________________________________________ ON/OFF
Indicates the (DLC) fat terminal.

FLG_OTLK
Range: ____________________________________________________ YES/NO
Indicates the transmission over-temperature lock-up mode.

FLUID TEMP
FLUID TEMP(V)
Range: ____________________________________________________ 0.0 to 5.0 V
Indicates the transmission fluid temperature.

FORWARD SWITCH
Range: ____________________________________________________ ON/OFF
Indicates the status of the forward position switch. It reads ON only when the shift selector lever is in any forward position, it reads OFF in P, R, or N.

GEAR
Range: ____________________________________________________ actual
Indicates the gear commanded by the module.

GEAR_MAX
Range: ____________________________________________________ variable
Indicates the highest gear allowed.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEAR_RA</td>
<td></td>
<td>Indicates the transmission gear ratio.</td>
</tr>
<tr>
<td>GEAR RAT</td>
<td>0 to 100%</td>
<td>Indicates the transmission gear ratio.</td>
</tr>
<tr>
<td>GEAR RATIO</td>
<td>0.000 to 8.00:1</td>
<td>Indicates the TCM calculated actual gear ratio of the current commanded gear.</td>
</tr>
<tr>
<td>GEN LIGHT</td>
<td>ON/OFF</td>
<td>Indicates the generator warning light.</td>
</tr>
<tr>
<td>GEN OUT(V)</td>
<td>0 to 18 V</td>
<td>Indicates the generator output voltage.</td>
</tr>
<tr>
<td>GEN(%)</td>
<td>0 to 100%</td>
<td>Indicates the generator field current control duty signal.</td>
</tr>
<tr>
<td>HC PRES SW</td>
<td>ON/OFF</td>
<td>Indicates the high clutch pressure switch.</td>
</tr>
<tr>
<td>HC(%)</td>
<td></td>
<td>Indicates the high clutch solenoid.</td>
</tr>
<tr>
<td>HC_SOL(%)</td>
<td>0 to 100%</td>
<td>Indicates the high clutch solenoid.</td>
</tr>
<tr>
<td>HEADLIGHT SW</td>
<td>ON/OFF</td>
<td>Indicates the headlight switch.</td>
</tr>
<tr>
<td>HI CLUTCH(%)</td>
<td>0 to 100%</td>
<td>Indicates the high clutch solenoid.</td>
</tr>
<tr>
<td>HI PS PRESSURE</td>
<td>ON/OFF</td>
<td>Indicates the power steering pressure switch.</td>
</tr>
<tr>
<td>HIGH GEAR</td>
<td>YES/NO</td>
<td>Indicates whether the high gear contacts in the transmission are open or closed.</td>
</tr>
<tr>
<td>HOLD LIGHT</td>
<td>ON/OFF</td>
<td>Indicates the transmission control indicator/hold light.</td>
</tr>
</tbody>
</table>
**HOLD SWITCH**
Range: __________________________________________________________ ON/OFF
Indicates the overdrive cancel switch/hold switch.

**HOT MODE**
Range: __________________________________________________________ ON/OFF

**NOTE:**
The temperature values stated are approximate and vary by transmission application and calibration.

Indicates hot mode status. Reads ON when the transmission is operating in hot mode. The transmission enters hot mode operation if the transmission fluid temperature exceed 266°F (130°C) and has not cooled to 248°F (120°C) for more than 5 seconds. During hot mode, the TCC engages in 4th gear until the temperature drops below 266°F (130°C), the brakes are applied, or the TP sensor signal is low. On some transmissions, if the temperature reaches 302 to 307°F (150 to 153°C) for 15 minutes, a DTC sets, or if the fluid temperature exceeds 309°F (154°C) for 1 second. Hot mode continues until the next ignition cycle.

**HTM_CNT**
Range: ___________________________________________________________ 0 to 255
High Temperature Mode count.

**HTM_DIS**
Range: ____________________________________________________________ actual
Indicates the distance traveled since high temperature.

**IAC=IDLE AIR(%)**
Range: ___________________________________________________________ 0 to 100%
Indicates the idle air control.

**IAT=ACT**
Range: ____________________________________________________________ –40 to 399°F or –40 to 199°C
Indicates the intake air temperature.

**IAT=ACT(V)**
Range: ___________________________________________________________ 0.0 to 5.0 V
Indicates the intake air temperature voltage.

**IGN ADVANCE(°)**
Range: ___________________________________________________________ –90° to +90°
Indicates the spark advance.

**IGN_V**
Range: ___________________________________________________________ 0.0 to 16.0 V
Indicates the ignition voltage.

**ILM CONTROL**
Range: __________________________________________________________ ON/OFF
Indicates the Illumination control system operating status. When the ECU is in fail-safe mode, the indicator lamp blinks as a warning lamp according to the illumination dimming cancel signal. Therefore the dimming cancel signal is sent to the dimming circuit to ensure the amount of light even when the parking lamps or headlights are lit. Normally, when the voltage is low, dimming is enabled. In fail-safe or service check mode, the voltage is high, and dimming is disabled.
**INDICATORS**

Range: __________________________________________________________ ON/OFF

Indicates whether a DTC exists for any of the range indicator lamps on the instrument panel. The reading alternates between ON and OFF if there is a DTC present, the appropriate indicator light blinks as well.

**INGEAR**

Range: __________________________________________________________ YES/NO

Indicates the in gear status.

**INJ(mS)**

Range: ___________________________________________________________________ 0.0 to 99.9 mS

Indicates the fuel pulse width.

**INPUT RPM**

Range: ___________________________________________________________________ actual

Indicates the turbine shaft speed.

**K/D SERVO SW**

Range: __________________________________________________________ ON/OFF

Indicates the status of the kickdown servo, which activates the piston that controls the kickdown band. It reads OFF when the kickdown band is applied; it reads ON when the kickdown band is not applied.

**K/D SW**

**KICKDOWN SW**

Range: __________________________________________________________ ON/OFF

Indicates the ECM command for a downshift during acceleration, it reads ON if the ECM has commanded a downshift.

**KICK-DOWN SWITCH**

Range: __________________________________________________________ ON/OFF

Indicates the status of an accelerator pedal switch. It reads ON when the pedal is fully depressed to initiate a transmission downshift.

**L SWITCH**

Range: __________________________________________________________ ON/OFF

Indicates the transmission L range switch.

**LAST SHFT (SEC)**

Range: __________________________________________________________ 0 to 6.38 seconds

Indicates the actual shift time of the last upshift.

**LEDA**

Range: __________________________________________________________ ON/OFF

Indicates the status of the shift indicator light control. It reads ON when the gear selector lever is in 4th or 5th position in the sequential mode.

**LEDB**

Range: __________________________________________________________ ON/OFF

Indicates the status of the shift indicator light control. It reads ON when the gear selector lever is in 2nd or 3rd position in the sequential mode.
Data Parameters

LEDC
Range: __________________________________________________________ ON/OFF
Indicates the status of the shift indicator light control. It reads ON when the gear selector lever is
in 1st, 3rd, or 5th position in the sequential mode.

LEVER POS
Range: __________________________________________ P/N, REV, DRIVE, 2ND, 1ST
Indicates the position of the shift selector lever.

LINE PRES (%)
LPS (%)
Range: _________________________________________________________ 0 to 100%
Indicates the duty cycle of the ECM command to the line pressure solenoid. The ECM relies on
the TP sensor to raise or lower line pressure. When the system functions properly, the larger the
throttle opening, the higher the percentage (solenoid on-time), and the greater the line pressure.

LINEDES (%)
Range: _________________________________________________________ 0 to 100%
Indicates the desired line pressure the ECM is attempting to maintain as a percentage of base
line pressure. The value indicates target modifier pressure and target pressure of the control
solenoid valve.

LOAD PCT(%)  
Range: _________________________________________________________ 0 to 100%
Indicates the engine load.

LOAD(%)  
Range: _________________________________________________________ 0 to 100%
Indicates the engine load.

LOCKUP B DUTY (%)
Range: _________________________________________________________ 0 to 100%
Indicates the duty cycle of the signal being applied to lockup solenoid B. When the solenoid
valve is energized, the fluid line is changed.

LOW HOLD INDICATOR
Range: __________________________________________________________ ON/OFF
Indicates the status of the low/hold indicator lamp on the instrument panel. Reads ON when the
panel lamp is on.

LOW HOLD SWITCH
LOW HOLD SWT
Range: __________________________________________________________ ON/OFF
Indicates the status of the low/hold switch on. Reads ON when the switch is on.

LPS(%)  
LPSB(%)  
Range: _________________________________________________________ 0 to 100%
Indicates the line pressure solenoid percentage, or the line pressure solenoid B percentage.

LPS(A)
Range: __________________________________________________________ 0.0 to 5.0 A
Indicates the line pressure solenoid.
LRB(%)  
Range: ____________________________________________________________________________ 0 to 100%  
There is no additional information available for this parameter.

MAF(V)  
MAF=MASS AIR(V)  
Range: ____________________________________________________________________________ 0.0 to 5.0 V  
Indicates mass air flow.

MAINSHAFT SPEED (KPH)(MPH)  
Range: ____________________________________________________________________________ 0 to vehicle max.  
Indicates the vehicle speed based on the mainshaft speed, which is determined by the signal of the counterspeed sensor.

MANUAL MODE INDICATOR  
Range: ____________________________________________________________________________ ON/OFF  
Indicates whether the shift selector lever is operating in the manual mode position, it reads ON when in manual mode.

MEAS_SSC(A)  
Range: ____________________________________________________________________________ 0.0 to 5.0 A  
Indicates the measured current shift solenoid C.

MEAS_SSD(A)  
Range: ____________________________________________________________________________ 0.0 to 5.0 A  
Indicates the measured current shift solenoid D.

MEAS_SSE(A)  
Range: ____________________________________________________________________________ 0.0 to 5.0 A  
Indicates the measured current shift solenoid E.

MEAS_SSF(A)  
Range: ____________________________________________________________________________ 0.0 to 5.0 A  
Indicates the measured current shift solenoid F.

MIL  
Range: ____________________________________________________________________________ ON/OFF  
Indicates the malfunction indicator lamp.

MLN_SW  
Range: ____________________________________________________________________________ ON/OFF  
Indicates whether the throttle plate is open.

MNL_SW  
Range: ____________________________________________________________________________ ON/OFF  
Indicates the manual range switch.

MTSW  
Range: ____________________________________________________________________________ AT/MT  
Indicates manual trans/auto trans discrimination signal.

N INDICATOR  
Range: ____________________________________________________________________________ ON/OFF  
Indicates the status of the N indicator lamp on the instrument panel. It should only read ON when the N position lamp is lighted.
### Data Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N SWITCH</td>
<td>ON/OFF</td>
<td>Indicates the park/neutral status.</td>
</tr>
<tr>
<td>NC(0) RPM</td>
<td>0 to vehicle max.</td>
<td>Indicates the direct clutch engagement RPM. These clutches rotate in forward gears, and are held in reverse and overdrive.</td>
</tr>
<tr>
<td>NEUT_SW(MTX)</td>
<td>ON/OFF</td>
<td>Indicates the neutral switch circuit.</td>
</tr>
<tr>
<td>N-SHIFT SOL</td>
<td>ON/OFF</td>
<td>Indicates the N-Shift solenoid.</td>
</tr>
<tr>
<td>O/D OFF INDICATOR</td>
<td>ON/OFF</td>
<td>Indicates the status of the dash-mounted OD lamp, reads ON when the lamp is off.</td>
</tr>
<tr>
<td>O/D OFF_HOLD SW</td>
<td>ON/OFF</td>
<td>Indicates the overdrive cancel switch/hold switch.</td>
</tr>
<tr>
<td>O/D SW</td>
<td>ON/OFF</td>
<td>Indicates the position of the overdrive control switch:</td>
</tr>
<tr>
<td>OD ENABLED</td>
<td>YES/NO</td>
<td>Indicates the position of the overdrive control switch:</td>
</tr>
<tr>
<td>OD SOLENOID</td>
<td>ON/OFF</td>
<td>Indicates the status of the overdrive solenoid, reads ON when the solenoid is energized.</td>
</tr>
<tr>
<td>OD CUT #2</td>
<td>ON/OFF</td>
<td>Indicates the status of the dash-mounted overdrive switch, it reads ON when the switch contacts are closed. This prevents the transmission from shifting into overdrive and turns on a panel lamp.</td>
</tr>
<tr>
<td>OD INDICATOR</td>
<td>ON/OFF</td>
<td>Indicates the status of the dash-mounted OD lamp, reads ON when the lamp is on.</td>
</tr>
<tr>
<td>OD OFF LIGHT</td>
<td>ON/OFF</td>
<td>Indicates the transmission control indicator light.</td>
</tr>
</tbody>
</table>

### Transmission Parameters
ODOMETER (km)(miles)
Range: ________________________________ actual distance
Indicates the distance driven since the TCM (PCM) was last reset.

OP_SW
Range: ________________________________ ON/OFF
Indicates the oil pressure switch.

OP_SW_24B
Range: ________________________________ ON/OFF
Indicates the 2–4 brake pressure switch.

OP_SW_LRB
Range: ________________________________ ON/OFF
Indicates the oil pressure switch.

OS_SRC
Range: ________________________________ 0 to vehicle max.
Indicates the output shaft speed.

OSS(RPM)
Range: ________________________________ 0 to vehicle max.
Indicates the output shaft speed.

OSS_FAULT
Range: ________________________________ YES/NO
Indicates the output shaft speed status.

OutShftSp(RPM)
Range: ________________________________ 0 to vehicle max.
Indicates the output shaft speed.

OUTPUT RPM
Range: ________________________________ 0 to vehicle max.
Indicates the speed of the transmission output shaft.

OVERRUN CLUTCH
Range: ________________________________ ON/OFF
Indicates the ECM command status for the overrun clutch solenoid valve. The solenoid valve should be open when the reading is ON.

P INDICATOR
Range: ________________________________ ON/OFF
Indicates the status of the P indicator lamp on the instrument panel. It should only read ON when the P position lamp is lighted.

P/E/HOLD SW
Range: ________________________________ PWR/ECON/HOLD
Indicates the position of the power economy shift pattern switch. The display should change to agree with the current switch position. If the switch is in the economy position, the transmission shift pattern is altered to economize fuel consumption.
P/N POSI SW
PNP SWITCH
PNP_SW
PNP SWT
  Range: ___________________________________________________________ ON/OFF
Indicates the position of the park/neutral position (PNP) switch, it should read on only with the
gear selector lever in N or P position.

P/N SWITCH
PNP SW (NSW)
  Range: _________________________________________________________ see below
Indicates the signal from the park/neutral position (PNP) switch.

What characters display in the range depend on the vehicle. On most, the readings for this
parameter are: PARK, REV, NEUT, DRIVE, 2ND, and LOW. Others use either P-N-- for park and
neutral or -R-DL for reverse and forward gears.

If the range displays a number, that number corresponds to the presently engaged gear. The
display shows question marks (????) between gears or when the signal is invalid.

P/N_POS
ParkNeuPos
  Range: ___________________________________________________ PARK/NEUT
Indicates the Park/Neutral position.

P/S PRESS SW
  Range: __________________________________________________________ ON/OFF
Indicates the power steering pressure switch.

PCA
  Range: _______________________________________________________ not available
Indicates the pressure control solenoid A.

PCA_FAULT
  Range: _______________________________________________________ YES/NO
Indicates the pressure control solenoid A status.

PCAA(A)
  Range: ___________________________________________________ 0.0 to 5.0 A
Indicates the pressure control solenoid A (AMP).

PCB
  Range: _______________________________________________________ not available
Indicates the pressure control solenoid B.

PCB_FAULT
  Range: _______________________________________________________ YES/NO
Indicates the pressure control solenoid B status.

PCBA(A)
  Range: ___________________________________________________ 0.0 to 5.0 A
Indicates the pressure control solenoid B (AMP).

PCF
  Range: _______________________________________________________ not available
Indicates the line pressure control.
PCF_FAULT
Range: __________________________________________________________ YES/NO
Indicates the line pressure control status.

PCFA(A)
Range: ________________________________________________________ 0.0 to 5.0 A
Indicates the line pressure control (AMP).

PCG
Range: ________________________________________________________ not available
Indicates the converter pressure control.

PCG_FAULT
Range: __________________________________________________________ YES/NO
Indicates the converter pressure control status.

PCSV DC (%)
Range: _______________________________________________________ 0 to 100.0%
Indicates the duty cycle (DC) of the pulse-width-modulated (PWM) signal being applied to the
pressure control solenoid valve (PCSV). The PCSV regulates hydraulic pressure to the clutches
during shifts.

PCS ACT(AMP)
Range: ________________________________________________________ 0 to 1.10 A
Indicates the actual current of the pressure control A solenoid at the control module.
• High current indicates low line pressure.
• Low current indicates high line pressure.

PCS DES (AMP)
Range: ________________________________________________________ 0 to 1.10 A
Indicates a calculated value determined by the accelerator pedal position and the actual throttle
position. The parameter represents the driver’s intended request for torque or acceleration and is
used to optimize transmission controls.
• 0% represents an idle or coast request.
• 100% represents a request for wide open throttle (WOT).

PCS DUTY(%)
PCS DUTY CYCL(%)
Range: _________________________________________________________ 0 to 100%
Indicates the duty cycle of the commanded state of the pressure control solenoid (PCS) and
reads as follows:
• 0% when the solenoid is not energized.
• About 60% at idle during maximum on-time.

POWERSHIFT SW
Range: __________________________________________________________ ON/OFF
Indicates whether the vehicle is operating in the power or economy mode. These modes affect
when shifts occur, as well as how smoothly the transmission shifts. Reads ON when operating in
the power mode.

PNP
Range: __________________________________________________________ ON/OFF
Indicates the clutch pedal position switch/neutral switch circuit status.
PULSE GEN-A
PULSE GEN-B
Range: _______________________________ 0 to engine max. rpm

Indicates input and output shaft speeds calculated by the TCM based on the signals from two
pulse-generator sensors installed on transmission:

- PULSE GEN-A represents input shaft speed.
- PULSE GEN-B represents output shaft speed.

The TCM uses these signals to control shift pattern and hydraulic pressure during shifting. Pulse
generator A is activated by holes in the kickdown drum. Therefore, generator A does not pulse
when the kickdown drum is held (in 2nd gear or 4th gear).

PWR/ECON SW
Range: _______________________________ PWR/ECON

Indicates the position of the power economy shift pattern switch. The display should change to
agree with the current switch position. If the switch is in the economy position, the transmission
shift pattern is altered to economize fuel consumption.

R INDICATOR
Range: _______________________________ ON/OFF

Indicates the status of the instrument panel R indicator lamp. Reads ON if the lamp is on.

R SWITCH
Range: _______________________________ ON/OFF

Indicates the transmission R range switch.

RED TIMING SOL
Range: _______________________________ ON/OFF

Indicates the reduction timing solenoid.

REV POS SWITCH
REV_SW
REVERSE SWITCH
Range: _______________________________ ON/OFF

Indicates the status of the reverse switch. Reads ON when the shift lever is in the R position.

RPM
Range: _______________________________ not available

Indicates the engine speed.

S MODE SWITCH
Range: _______________________________ ON/OFF

Indicates the status of the mode switch. It reads ON when the switch is on.

S SWITCH
Range: _______________________________ ON/OFF

Indicates the transmission S range switch.

SELF DIAG LAMP
Range: _______________________________ ON/OFF

Indicates the status of the Powershift or O/D Off lamp on the instrument panel, and the presence
of a transmission diagnostic trouble codes on some vehicles. It reads:

- ON if a DTC set, or the lamp is on, or both.
- OFF if no codes set and that the lamp is off.
SFT ERROR CODE ($XX)

Indicates the cause of a single function test (DFT) error as a hex value:

- $00: Not under testing (NOT TEST)
- $01: Oil temperature too low (EOT LO)
- $02: Oil temperature too high (EOT HI)
- $03: Engine speed to low (RPM LO)
- $04: Engine speed to high (RPM HI)
- $05: Wrong throttle condition (TPS)
- $06: Throttle position to low (TPS LO)
- $07: Throttle position to high (TPS HI)
- $08: Wrong vehicle speed condition (VSS)
- $09: Vehicle speed to low (VSS LO)
- $0A: Vehicle speed to high (VSS HI)
- $0B: Brake switch OFF (BOO OFF)
- $0C: Brake switch ON (BOO ON)
- $0D: Wrong switch lever position (MLP POS)
- $0E: Engine is running
- $0F: Operational parameter is out of range
- $10: Shift request not sequential
- $11: Shift request too low
- $12: Shift request too high
- $13: Water temperature to low
- $14: Water temperature to high
- $15: Gear ratio high
- $16: Gear ratio low
- $18: Shift selector is not P position
- $19: Shift selector is not R position
- $1A: Shift selector is not N position
- $1B: Shift selector is not D5 position
- $1C: Shift selector is not D4 position
- $1D: Shift selector is not D3 position
- $1E: Shift selector is not 2 position
- $1F: Shift selector is not 2 position
- $20: Any failure is detected (FAILURE)
- $21: No main shaft speed signal (M-SHAFT)
- $22: 2nd gear oil pressure switch malfunction (2nd GR)
- $23: 3rd gear oil pressure switch malfunction (3rd GR)
- $24: 4th gear oil pressure switch malfunction (4th GR)
- $25: Shift selector is not D position
- $26: Shift selector is not S position
- $27: Shift selector is not L position
• $30: Interrupt request by PGM-FI system
• $FF: Unknown error (ERROR)

**SHIFT A**
**SHIFT SOL A**
Range: __________________________________________________________ ON/OFF
Indicates the state of shift solenoid A.

**SHIFT B**
**SHIFT SOL B**
Range: __________________________________________________________ ON/OFF
Indicates the state of shift solenoid B.

**SHIFT SOL C**
Range: __________________________________________________________ ON/OFF
Indicates the state of shift solenoid C.

**ShiftSol1**
**ShiftSol2**
**ShiftSol3**
**ShiftSol4**
Range: __________________________________________________________ ON/OFF
Indicates the PCM commands for the shift solenoids. Reads ON when the PCM has command the solenoid on, reads OFF at all other times.

**ShiftSol1Fault**
**ShiftSol2Fault**
Range: __________________________________________________________ YES/NO
Indicates the shift solenoid status.

**SHIFT CONTROL**
Range: __________________________________________________________ variable
Indicates the shift position that the TCM intends to control the automatic transmission with.

**SHIFT LIGHT**
Range: __________________________________________________________ ON/OFF
Indicates an output command from the ECM to the instrument panel lamp on some vehicles with a manual transmission. It reads ON when the panel lamp should be lit.

**SHIFT LOCK**
Range: __________________________________________________________ LOW/HIGH
Indicates the status of the shift lock unit, which prevents the shift selector lever from moving out of the “P” position unless the brake pedal is depressed and the throttle pedal is released.

**SHIFT LOCK SOL**
Range: __________________________________________________________ ON/OFF
Indicates the status of the shift lock solenoid valve, it reads ON when the solenoid is energized, this releases the shift lock.

**SHIFT MAP #**
**SHIFT MAP NUMBER**
Range: __________________________________________________________ not available
Indicates changing the speed data number used for internal calculations.
SHIFT SOL A
SHIFT SOL B
Range: ___________________________________________ ON/OFF
Indicates the ECM command state of the shift solenoid valves (A and B). Reads ON when the
solenoid is energized. Compare readings to the table that follows:

Table 18-9 Shift solenoid relationships

<table>
<thead>
<tr>
<th></th>
<th>1st Gear</th>
<th>2nd Gear</th>
<th>3rd Gear</th>
<th>4th Gear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shift Solenoid A</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>Shift Solenoid B</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

SCS
Range: ___________________________________________ OPEN/SHORT
Indicates the status of the service check signal. It reads SHORT when the SCS line is grounded.
After turning on the ignition switch, the indicator light flashes DTCs.

SLIP DES
Range: ___________________________________________ not available
Indicates the desired torque converter slip in rpm.

SLN SOLENOID
Range: ___________________________________________ ON/OFF
Indicates the ECM command status for the modulated accumulator back pressure solenoid,
which assures smooth shifting. Reads ON when the solenoid is energized.

SLT SOLENOID
Range: ___________________________________________ ON/OFF
Indicates the ECM command status for the SLT solenoid, which modulates main line pressure.
Reads ON when the solenoid is energized.

SLU SOLENOID
Range: ___________________________________________ ON/OFF
Indicates the ECM command to the torque converter clutch (TCC). Reads ON or YES when the
ECM commands the TCC to engage, and OFF or NO when the TCC is commanded off.

SNOW MODE INDICATOR
Range: ___________________________________________ ON/OFF
Indicates the ECM command status for the Snow Mode indicator lamp on the instrument panel, it
should read ON when the lamp is on.

SNOW MODE SWITCH
Range: ___________________________________________ ON/OFF
Indicates the status of the snow mode switch on the instrument panel, it should read ON when
the switch is on.

SOL SUPPLY (V)
Range: ___________________________________________ variable
Indicates the status of the supply voltage to the solenoid valves.

SPARK ADV(°)
Range: ___________________________________________ actual
Indicates the spark advance in degrees.
SPEED RATIO
Range: ______________________________ 0.00:1 to 8.00:1
Indicates the ratio of engine speed to transmission speed. This value is used by the TCM to estimate gear ratios.

SS MODE SWITCH
SS MODE SWT
Range: _______________________________ ON/OFF
Indicates the status of the sequential sportshift mode switch. It reads ON when the shift selector lever is in the sequential sportshift mode position.

SSA_SS1
Range: _______________________________ ON/OFF
Indicates the state of shift solenoid 1.

SSA_SS1(%)
Range: _______________________________ 0 to 100%
Indicates the state of shift solenoid 1 percentage.

SSA_SS1_FAULT
Range: _______________________________ YES/NO
Indicates the state of shift solenoid 1 status.

SSB_SS2
Range: _______________________________ ON/OFF
Indicates the state of shift solenoid 2.

SSB_SS2(%)
Range: _______________________________ 0 to 100%
Indicates the state of shift solenoid 2 percentage.

SSB_SS2_FAULT
Range: _______________________________ YES/NO
Indicates the state of shift solenoid 2 status.

SSC_SS3
Range: _______________________________ ON/OFF
Indicates the state of shift solenoid 3.

SSC_SS3(%)
Range: _______________________________ 0 to 100%
Indicates the state of shift solenoid 3 percentage.

SSD_SS4
Range: _______________________________ ON/OFF
Indicates the state of shift solenoid 4.

SSE_SS5
Range: _______________________________ ON/OFF
Indicates the state of shift solenoid E/5.

SSF_SS6
Range: _______________________________ ON/OFF
Indicates the state of shift solenoid F/6.
SSF(A)
Range: __________________________________________________________________________ 0 to 5(A)
Indicates the amp draw of shift solenoid F/6.

SSG(A)
Range: __________________________________________________________________________ 0 to 5(A)
Indicates the amp draw of shift solenoid G.

START SIG
Range: __________________________________________________________________________ ON/OFF
No additional information is available for this parameter.

T-CASE RATIO
Range: __________________________________________________________________________ variable
Indicates the ratio of the transfer case, calculated by engine speed, divided by transmission output speed based on transmission commanded gear.

TARG LINE
Range: __________________________________________________________________________ 60 to 300 psi
Indicates the target modifier pressure/target pressure control solenoid pressure.

TC_SLIP(RPM)
Range: __________________________________________________________________________ not available
Indicates the torque converter slip actual.

TCC BRAKE SW
Range: __________________________________________________________________________ OPEN/CLSD
Indicates the status of the torque converter clutch (TCC) brake switch. This is a normally closed, 2 pole switch and may be equipped with a vacuum port. The TCC brake switch supplies ignition voltage to the TCC and a feedback signal to the PCM. When the brake pedal is pressed, the switch opens, ignition voltage is removed from the TCC, and the PCM receives a feedback signal. On models with cruise control, the TCC brake switch is also used to vent the cruise control servo to atmosphere.

Reads OPEN when the brake pedal is applied (switch open) to disengage the torque converter clutch and cruise control, and CLSD when the brake pedal is released (switch closed).

TCC COMMAND
TCCC
TCC PWM ENABLED
TCC SOLENOID
Range: __________________________________________________________________________ ON/OFF
Indicates the ECM command to the torque converter clutch (TCC). Reads ON or YES when the ECM commands the TCC to engage, and OFF or NO when the TCC is commanded off.

TCC engagement (lockup) depends on gear selection, speed, engine temperature and throttle position. The ECM grounds one side of the circuit that energizes the TCC solenoid. In addition, the circuit must also be completed by various transmission, speed, and brake switches to open the transmission hydraulic line and engage the TCC.

TCC DUTY(%)
Range: __________________________________________________________________________ 0 to 100%
Indicates the commanded duty cycle of the TCC solenoid and reads as follows:
• 90% = the TCC solenoid is fully energized.
• 0% = the TCC solenoid is off.

**TCC EFFICIENCY**
**Range:** ________________________________________________________ 0.0 to 2.0:1

Indicates a ratio which is calculated by multiplying the speed ratio by a value related to the “K factor” of the torque converter. The “K factor” is the looseness or tightness of the torque converter for a given torque.

The nearer the torque converter is to full coupling (1.0:1), the closer the torque converter efficiency number will be to 1.

**TCC ENABLED**
**TCC ENABLE SOL**
**TCC SOL**
**Range:** __________________________________________________________ YES/NO

Indicates the PCM commanded state of the torque converter clutch (TCC) solenoid and reads YES when the TCC solenoid is energized.

**TCC GROUNDED**
**Range:** __________________________________________________________ YES/NO

Indicates the state of TCC solenoid voltage available at pin F of the ALDL connector on some models. This parameter is not part of the serial data list, and does not appear in a data movie. Interpret the voltage at pin F as follows:

• YES means no voltage (circuit closed to ground)
• NO means high voltage (circuit open)
• If pin F is not present or is open, TCC GROUNDED continuously reads YES.

YES indicates that the ECM has grounded its side of the circuit; it does not indicate that the circuit is complete. The circuit is not complete until all other switches in series are closed. This parameter is useful to eliminate the ECM as the cause of a TCC solenoid that does not energize.

**TCC RELEASE**
**Range:** __________________________________________________________ YES/NO

Indicates the state of the normally-closed TCC release switch. It reads:

• YES if the switch is open, the TCC is released
• NO if the switch is closed, the TCC is applied

**TCC SLIP(RPM)**
**Range:** ________________________________0 to engine max. or –4080 to +4079 rpm

Indicates the TCC slip rate on some 4T60E transaxles and 4L60E and 4L80E transmissions.
For a 4T60E transaxle, TCC SLIP(RPM) reads as follow:

• A negative value means engine speed is less than turbine speed (deceleration).
• A positive value means engine speed is greater than turbine speed (acceleration).
• A value of zero means engine speed equals turbine speed (TCC is applied).

For 4L60E and 4L80E transmissions, the speed difference between input and output vanes of the torque converter displays.

**TCC SOL (%)**
**Range:** __________________________________________________________ 0 to 100%

Indicates the duty cycle of the signal the ECM is applying to the torque converter clutch (TCC) solenoid. As the value increases, so does the degree of TCC lockup.
<table>
<thead>
<tr>
<th>Data Parameters</th>
<th>Transmission Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TCC(%)</strong></td>
<td><strong>Range:</strong> 0 to 100%</td>
</tr>
<tr>
<td>Indicates the pulse-width-modulated (PWM) signal to</td>
<td></td>
</tr>
<tr>
<td>the torque converter clutch (TCC).</td>
<td></td>
</tr>
<tr>
<td><strong>TCC_FAULT</strong></td>
<td><strong>Range:</strong> YES/NO</td>
</tr>
<tr>
<td>Indicates a torque converter clutch fault.</td>
<td></td>
</tr>
<tr>
<td><strong>TCC_MES(A)</strong></td>
<td><strong>Range:</strong> 0.0 to 5.0 A</td>
</tr>
<tr>
<td>Indicates the measured current for the TCC pressure</td>
<td></td>
</tr>
<tr>
<td>control.</td>
<td></td>
</tr>
<tr>
<td><strong>TCCA(V)</strong></td>
<td><strong>Range:</strong> 0.0 to 5.0 V</td>
</tr>
<tr>
<td>Indicates the torque converter clutch actual.</td>
<td></td>
</tr>
<tr>
<td><strong>TCCC(%)</strong></td>
<td><strong>Range:</strong> 0 to 100%</td>
</tr>
<tr>
<td>Indicates the torque converter clutch control solenoid.</td>
<td></td>
</tr>
<tr>
<td><strong>TCCFault</strong></td>
<td><strong>Range:</strong> YES/NO</td>
</tr>
<tr>
<td>Indicates the torque converter clutch fault.</td>
<td></td>
</tr>
<tr>
<td><strong>TCCM ACT(RPM)</strong></td>
<td><strong>Range:</strong> actual</td>
</tr>
<tr>
<td>Indicates the torque converter slip actual.</td>
<td></td>
</tr>
<tr>
<td><strong>TCIL</strong></td>
<td><strong>Range:</strong> ON/OFF</td>
</tr>
<tr>
<td>Indicates the transmission control indicator light.</td>
<td></td>
</tr>
<tr>
<td><strong>TCIL_FAULT</strong></td>
<td><strong>Range:</strong> YES/NO</td>
</tr>
<tr>
<td>Indicates the transmission control indicator light fault.</td>
<td></td>
</tr>
<tr>
<td><strong>TCS</strong></td>
<td><strong>Range:</strong> ON/OFF</td>
</tr>
<tr>
<td>Indicates the overdrive cancel switch/hold switch status.</td>
<td></td>
</tr>
<tr>
<td><strong>TCS ACTIVE</strong></td>
<td><strong>Range:</strong> YES/NO or ACTIVE/INACTIVE</td>
</tr>
<tr>
<td>Indicates the status of the traction control system (TCS), it reads:</td>
<td></td>
</tr>
<tr>
<td>• YES or ACTIVE when the TCS is operating</td>
<td></td>
</tr>
<tr>
<td>• NO or INACTIVE at all other times</td>
<td></td>
</tr>
<tr>
<td><strong>TFP SW</strong></td>
<td><strong>Range:</strong> PARK, REV, NEUT, 4 th, 3 rd, 2 nd, LOW, INV</td>
</tr>
<tr>
<td>Indicates the decoded status of the three A/B/C inputs from the transmission fluid pressure (TFP)</td>
<td></td>
</tr>
<tr>
<td>manual valve position switch.</td>
<td></td>
</tr>
<tr>
<td>The TFP RANGE reading should match the current gear:</td>
<td></td>
</tr>
<tr>
<td>Park (P), Reverse (R), Neutral (N), Drive 4 (4th), Drive 3 (3rd), Drive 2 (2nd), Drive 1 (1st), INV will display when the PCM does not recognize a valid combination of inputs. See Table 18-10 for example.</td>
<td></td>
</tr>
</tbody>
</table>
Table 18-10  *Transmission fluid pressure manual valve switch logic chart*

<table>
<thead>
<tr>
<th>Gear Selector Position</th>
<th>TFP SW(A)</th>
<th>TFP SE(B)</th>
<th>TFP SW(C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park (P)</td>
<td>HI</td>
<td>LO</td>
<td>HI</td>
</tr>
<tr>
<td>Reverse (R)</td>
<td>LO</td>
<td>LO</td>
<td>HI</td>
</tr>
<tr>
<td>Neutral (N)</td>
<td>HI</td>
<td>LO</td>
<td>HI</td>
</tr>
<tr>
<td>Drive 4 (4TH)</td>
<td>HI</td>
<td>LO</td>
<td>LO</td>
</tr>
<tr>
<td>Drive 3 (3RD)</td>
<td>HI</td>
<td>HI</td>
<td>LO</td>
</tr>
<tr>
<td>Drive 2 (2ND)</td>
<td>HI</td>
<td>HI</td>
<td>HI</td>
</tr>
<tr>
<td>Drive 1 (1ST)</td>
<td>LO</td>
<td>HI</td>
<td>LO</td>
</tr>
<tr>
<td>Invalid (INV)</td>
<td>LO</td>
<td>LO</td>
<td>LO</td>
</tr>
</tbody>
</table>

HI = Ignition voltage
LO = 0 volts

**TFP SWITCH A**
**TFP SWITCH B**
**TFP SWITCH C**

Range: __________________________________________________________ ON/OFF

Indicates the status of the PCM switch (A, B, and C) inputs to the transmission fluid pressure (TFP) switch assembly. Readings are:

- ON when the voltage signal is low and the switch is closed
- OFF when the voltage signal is high and the switch is open

The PCM uses the combination of high and low voltage signals from the switches to determine manual valve position. The manual valve regulates line pressure, TCC engagement, and shift solenoid operation.

**TFT**

Range: ___________________________ –40 to 399°F or –40 to 199°C

Indicates the transmission fluid temperature.

**TFT(V)**

TrnFluidTmp(V)

Range: ___________________________ 0.0 to 5.0 V

Indicates the transmission fluid temperature voltage.

**TFT_FAULT**

Range: ___________________________ YES/NO

Indicates a transmission fluid temperature fault.

**THROTTLE SW**

Range: ___________________________ ON/OFF

Indicates the throttle switch.

**THOP(%)**

THROTTLE(%)

Range: ___________________________ 0 to 100%

Indicates the throttle position.
ThrPosMODE
Range: _______________________________________________________ PT/WOT/CT
Indicates the throttle position.

TORQ DELIV(Nm)
Range: ___________________________________________________________0 to 691
Indicates the estimated amount of torque in Nm that is delivered from the engine. The ECM
sends the engine torque information to the transmission control module (TCM) via the high
speed GMLAN serial data line.

TORQUE
Range: ___________________________________________________________ actual
Indicates the net engine torque.

TP MODE
TP(%) Range: _________________________________________________________ 0 to 100%
Indicates the throttle position percentage.

TP(V) Range: ________________________________________________________ 0.0 to 5.0 V
Indicates the throttle position voltage.

TP_FAULT
Range: ___________________________________________________________ YES/NO
Indicates a throttle position sensor fault.

TP_PER(%) Range: _________________________________________________________ 0 to 100%
No additional information is available for this parameter.

TP=TPS(V) Range: ________________________________________________________ 0.0 to 5.0 V
Indicates the throttle position voltage.

TPCT(V) Range: ________________________________________________________ 0.0 to 5.0 V
Indicates the lowest closed throttle voltage.

TPS(%) Range: _________________________________________________________ 0 to 100%
Indicates the throttle position percentage.

TPS(V) Range: ________________________________________________________ 0.0 to 5.0 V
Indicates the throttle position voltage.

TPS/8 Range: _____________________________________________________________0 to 8
Indicates throttle position angle in 8 increments, read as follows:

• 0 indicates a closed throttle
• 4 indicates half-open throttle
• 8 indicates a wide-open throttle
TR
Range: ____________________________________________________________ actual
Indicates the transmission range.

TR SW(A)
TR SW(B)
TR SW(C)
TR SW(P)
Range: ____________________________________________________________ HI/LO
TR SW A/B/C/P
Range: _________________________________________________________ HI/LO/INV
Indicates the HI (high) or LO (low) status of the four inputs (A/B/C/P) from the transmission range switch to the PCM.

• HI indicates ignition voltage.
• LO indicates no voltage.
• INV indicates an invalid signal.

The PCM detects the selected gear range by deciphering the combination of the voltage signals. The PCM compares the actual voltage combination of the switch signals to a TR switch combination table stored in memory.

See Table 18-11 for an example.

Table 18-11 Transmission range switch logic chart

<table>
<thead>
<tr>
<th>Gear Selector Position</th>
<th>TFP SW(A)</th>
<th>TFP SE(B)</th>
<th>TFP SW(C)</th>
<th>TFP SW(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park (P)</td>
<td>LO</td>
<td>HI</td>
<td>HI</td>
<td>LO</td>
</tr>
<tr>
<td>Reverse (R)</td>
<td>LO</td>
<td>LO</td>
<td>HI</td>
<td>HI</td>
</tr>
<tr>
<td>Neutral (N)</td>
<td>HI</td>
<td>LO</td>
<td>HI</td>
<td>LO</td>
</tr>
<tr>
<td>Drive 4 (4TH)</td>
<td>HI</td>
<td>LO</td>
<td>LO</td>
<td>HI</td>
</tr>
<tr>
<td>Drive 3 (3RD)</td>
<td>LO</td>
<td>LO</td>
<td>LO</td>
<td>Lo</td>
</tr>
<tr>
<td>Drive 2 (2ND)</td>
<td>LO</td>
<td>HI</td>
<td>LO</td>
<td>HI</td>
</tr>
<tr>
<td>Drive 1 (1ST)</td>
<td>HI</td>
<td>HI</td>
<td>LO</td>
<td>LO</td>
</tr>
</tbody>
</table>

HI = Ignition voltage
LO = 0 volts
INV = Invalid will display if any other combination is received.

TR SWITCH
Range: ____________________________________________________________ see below
Indicates the decoded status of the four transmission range (TR) switch signals. The switch (A, B, C, and P) status determines what gear the transmission is operating in, and the current gear (PARK, NEUT, REV, 4TH, 3RD, 2ND, 1ST, or INV). An INV (invalid) reading means the PCM does not recognize a valid combination of inputs.
Switch logic is shown in Table 18-12.

**Table 18-12 Transmission range switch logic**

<table>
<thead>
<tr>
<th>Gear Selector Position</th>
<th>TR SW A</th>
<th>TR SW B</th>
<th>TR SW C</th>
<th>TR SW P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park</td>
<td>LOW</td>
<td>HI</td>
<td>HI</td>
<td>LOW</td>
</tr>
<tr>
<td>Reverse</td>
<td>LOW</td>
<td>LOW</td>
<td>HI</td>
<td>HI</td>
</tr>
<tr>
<td>Neutral</td>
<td>HI</td>
<td>LOW</td>
<td>HI</td>
<td>LOW</td>
</tr>
<tr>
<td>Drive 4</td>
<td>HI</td>
<td>LOW</td>
<td>LOW</td>
<td>HI</td>
</tr>
<tr>
<td>Drive 3</td>
<td>LOW</td>
<td>HI</td>
<td>LOW</td>
<td>LOW</td>
</tr>
<tr>
<td>Drive 2</td>
<td>LOW</td>
<td>HI</td>
<td>LOW</td>
<td>HI</td>
</tr>
<tr>
<td>Drive 1</td>
<td>HI</td>
<td>HI</td>
<td>LOW</td>
<td>LOW</td>
</tr>
<tr>
<td>Invalid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

HI = Ignition voltage
LOW = 0 voltage

**TR_FAULT**

Range: __________________________________________________________ YES/NO

Indicates a transmission range fault.

**TR_POS**

Range: __________________________________________________________ actual

Indicates the transmission range.

**TRANS CTRL LAMP**

Range: __________________________________________________________ ON/OFF

Indicates the transmission control indicator light.

**TRANS SLIP CNT**

Range: __________________________________________________________ 0, 1, 2

Indicates the number of times the P0894 diagnostic test has identified a slipping condition. In order to set DTC P0894 (Transmission Component Slipping), the diagnostic test must identify a slipping condition three times in a row.

**TR_SNSOR(V)**

TransRange_ACTUAL GEAR

TransRange(V)

Range: __________________________________________________________ 0.0 to 5.0 V

Indicates the transmission range.

**TransRange_D**

TRD

Range: __________________________________________________________ ON/OFF

Indicates the transmission range switch.

**TRIP**

Range: __________________________________________________________ YES/NO

Indicates the on-board diagnostic trip has completed.

**TRIP CouNT**

TRIP_CNT

Range: __________________________________________________________ 0 to 255

Indicates the number of on-board diagnostic trips completed.
TRL
Range: ________________________________ ON/OFF
Indicates the transmission L range switch.

TrnAxleRLRN
Range: ________________________________ not available
Transmission Axle Relearn.

TrnCtrlIndLamp
Range: ________________________________ ON/OFF
Indicates the transmission control warning indicator.

TrnCtrlSw
Range: ________________________________ ON/OFF
Indicates the transmission control switch range.

TrnFluidTmp(V)
Range: ________________________________ 0.0 to 5.0 V
Indicates the transmission fluid temperature.

TRR
Range: ________________________________ ON/OFF
Indicates the transmission R range switch.

TRS
Range: ________________________________ ON/OFF
Indicates the transmission S range switch.

TS_SRC
TSS(RPM)
TurbSpdS(RPM)
Range: ________________________________ 0 to vehicle max.
Indicates the turbine shaft speed.

TSLIPRAT(1000:1)
Range: ________________________________ actual
Indicates the transmission slip ratio.

TSS_FAULT
Range: ________________________________ YES/NO
Indicates a turbine shaft speed fault.

UP SHIFT SWITCH
UP SHIFT SWT
Range: ________________________________ ON/OFF
Indicates whether the shift selector lever has been moved to initiate an upshift, reads ON if an upshift has been requested.

UP_SW
Range: ________________________________ ON/OFF
Indicates whether the ECM is allowing an upshift, reads ON when an upshift is allowed.

VBATT(V)
Range: ________________________________ 0.0 to 16.0 V
Indicates the battery position voltage.
VEH SPEED

Range: ___________________________________________________ 0 to vehicle max.
Indicates the vehicle speed.

VPoWeR(V)

Range: _______________________________________________________ 0.0 to 16.0 V
Indicates the battery positive voltage.

VPWR=BATT(V)

Range: _______________________________________________________ 0.0 to 16.0 V
Indicates the module supply voltage.

VSS

Range: ___________________________________________________ 0 to vehicle max.
Indicates the vehicle speed.

VSS (METER)

Range: ___________________________________________________ 0 to vehicle max.
Indicates the digital input from the VSS analog-to-digital converter in the instrument meter.

WAC=WOT A/C

Range: ________________________________ ON/OFF
Indicates the wide open throttle air conditioning cut out.
The vehicles listed in the following sections are specific Asian Import models that may have problems communicating with the scan tool.

A.1 Slow Codes for Many 1988 and Later Mitsubishi, Chrysler Imports, and Hyundai Sonata

Models with the 2.4L 4-cylinder or the 3.0L V6 SOHC engine transmit data at 63 baud rate. It may appear that there is a communication problem when actually, data is transmitting at a very slow speed. The Main Menu for these vehicles displays Codes and Data (Slow).

Readings from these vehicles take up to seven seconds to change. The baud rate, or “data update rate” depends on the ECM; it is not controlled by the scan tool.

A.2 Codes and Data for 1989 and Later Toyota Cressida and Lexus LS400

These vehicles transmit ECM operating data to the scan tool. This test mode appears on the Main Menu as the selection Data (No Codes). These Toyota systems do not transmit trouble codes in this mode. Codes must be read separately by using the Code Functions selection from the Main Menu.

To place the Cressida and Lexus LS400 in a test mode where the ECM is more sensitive to trouble codes, see “Code Sensitivity—OBD-II and some Pre-OBD-II” on page 199.

For a detailed explanation, refer to Troubleshooter References TA043 and TA044.

A.3 1996-2006 Mazda 16 Pin DLC Voltage Chart

To test the terminal voltages:
- Test the terminal voltages using a voltmeter. Figure A-1 maps the data link connector. Refer to Table A-1 for corresponding voltages.
For a communication problem with all 1987–90 Nissan models except the 1987 Sentra and 1990 300ZX, gather codes manually by placing the ECM in the diagnostic mode and observing two flashing LEDs. This also applies to 1991 Maxima, Axxess, Van, and Pickup models.

See “Code Types 07” on page 125 for detailed instructions.
A.5 GM Control Systems on Isuzu and Isuzu-built Geo

Some Isuzu and Isuzu-built Geo models have General Motors control systems. These vehicles may display a No Communication message when the scan tool and the control module cannot communicate with each other for some reason. Common problems that prevent a vehicle from performing a test or communicating with the scan tool are listed below.

If the Check Engine lamp passes the bulb check, put the ECM into the “field service” mode by turning the ignition on and jumpering pin B to pin A in the 12-pin ALDL connector, or pin A to pin C on the 3-pin ALDL connector (Figure A-2).

![Figure A-2 Jump these pins to flash codes on the Check Engine lamp](image)

The Check Engine lamp should flash code 12 three times. It then flashes any other codes present in ECM memory, or it flashes code 12 again. Code 12 appears on the Check Engine lamp as in Figure A-3.

![Figure A-3 Code 12 on Check Engine lamp](image)

Several different symptoms and problems may occur at this point:

- If the Check Engine lamp lights for a bulb check but stays off and does not flash any codes, check the continuity between pins A and B in the ALDL connector (A and C on the 3-pin connector).
- If the Check Engine lamp flashes rapidly with no code pattern, check the ECM. Verify that a PROM is installed. Refer to the troubleshooting procedure for the test vehicle.
- If the Check Engine lamp lights steadily and does not flash with ALDL pins A and B jumpered, refer to the factory troubleshooting chart for the specific vehicle.
- Watch for code 51 or other 50-series codes that indicate a PROM or ECM problem. Code 51 means there is either a PROM failure or a missing PROM. Many carbureted engines do not transmit a code 51 on the data stream; and if the PROM is missing, the ECM for these systems does not communicate with the scan tool. However, some ECMs do flash code 51 on the Check Engine lamp.

Most communication problems can be found and corrected by checking the points listed in this section. In a few cases, communication failure may be due to ECM failure. In all cases, check and verify all circuits and parts involved in data communication before condemning the ECM.

**NOTE:**
You may need a wiring diagram for the specific test vehicle along with troubleshooting procedures from the manufacturer for some of the following checks.
Check the ALDL connector with a digital voltmeter (Figure A-4) if the Check Engine lamp does not flash code 12, or if it does but the scan tool does not receive data.

![ALDL connector diagram]

1—Check Engine lamp/data transmission  
2—Test or diagnostic enable  
3—Ground

Figure A-4 Isuzu and Isuzu-built Geo ALDL 3-pin and 12-pin connectors

To check ground continuity:
1. Connect the voltmeter positive (+) lead to ALDL pin A on the 12-pin connector, or to pin C on the 3-pin connector.
2. Connect the negative (–) lead to the negative battery terminal. Use jumper wires as needed.

NOTE:
Do not connect to a body or chassis ground; go directly to the negative battery terminal.

3. Measure voltage drop with the ignition switched on. 
   Voltage drop across the ground terminal should be 0.1 V or less. An open or high resistance ground prevents the ECM from entering the diagnostic mode.

To test for an open ground at ALDL pin A (or C):
1. Turn the ignition on and jumper pin B to pin A in the 12-pin ALDL connector, or pin A to pin C on the 3-pin connector.
2. Connect the voltmeter positive lead to the jumper and the negative lead to a known good ground; connect directly to the negative battery terminal if possible.
   - The meter should read 50 millivolts (0.050 V) or less for a good ground (Figure A-5 on page 527).
   - Higher readings indicate a high-resistance ALDL ground connection.
   - If the meter reads 5 V, the ALDL ground connection is open.
To check voltage on the test terminal:
- Connect the voltmeter positive lead to pin B of the 12-pin ALDL connector, or to pin A of the 3-pin connector, and the negative lead to the ALDL ground pin or a good ground. With the ignition on, voltage should be 5 V. If the test terminal (pin B or pin A) circuit is open, a 160-baud ECM cannot switch into diagnostic mode.

To check voltage on pin B of the 3-pin connector (Check Engine lamp):
- Connect the voltmeter positive lead to ALDL pin B and the negative lead to the ground pin or a known good ground.
  - With the ignition on and the engine off, voltage on pin B should be less than 1 V (0.7 to 0.8 V) when the lamp is on.
  - When the lamp is off with the engine running, the meter should read battery voltage. If the circuit to pin B is open, the ECM cannot transmit data to the scan tool.

To check voltage on pin E of the 12-pin connector:
- Connect the positive voltmeter lead to connector pin E and the negative lead to either pin A or a good ground.
  With the ignition on, voltage should be 5 V or fluctuating between 3.5 and 5.0 V. If the circuit is open, the ECM cannot transmit data to the scan tool.
Glossary

Numerics

2WD
Two wheel drive

4EAT
4-speed Electronic Automatic Transmission

4WD
Four Wheel drive

A

A/C
Air Conditioner

A/F
Air/Fuel

AAT
Ambient Air Temperature. Air temperature surrounding the vehicle.

ABS
Antilock Brake System

ACCEL
accelerator

ACTV
Active

ADJ
adjust (or adjustment)

ADV
advance

ALDL
Assembly Line Diagnostic Link

ASYNCH
Asynchronous

ATC
Automatic Transfer case
Glossary

**B**

**BARO**
Barometric pressure. Pertaining to atmospheric pressure or the results obtained by using a barometer.

**Baud rate**
The speed at which the scan tool communicates with a vehicle ECM and records data movies. The baud rate depends on the vehicle ECM—it is not controlled by the scan tool.

**BCM**
Body Control Module

**BLM**
Block Learn Multiplier

**C**

**C/OFF**
Cutoff

**CAN**
Controller Area Network

**CCP**
Charcoal Canister Purge

**CHT**
Cylinder Head Temperature

**CKP**
Crankshaft Position

**CKT**
Circuit

**CLSD**
Closed

**CMP**
Camshaft Position Sensor

**codes**
A numerical code, generated by the vehicle control system to indicate a fault has occurred in a particular subsystem, circuit, or part.

**CTP**
Closed Throttle Position

**D**

**D/M**
Dual Mode
DAB
Driver Airbag

DCCSV
Damper Clutch Control Solenoid Valve,

D-Check
Dealer check

DECEL
Decelerate

DIS
Direct (distributorless) Ignition System. A system in which the ignition coil secondary circuit is dedicated to specific spark plugs without the use of a distributor. Also referred to as the Electronic Ignition (EI) system.

DRVR
Driver

DTC
Diagnostic Trouble Code. An alphanumeric identifier for a fault condition identified by the on-board diagnostic system.

E

ECC
Electronically-Controlled Carburetor

ECCS
Electronic Concentrated Control System

ECM
Electronic Control Module

ECON
Economy

ECS
Electronic Control System or Evaporative Control System

ECU
Electronic Control Unit

EFC
Electronic Feedback Control

EFE
Early Fuel Evaporation. Enhancing air/fuel vaporization during engine warmup.

EGI
Electronic Gasoline Injection
<table>
<thead>
<tr>
<th>Glossary Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI</td>
<td>Electronic Ignition system. A system in which the ignition coil secondary circuit is dedicated to specific spark plugs without the use of a distributor. Also referred to as the Direct or Distributorless Ignition System (DIS).</td>
</tr>
<tr>
<td>ELEC</td>
<td>Electric or Electronic</td>
</tr>
<tr>
<td>EMB</td>
<td>Electromagnetic Brake</td>
</tr>
<tr>
<td>ENG</td>
<td>Engine</td>
</tr>
<tr>
<td>EOT</td>
<td>Engine Oil Temperature</td>
</tr>
<tr>
<td>F</td>
<td></td>
</tr>
<tr>
<td>FC</td>
<td>Fuel Cut or Fan Control</td>
</tr>
<tr>
<td>FT</td>
<td>Fuel Trim</td>
</tr>
<tr>
<td>G</td>
<td></td>
</tr>
<tr>
<td>GEN</td>
<td>Generator</td>
</tr>
<tr>
<td>Hz</td>
<td>Hertz (cycles per second)</td>
</tr>
<tr>
<td>I</td>
<td></td>
</tr>
<tr>
<td>IAC</td>
<td>Idle Air Control. Electrical or mechanical control of throttle bypass air.</td>
</tr>
<tr>
<td>IAT</td>
<td>Intake Air Temperature. Also referred to as Manifold Air Temperature (MAT).</td>
</tr>
<tr>
<td>IGN</td>
<td>Ignition</td>
</tr>
<tr>
<td>inHg</td>
<td>Inches of mercury</td>
</tr>
<tr>
<td>INJ</td>
<td>Injector</td>
</tr>
<tr>
<td>ISC</td>
<td>Idle Speed Control. Electronic control of minimum throttle position.</td>
</tr>
</tbody>
</table>
Glossary

K

K/D
Kickdown

kPa
Kilopascals

L

LCKD
Locked

LED
Light-Emitting Diode

M

MAT
Manifold Air Temperature. Also referred to as Intake Air Temperature (IAT).

MES
Memory Erase Signal

MFI
A fuel-delivery system in which each cylinder is individually fueled. Also referred to as Multi-Point Injection (MPI).

movie
A vehicle data record whose length depends on the number of selected data parameters.

MPFI
Multiport Fuel Injection

MPI
Multi-Point Injection. A fuel-delivery system in which each cylinder is individually fueled. Also referred to as Multiport Fuel Injection (MFI).

mS
Milliseconds

mV
Millivolts

O

O2
Oxygen

O2S
Oxygen Sensor. A sensor which detects oxygen (O2) content in the exhaust gases.

OD
Overdrive
Glossary

P

P/S
Power Steering

PAB
Passenger Airbag

PASS
Passenger

PCM
Powertrain Control Module

Personality Key™
A device that identifies a manufacturer’s configuration for the vehicle diagnostic connector to the scan tool.

PIP
Position Indicator Pulse

POS
Position

psi
Pounds per square inch

PSP
Power Steering Pressure

PW
Pulse Width

PWM
Pulse-Width Modulation

PWR
Power

R

REF
Reference

RF
Right Front or Radio Frequency

RPM
Revolutions Per Minute (engine speed)

S

SCS
Service Check Signal
Glossary

**SOL**
Solenoid

**SPI**
Single Point Injection. An electronically controlled fuel injection system in which one or more fuel injectors are located in a throttle body. Also referred to as Throttle Body Fuel Injection (TBI).

**SRS**
Supplemental Restraint System (airbags)

**SW**
Switch

**T**

**TAC**
Throttle Actuator Control

**TCM**
Transmission Control Module

**TCS**
Traction Control System

**TEMP**
Temperature

**TFP**
Transmission Fluid Pressure. Positive pressure in a transmission hydraulic system.

**THROT**
Throttle

**TP**
Throttle Position

**V**

**V**
Voltage or Volts

**VAC**
Vacuum

**VEH**
Vehicle

**VIN**
Vehicle Identification Number

**VPWR**
Vehicle Power

**VSS**
Vehicle Speed Sensor
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VSV</td>
<td>Vacuum Switching Valve</td>
</tr>
<tr>
<td>VTD</td>
<td>Vehicle Theft Deterrent</td>
</tr>
<tr>
<td>VVT</td>
<td>Variable Valve Timing</td>
</tr>
<tr>
<td>WOT</td>
<td>Wide Open Throttle</td>
</tr>
<tr>
<td>XFER</td>
<td>Transfer</td>
</tr>
</tbody>
</table>
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