Asian Import Vehicle Communication Software Manual

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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

Table of Contents

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.

Chapter 2 Introduction

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.

Chapter 3 Operations

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.

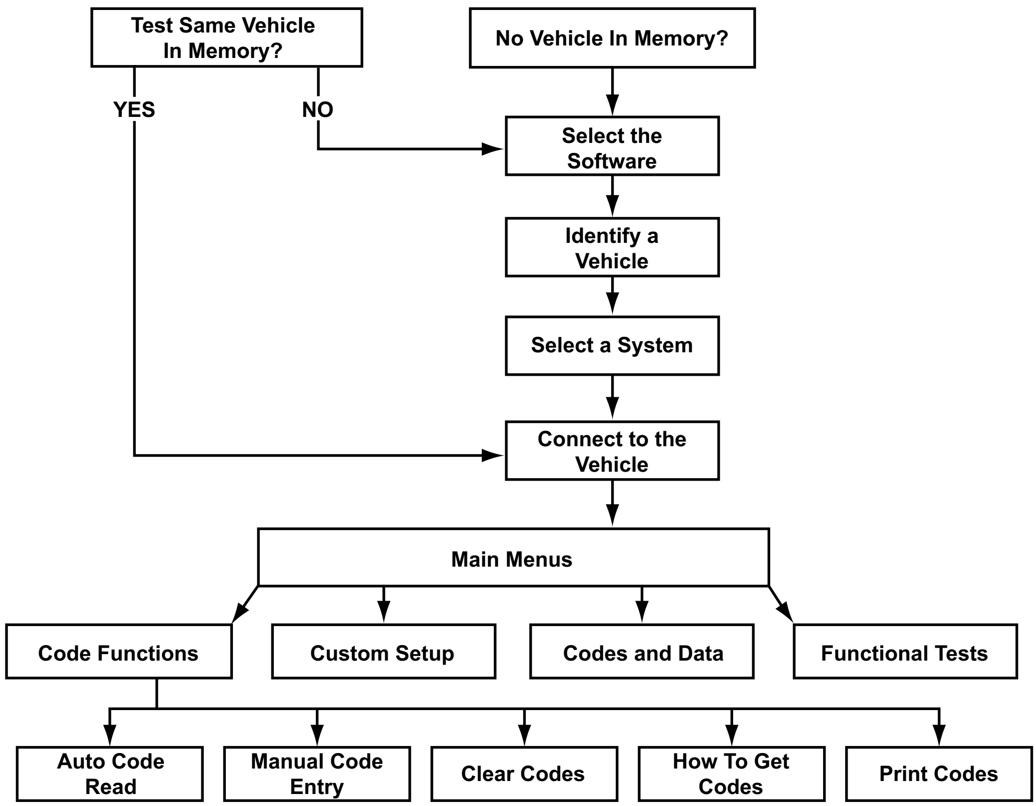


Figure 3-1 *Basic Asian Import scan tool test operation*

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

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.

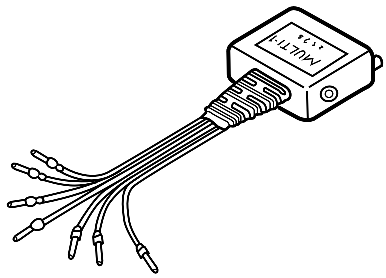


Figure 3-2 *MULTI-1 adapter*

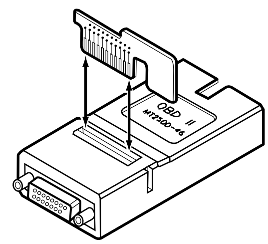


Figure 3-3 *OBD-II adapter with Personality Key™*

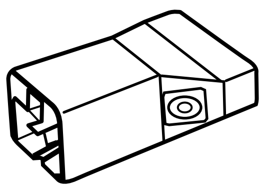


Figure 3-4 *TOYOTA-1 adapter*

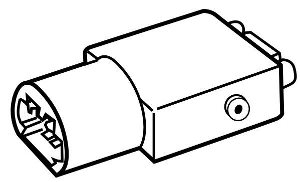


Figure 3-5 *TOYOTA-2 adapter, MAZDA-1 adapter*

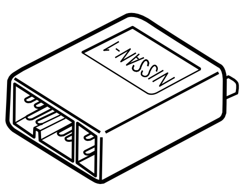


Figure 3-6 *NISSAN-1 adapter (12-pin)*

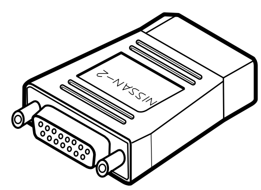


Figure 3-7 *NISSAN-2 adapter (16-pin)*

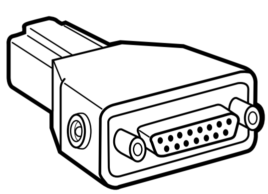


Figure 3-8 *HON-1 adapter*

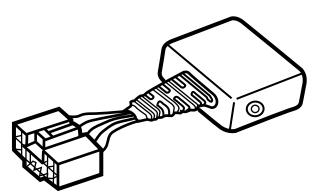


Figure 3-9 *HYUNDAI-2 adapter*

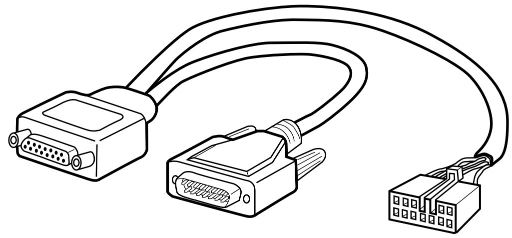


Figure 3-10 *MITSU-1 adapter*

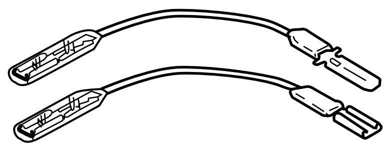


Figure 3-11 *Terminal Converters*

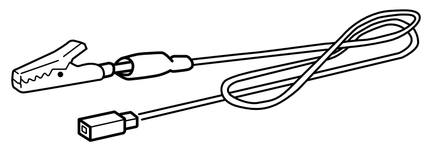


Figure 3-12 *Ground adapter*

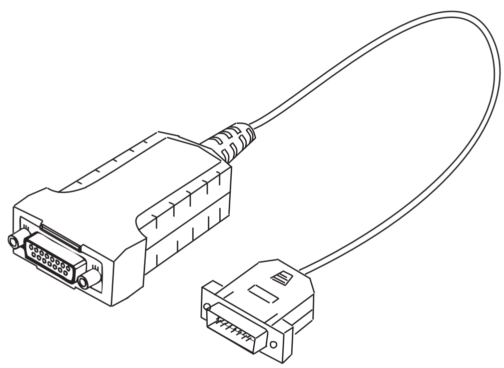
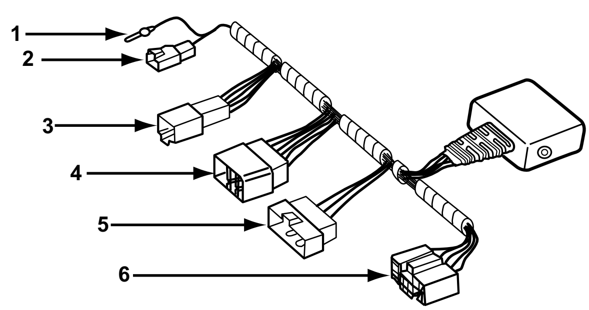


Figure 3-13 *CAN1B adapter*



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.

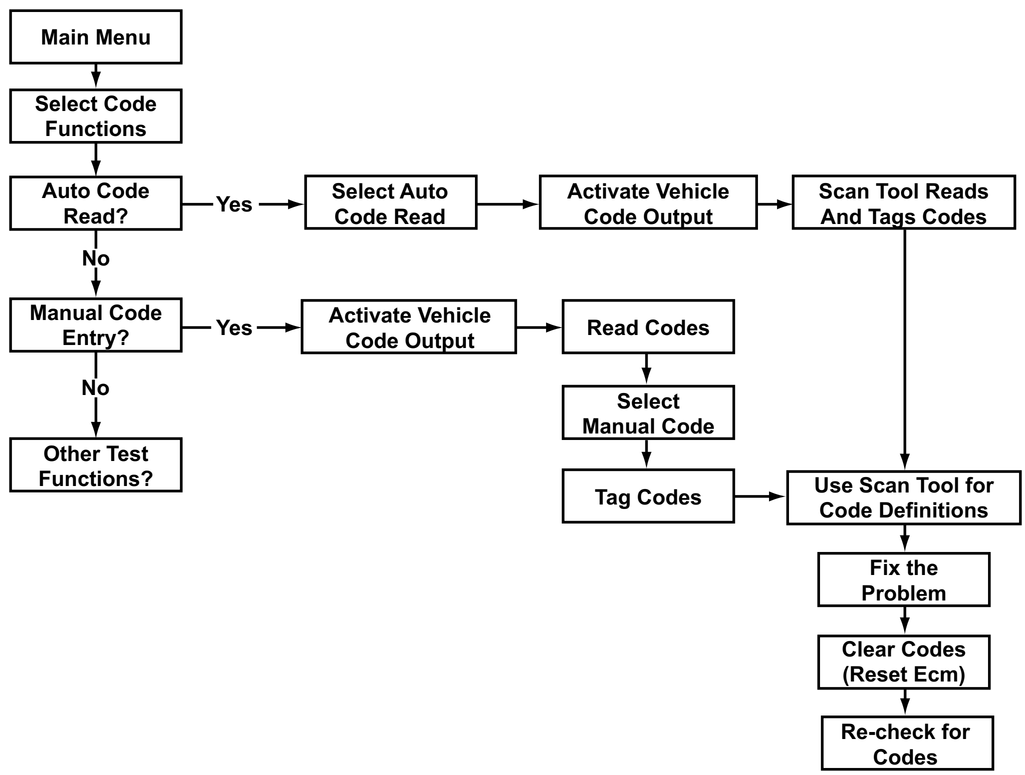


Figure 3-15 *Basic Code Functions: Auto Code Read and Manual Code Entry*

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.

Chapter 4

Acura

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.

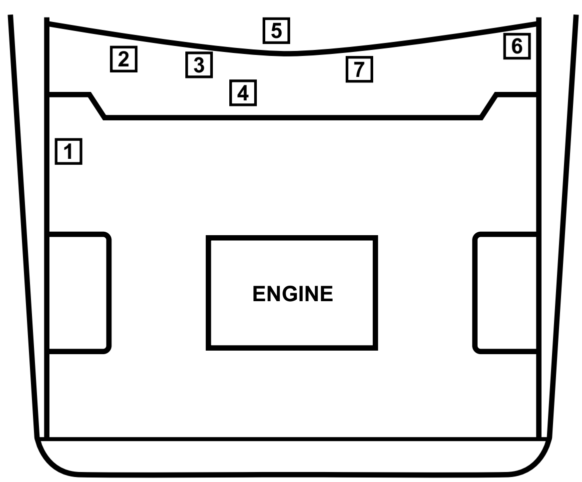


Figure 4-1 *Common connector locations*

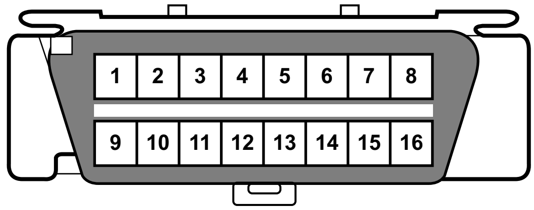


Figure 4-2 *OBD-II data link connector (DLC)*

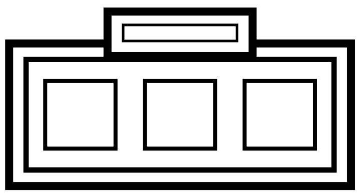


Figure 4-3 *3-pin DLC*

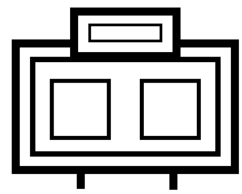


Figure 4-4 *2-pin service check signal (SCS) connector*

Refer Table 4-1 to determine which adapter to use to test a specific model.

Table 4-1 *Common connector locations*

VEHICLE	YEAR	SCS 2-PIN	DLC 3-PIN	DLC 16-PIN
2.2 CL	1997	3		5*
2.3 CL	1998–99	3		5*
2.5 TL	1995–98	2		5*
3.0 CL	1997–99	3		5*
3.2 CL	2001–02			5*
	2003			7
3.2 TL	1996–98	2		5*
	1999–2002			5*
	2003			7
3.5 RL	1996–2003	2		5*
Integra	1992–95	1	1	
	1996–2001	1		4
MDX	2001–04			7
NSX	1995–2003	1		3*
RSX	2002–04			7
SLX	1996–99			6**
3.2 TL	2004			6
NSX	2004	2		3
TSX	2004			6
3.5 RL	2004	3		5*
* Remove ashtray ** Remove the DLC cover				

4.1.2 ECM Locations 1986 to 1990 with ECM LED

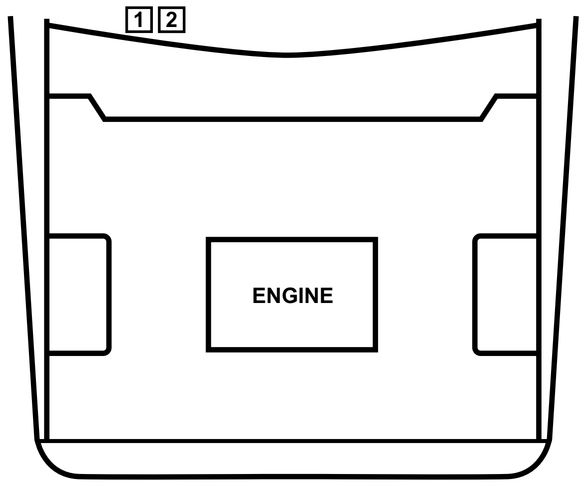
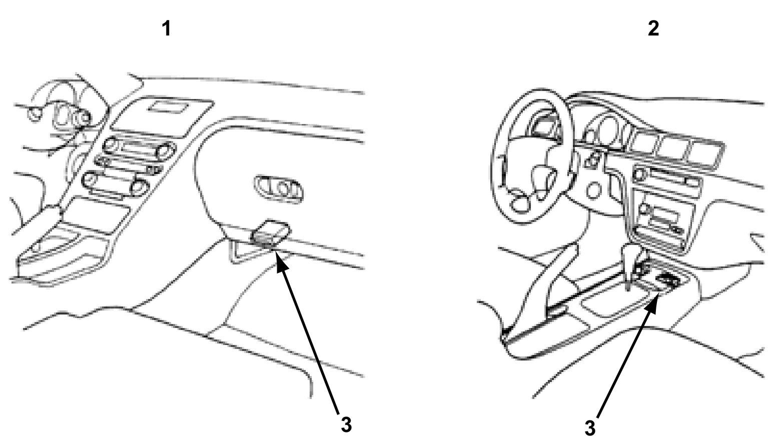


Figure 4-5 *LED Locations.*

Table 4-2 *LED locations*

VEHICLE	YEAR	LED LOCATION
Integra	1986–89	1
Legend Sedan	1986–90	2

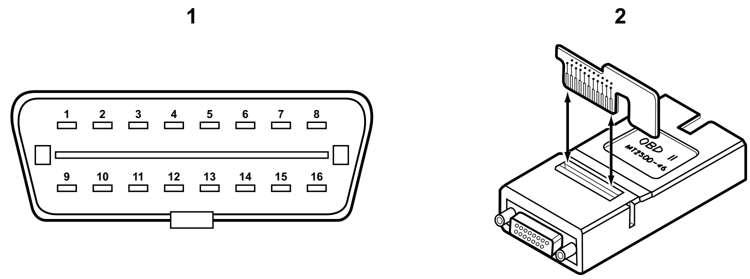


1— 1995 2.5, 3.2 TL

2— 1995 NSX

3— 16-pin Data Link Connector (DLC)—Use OBD-II adapter.

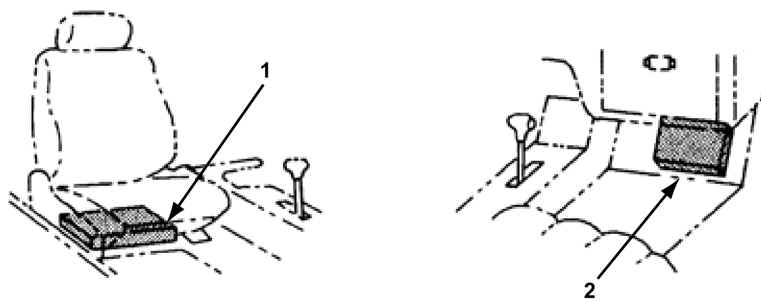
Figure 4-6 *Acura data link connector (DLC) locations*



1— 16-pin DLC

2— OBD-II adapter

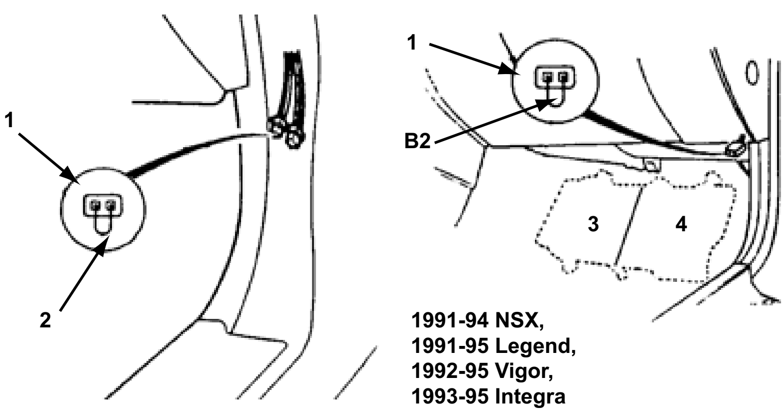
Figure 4-7 *Acura DLC and adapter*



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

2— 1990–91 Integra, 1987–90 Legend Coupe

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.

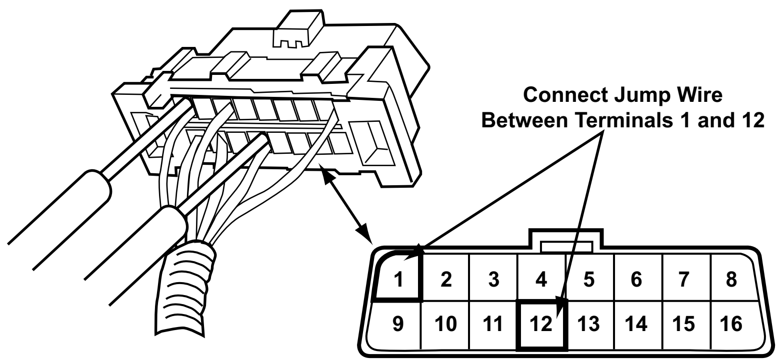


Figure 4-10 *Data connector from the wire side (Honda numbering, not the same as SAE)*

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

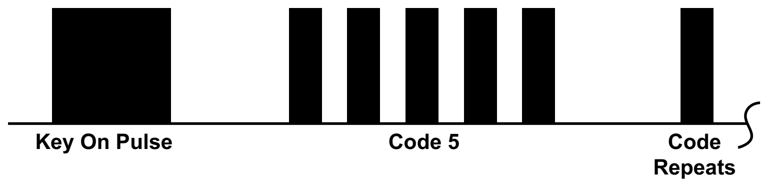


Figure 4-11 *Acura engine Code Type 02*

Table 4-3 *Acura engine Code Type 02*

Pattern:	Long and short
Read codes on:	Red LED on ECU
Start codes by:	Turn the ignition on.
When done:	Turn the ignition off and clear codes.
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.	

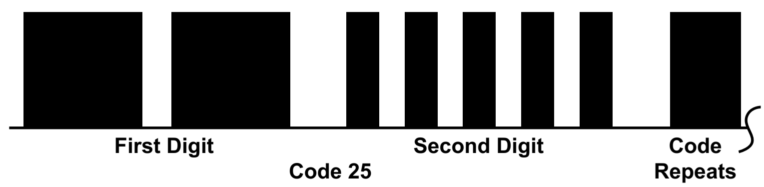


Figure 4-12 *Acura engine Code Type 03*

Table 4-4 *Acura engine Code Type 03*

Pattern:	Long and short
Read codes on:	Red LED on ECM; except most 1991 and later flash codes on CHECK engine lamp on dash
Start codes by:	Turn the ignition on; except most 1991 and later, jumper the check connector, then turn the ignition on.
When done:	Turn the ignition off and clear codes.
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.	

4.1.6 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:

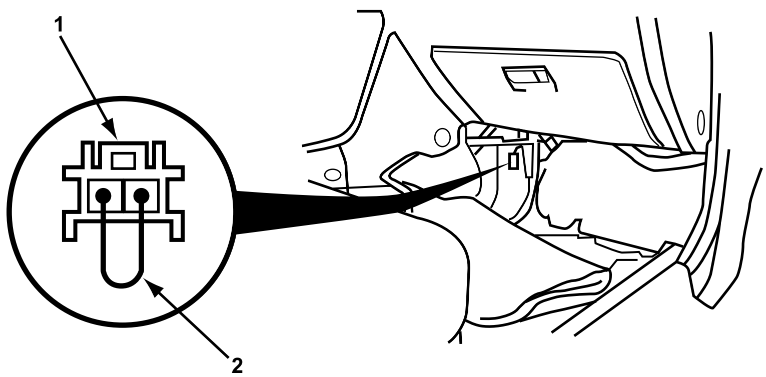
1. Read the trouble code.
2. Fix the problem.
3. Reset the ECM.
4. Drive the vehicle.
5. Check the LED for a new code.
6. Continue until no codes are present.

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

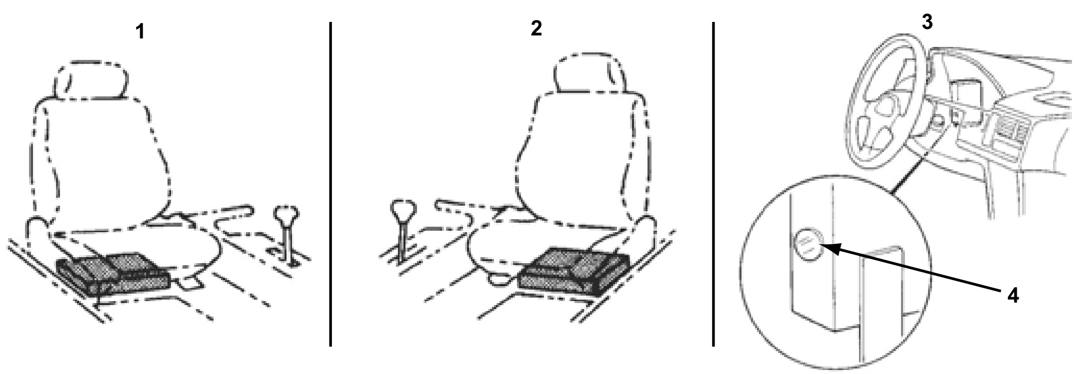
Figure 4-13 and Figure 4-14 provide diagnostic connector locations and adapter information.



1— Service check connector

2— Jump wire

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



1— 1987–90 Legend Coupe

2— 1988–90 Legend Sedan

3— 1990–95 Integra

4— LED display

Figure 4-14 *Acura transmission service check connector locations*

Figure 4-15 shows common transmission diagnostic connector locations for Acura vehicles.

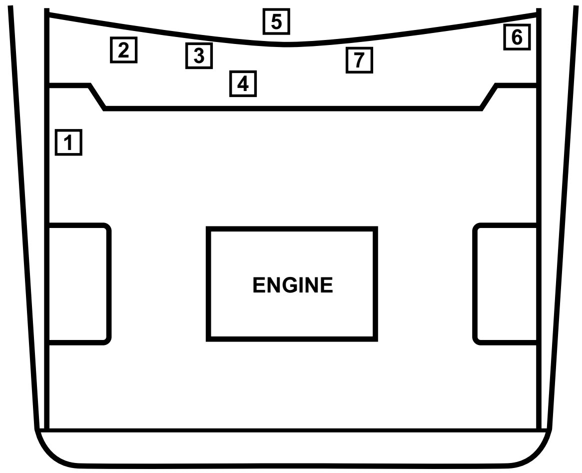


Figure 4-15 *Common transmission connector locations for 1995–2003 vehicles*

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

Table 4-5 *Common connector locations*

VEHICLE	YEAR	SCS 2-PIN	DLC 3-PIN	DLC 16-PIN
2.2 CL	1997	3		5*
2.3 CL	1998–99	3		5*
2.5 TL	1995–98	2		5*
3.0 CL	1997–99	3		5*
3.2 CL	2001–02			5*
	2003			7
3.2 TL	1996–98	2		5*
	1999–02			5*
	2003			7
3.5 RL	1996–2003	2		5*
Integra	1996–2001	1		4
MDX	2001–04			7
NSX	1995–2003	1		3*
RSX	2002–04			7
SLX	1996–99			6**
TSX	2004			6
3.2 TL	2004			6
NSX-T	2004			3
3.5 RL	2004	3		5*
* Remove ashtray ** Remove the DLC cover				

NOTE:
To retrieve codes with the scan tool, use the 16-pin connector. To retrieve codes manually, use the SCS connector.

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.

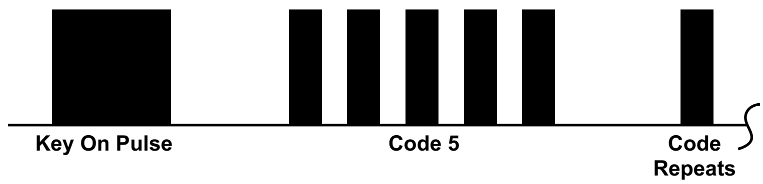


Figure 4-16 *Acura transmission Code Type 02*

Table 4-6 *Acura transmission Code Type 02*

Pattern:	Straight count
Read codes on:	Red LED on TCM
Start codes by:	Turn the ignition on.
When done:	Turn the ignition off, then clear codes.
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*

Table 4-7 *Acura transmission Code Type 03*

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

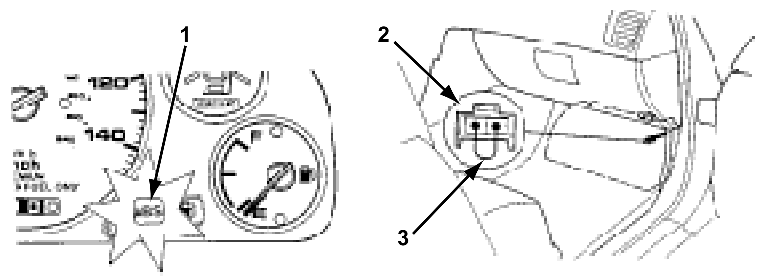
4.3 Testing Antilock Brake Systems (ABS)

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.



1— ABS indicator lamp

2— Service check connector

3— Jump wire

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

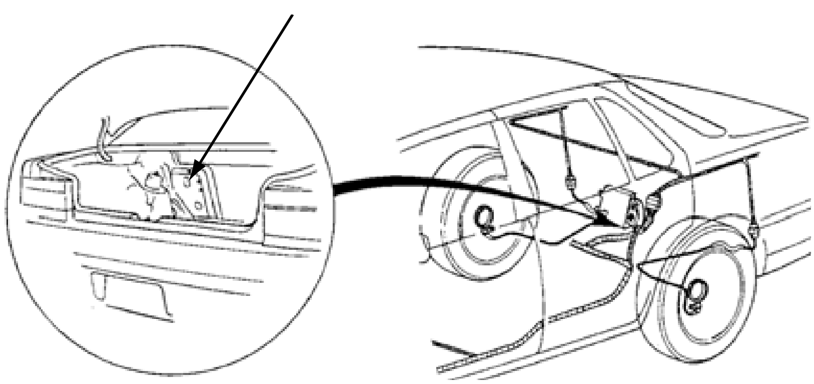
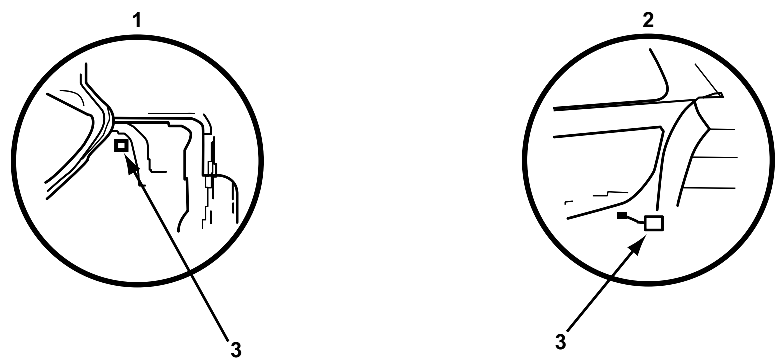


Figure 4-19 *1986–90 Legend ABS controller and service check LED location*

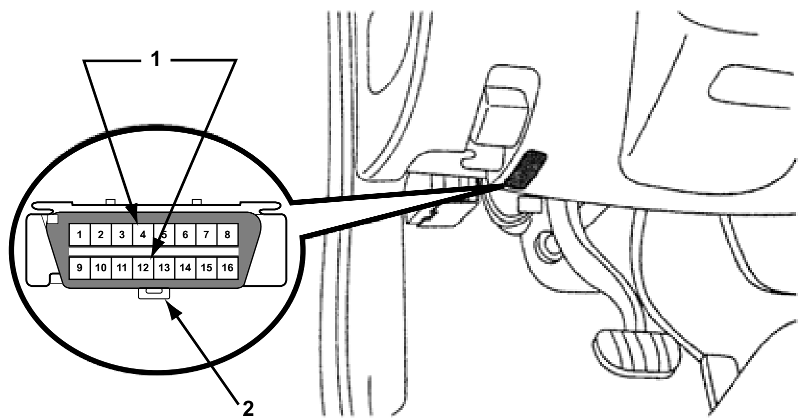


1— 4-door

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.

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.

   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.

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.
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

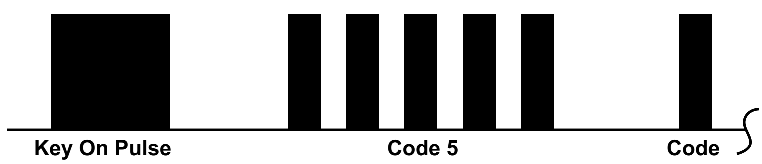


Figure 4-22 *Acura ABS Code Type 02*

Table 4-8 *Acura ABS Code Type 02*

Pattern:	Straight count
Read codes on:	ABS lamp on dash
Start codes by:	Jumper the check connector, then turn the ignition on.
When done:	Turn the ignition off, then clear codes.
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.	

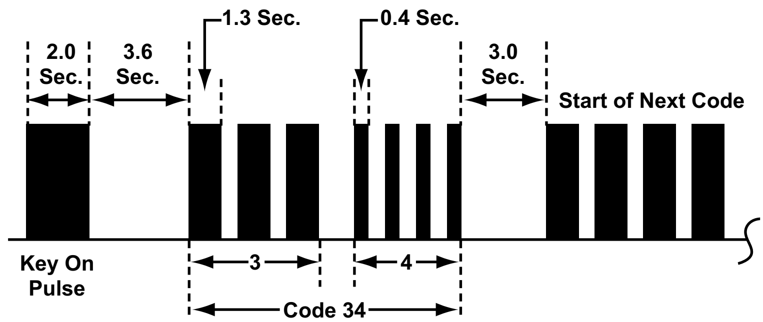


Figure 4-23 *Acura ABS Code Type 04*

Table 4-9 *Acura ABS Code Type 04*

Pattern:	10s and 1s
Read codes on:	ABS warning lamp
Start codes by:	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.
Clear codes:	**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.

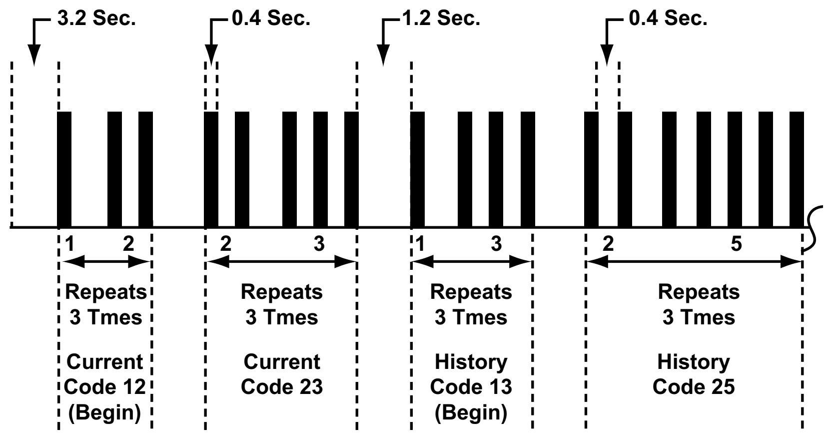


Figure 4-24 *Acura ABS Code Type 5a*

Table 4-10 *Acura ABS Code Type 5a*

Pattern:	10s and 1s
Read codes on:	ABS warning lamp
Start codes by:	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.
Clear codes by:	Within three seconds after entering the diagnostic mode, pulsate the brake switch on and off at least six times.
When done:	Turn the ignition off, disconnect connectors, then clear codes.
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.	

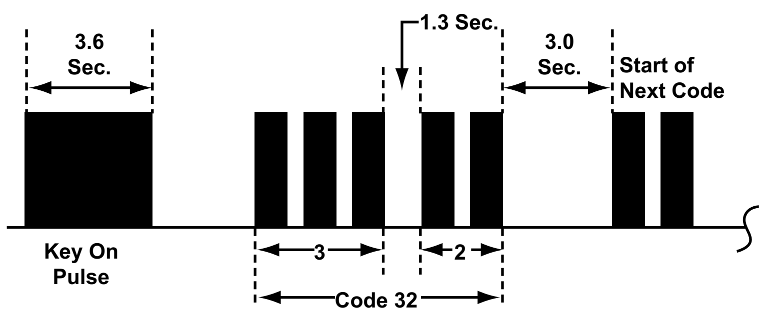


Figure 4-25 *Acura ABS Code Type 06*

Table 4-11 *Acura ABS Code Type 06*

Pattern:	Main code and sub-code
Read codes on:	ABS warning lamp
Start codes by:	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.
When done:	To clear codes, remove ABS B2 (15A) fuse in the ABS fuse box for 10 seconds.**NSX only**: Remove #2 and #3 ABS fuse for 10 seconds.

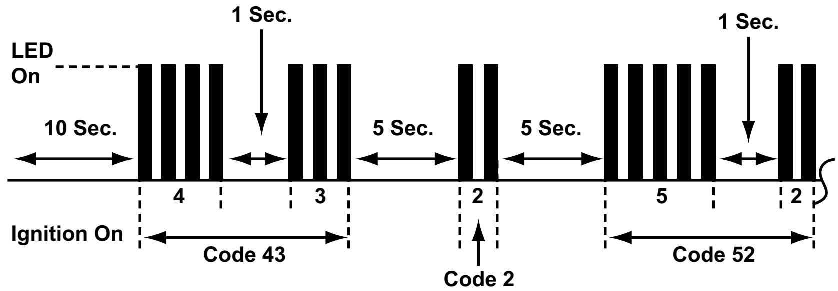


Figure 4-26 *Acura ABS Code Type 12*

Table 4-12 *Acura ABS Code Type 12*

Pattern:	Main code and sub-code
Read codes on:	Red LED on antilock brake controller
Start codes by:	Turn the ignition on.
When done:	Turn the ignition off, then clear codes.
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.	

4.4 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

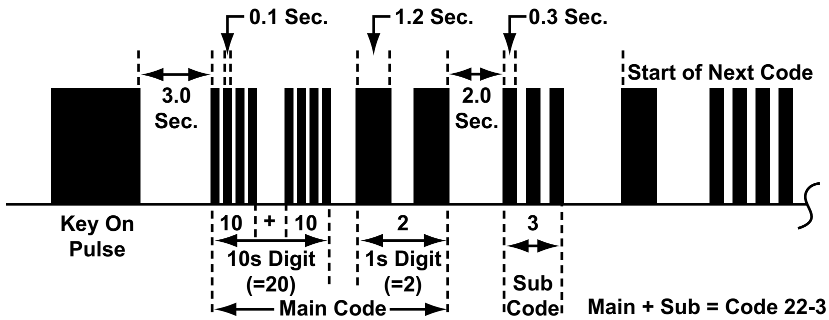


Figure 4-27 *Acura SRS Code Type 06*

Table 4-13 *Acura SRS Code Type 06*

Pattern:	Main code and sub-code
Read codes on:	SRS warning lamp
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.	

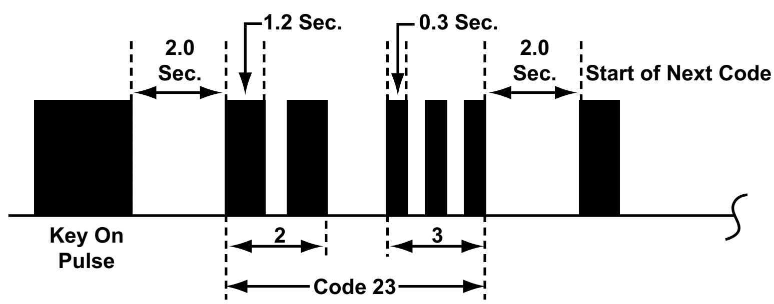


Figure 4-28 *Acura SRS Code Type 07*

Table 4-14 *Acura SRS Code Type 07*

Pattern:	Main code and sub-code
Read codes on:	SRS warning lamp
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.

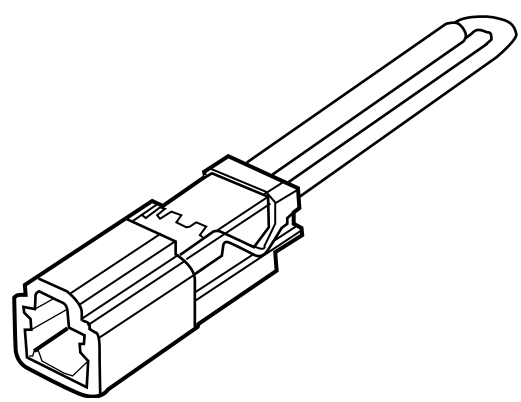
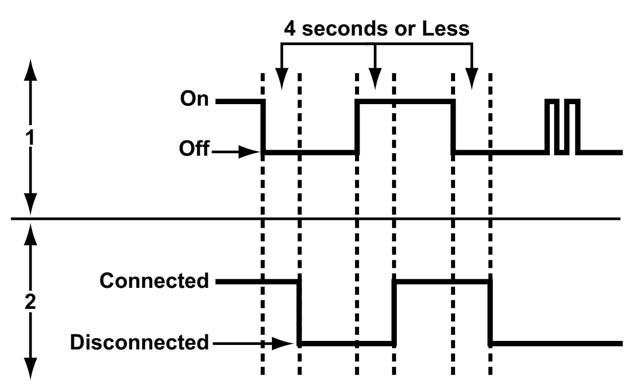
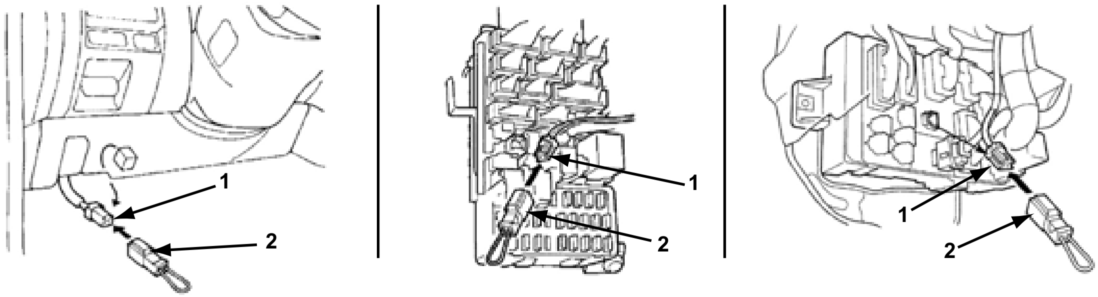


Figure 4-29 *SCS Service Connector. Use Acura tool 07PAZ-0010100 (or use jumper wire equivalent)*



1— SRS indicator lamp
2— MES connector terminals

Figure 4-30 *SRS code clearing*



1996-1998 3.2 TL,
1996-2004 3.5 RL

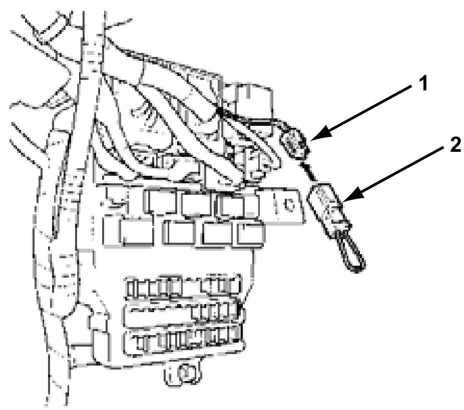
1999-2003 3.2 TL,
2001-2003 3.2 CL

2002-2004 RSX

1— Memory Erase Signal (MES) 2P connector

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

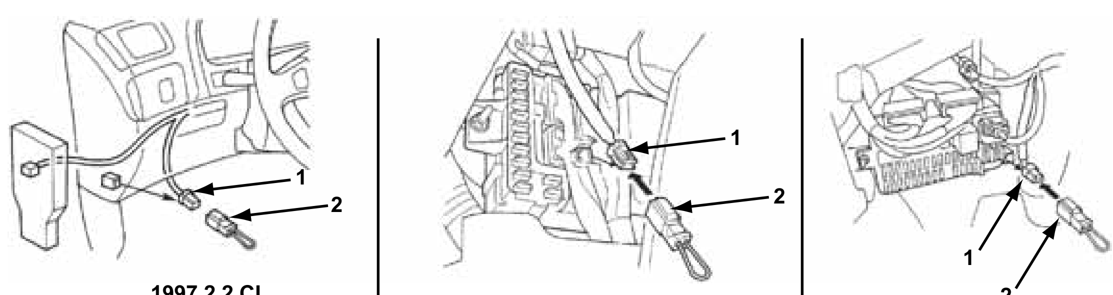
Figure 4-31 *Acura OBD-II SRS MES connector (1 of 2)*



1— MES connector

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

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



1997 2.2 CL,
1997-1999 3.0 CL,
1998-1999 2.3 CL

1996-2001 Integra

2001-2004 MDX

1— MES 2P connector

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

Figure 4-33 *Acura OBD-II SRS MES connector location (2 of 2)*

Chapter 5 Chrysler Imports

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.

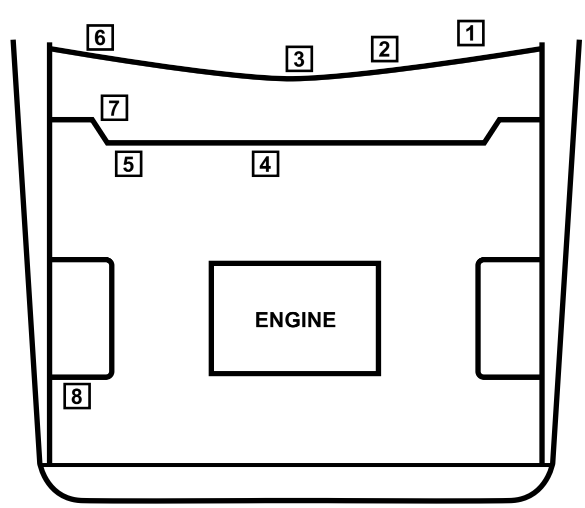


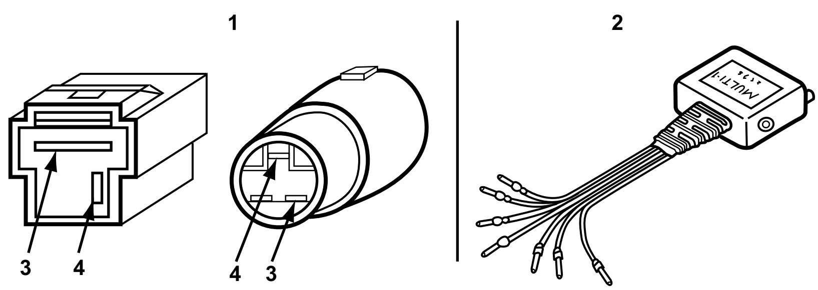
Figure 5-1 *Common connector locations*

Table 5-1 *Common connector locations*

VEHICLE	YEAR	LOCATION	
Avenger/Sebring	1995–2000	2	Next to console
Colt Turbo	1994–96	5	Near firewall
	1987–88	4	Near firewall
Colt Wagon	1988–90	3	Near ECM at center console
Colt/Summit	1989–96	1	Next to fuse panel
Conquest	1984–86	8	Engine compartment
	1987–89	7	Next to glove box striker
Laser/Talon	1990–94	1	Next to fuse panel
Raider	1989	7	Behind glove box
Stratus Coupe	2004	4	Near firewall
Sebring Coupe	2004	4	Near firewall
Stealth	1991–93	1	Next to fuse panel
	1994–96	2	Next to console
Talon	1995–98	2	Next to console
Truck	1990–94	1	Next to fuse panel
Vista	1987–91	6	Next to latch at lower glove box
Vista/Summit Wagon	1992–96	1	Next to fuse panel

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



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

Figure 5-2 *Connectors and adapter for most vehicles before 1987*

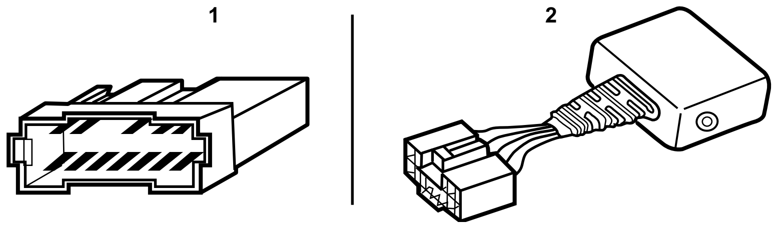
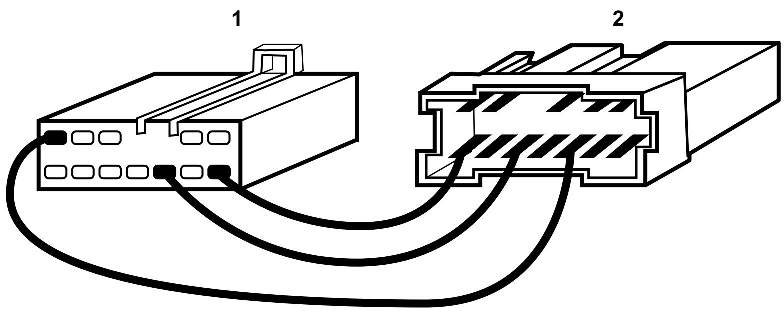


Figure 5-3 *Connector and adapter for most OBD-I vehicles*

1— Connector

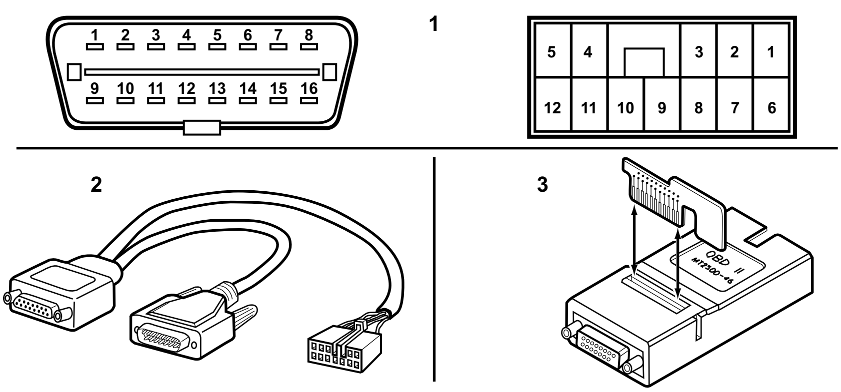
2— HYUN-2 adapter



1— HYUN-2 adapter

2— Connector

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



1— Connectors

2— MITSU-1 adapter

3— OBD-II adapter

Figure 5-5 *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 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 antilock brake systems (ABS) transmit Type 11 codes. Figure 5-6 shows how codes display. Table 5-2 explains how to read the codes.

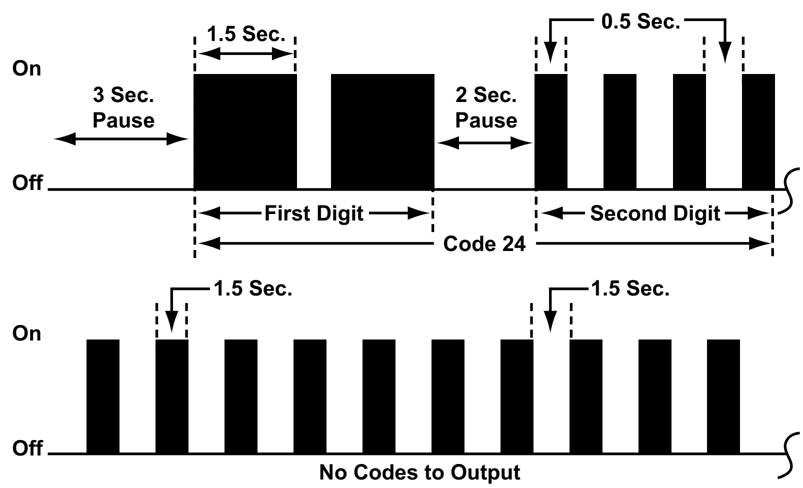


Figure 5-6 *Chrysler Imports antilock brake Code Type 11*

Table 5-2 *Chrysler Import ABS codes type 11*

Pattern:	For code output: long and short
Read codes on:	ABS warning lamp
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/F4ACI 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.

Chapter 6 Daihatsu

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:

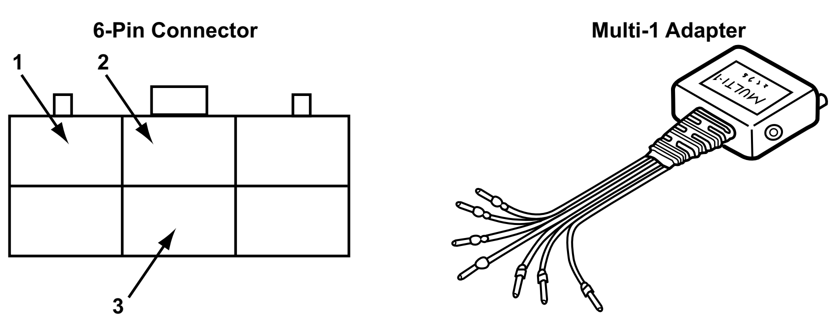
- “Code Reading Connectors and Locations” on page 40
- “Manual Code Reading” on page 41
- “Code Reading Connector Locations (Transmission)” on page 42

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.

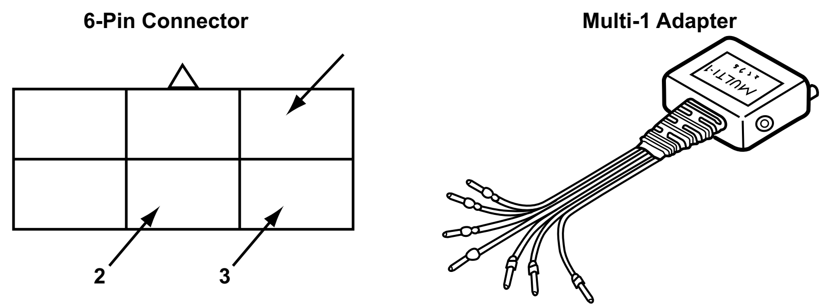


1— White
2— Black
3— Blue

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).



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.

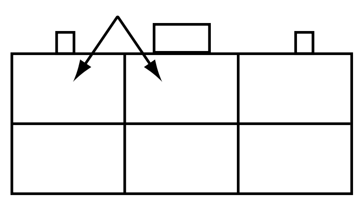


Figure 6-3 *Jumper Engine connector. Pins as shown for flash codes (Flash Codes)*

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.

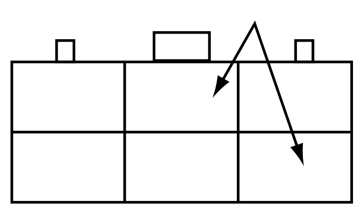


Figure 6-4 *Jumper ABS 6-pin connector pins shown for flash codes.*

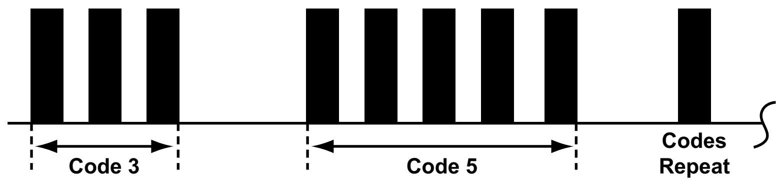


Figure 6-5 *Daihatsu engine and antilock brake system code flash pattern*

Table 6-1 *Daihatsu engine and ABS codes*

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

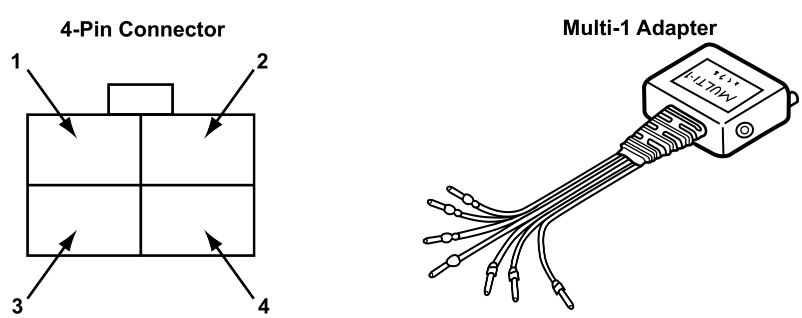
6.2 Testing Transmission Systems

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.

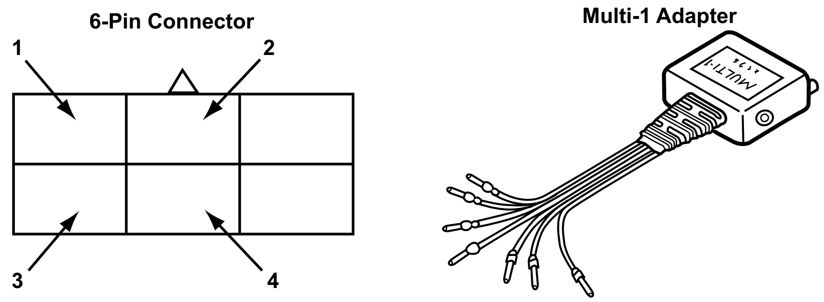


1— Yellow
2— White
3— Green
4— Black

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.



1— Yellow

2— White

3— Green

4— Black with ground extension

Figure 6-7 *1990-1992 6-pin Transmission connector and MULTI-1 adapter*

Chapter 7 Geo

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:

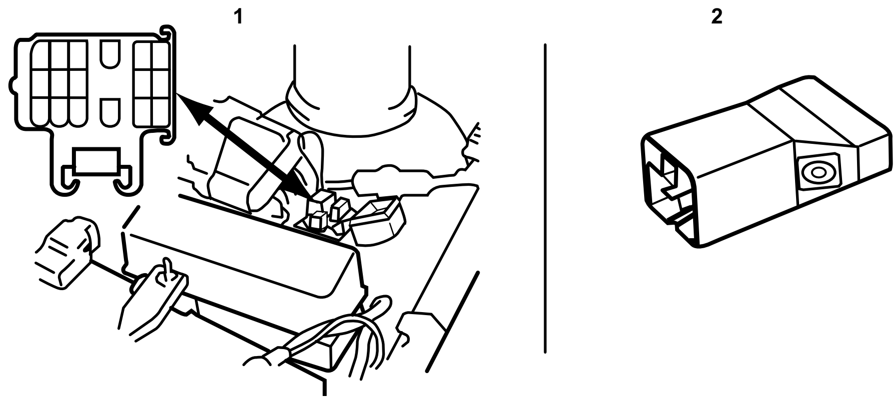
- "Code Reading Connectors and Locations" on page 44
- "Hard Codes and Soft Codes" on page 51
- "Clearing Codes" on page 51
- "Field Service Functional Tests" on page 52
- "Prizm Actuator Tests" on page 52

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).



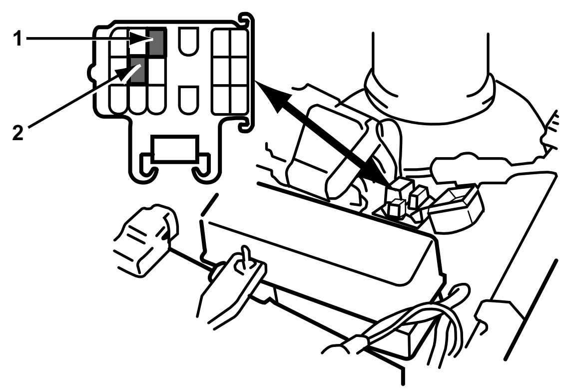
1— Connector

2— TOY-1 adapter

Figure 7-1 *1989–95 Prizm connector location*

To read 1989–95 Prizm engine codes (optional):

- Jump diagnosis connector pins as shown in Figure 7-2.



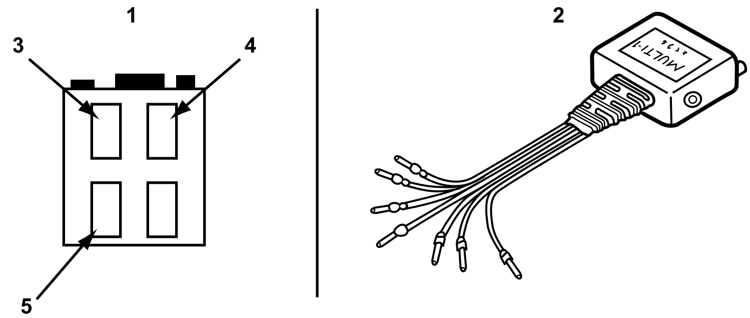
1— Terminal E1

2— Terminal T, TE, or TE1

Figure 7-2 *Jump pins for flash codes*

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).



1— Connector

2— MULTI-1 adapter

3— Green

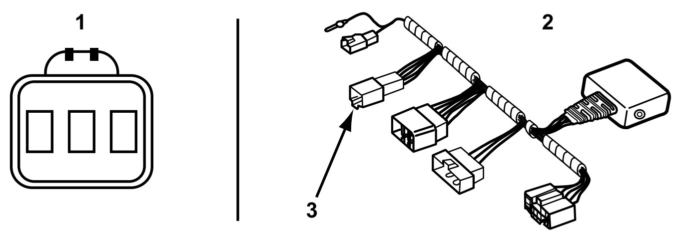
4— White

5— Black

Figure 7-3 *1989–92 (except 1992 1.3L) connector and adapter*

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).



1— Connector

2— MULTI-2 adapter

3— MULTI-2-D

Figure 7-4 *1989 Spectrum and 1990–94 Storm connector and adapter*

To read 1989 Spectrum and 1990–94 Storm engine codes (optional):

- Jump pins as shown in Figure 7-5.

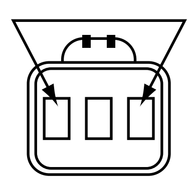


Figure 7-5 *Pins to jump for flash codes*

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.

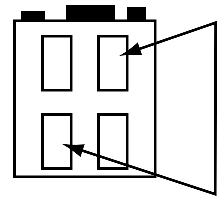


Figure 7-6 *1989–95 Tracker connector jump pins*

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.

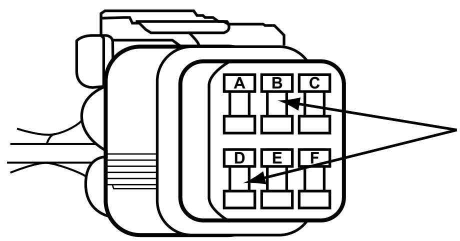
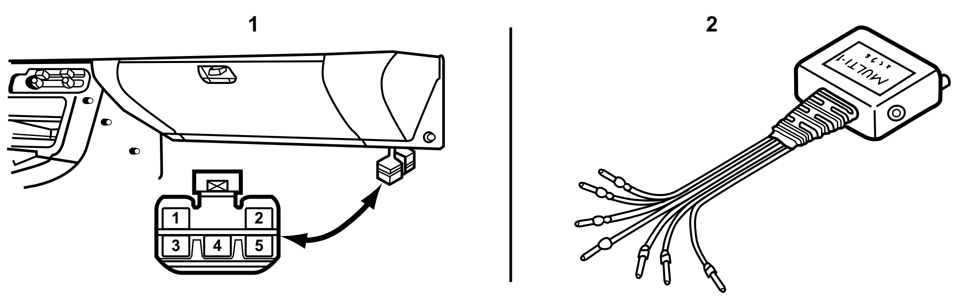


Figure 7-7 *1992–1995 Metro connector jump pins*

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).



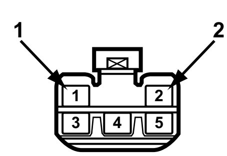
1— Connector

2— MULTI-1 adapter

Figure 7-8 *1992–94 Storm 1.8L connector and adapter*

To read 1992–94 Storm 1.8L transmission codes (optional):

- Jump pins as shown in Figure 7-9.



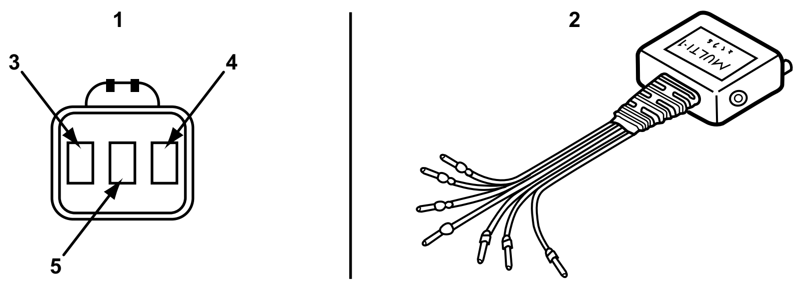
1— Red

2— Black

Figure 7-9 *Pins to jumper for transmission codes*

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.

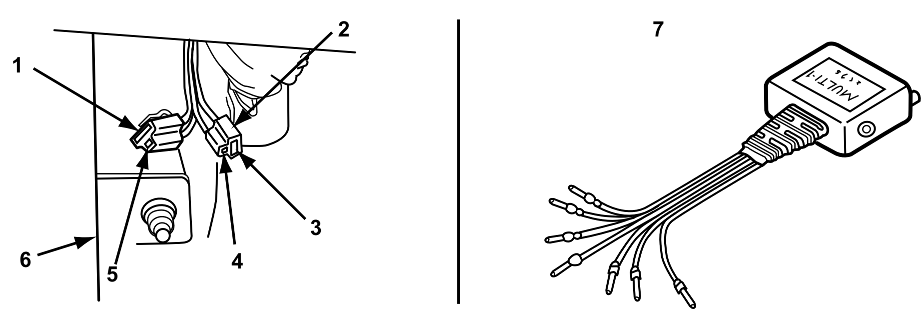


1— Connector
2— MULTI-1 adapter
3— Green
4— White
5— Black

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.

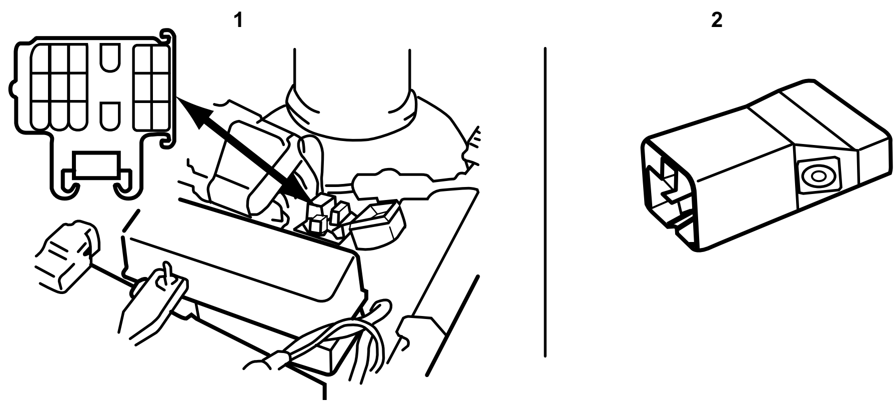


1— Diagnostic connector 701—pink wire and black/white wire
2— Diagnostic connector 705—black wire and pink/black wire
3— Black
4— White
5— Green
6— Steering column
7— MULTI-1 adapter

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.



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.

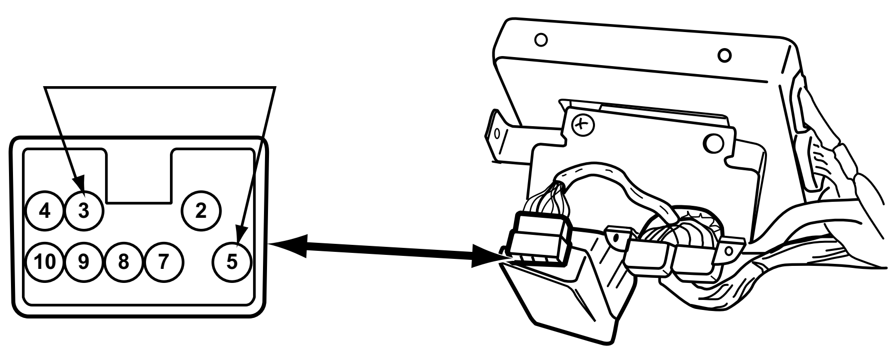


Figure 7-13 *1990–95 Tracker RWAL ABS connector jump pins*

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

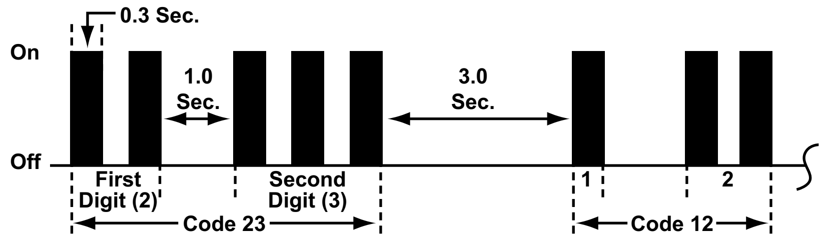


Figure 7-14 *Engine Code Type 01*

Table 7-1 *Engine Code Type 01*

Pattern:	10s and 1s
Read codes on:	Check Engine lamp
Start codes by:	Install a jumper wire between two pins and turn the ignition on.
When done:	Turn the ignition off, remove jumper wire, then clear codes.
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.	

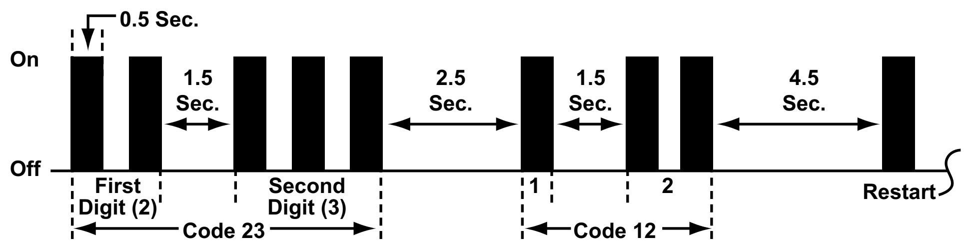


Figure 7-15 *Engine Code Type 09*

Table 7-2 *Engine Code Type 09*

Pattern:	10s and 1s
Read codes on:	Check Engine lamp
Start codes by:	Use TOY-1 adapter, turn the ignition on, and select Manual Codes.
When done:	Turn the ignition off, disconnect the scan tool, the clear codes.

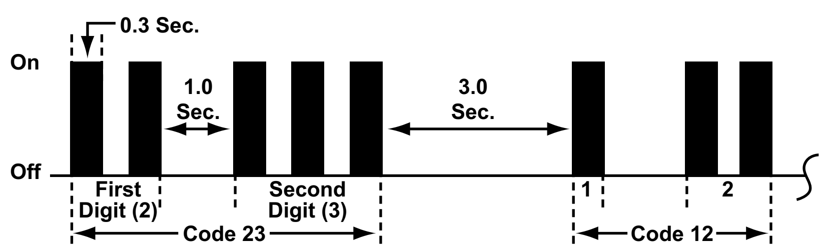


Figure 7-16 *Transmission Code Type 01*

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

Pattern:	10s and 1s
Read codes on:	ECONO lamp

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

Start codes by:	Connect the MULTI-1 adapter, turn the ignition on, and select Manual Codes, or install a jumper wire between two pins and turn the ignition on.
When done:	Turn the ignition off, remove the jumper wire, then clear codes.
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.	

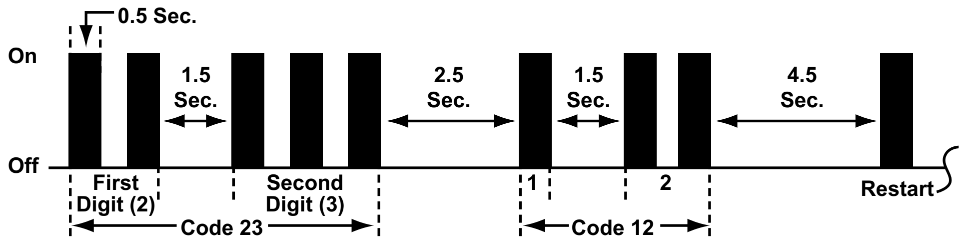


Figure 7-17 *Transmission Code Type 09*

Table 7-4 *Transmission Code Type 09*

Pattern:	10s and 1s
Read codes on:	O/D OFF lamp
Start codes by:	Connect the TOY-1 adapter, turn the O/D switch on, turn the ignition on, then select Manual Codes.
When done:	Turn the ignition off, disconnect the scan tool, then clear codes.

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.

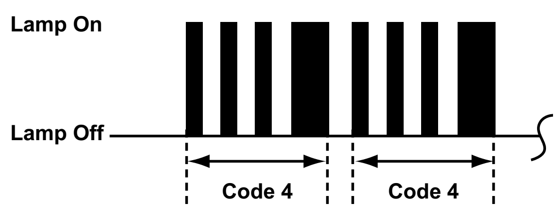


Figure 7-18 *ABS diagnostic code pulse*

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.

Chapter 8 Honda

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.

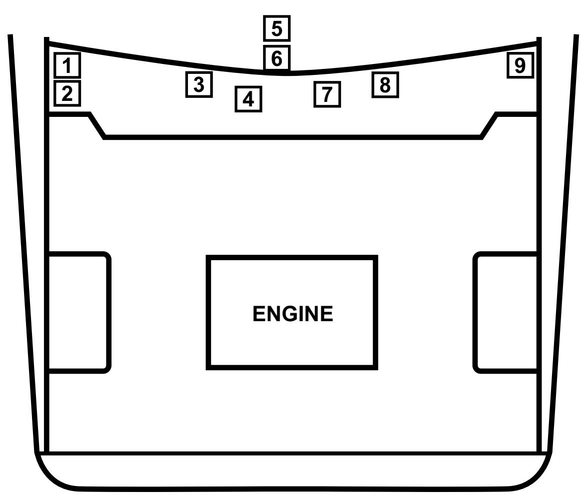


Figure 8-1 *Common connector locations*

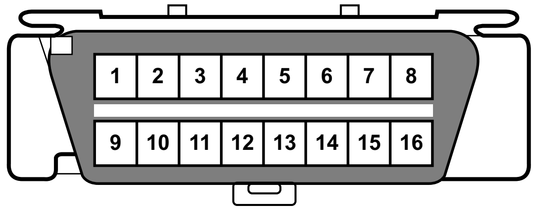


Figure 8-2 *OBD-II data link connector (DLC)*

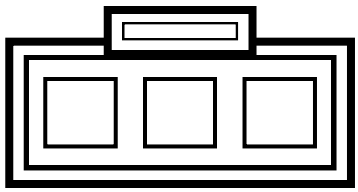


Figure 8-3 *3-pin DLC*

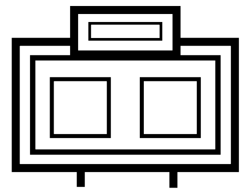


Figure 8-4 *2-pin service check signal (SCS) connector*

Table 8-1 *Common connector locations*

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

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

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.

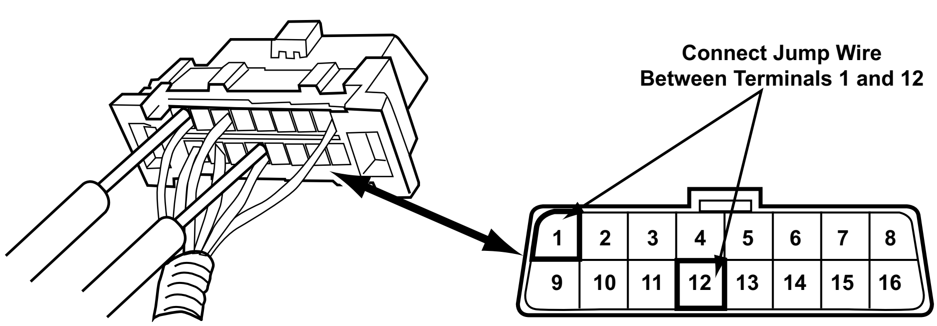


Figure 8-5 *Data connector from the wire side (Honda numbering, not the same as SAE)*

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

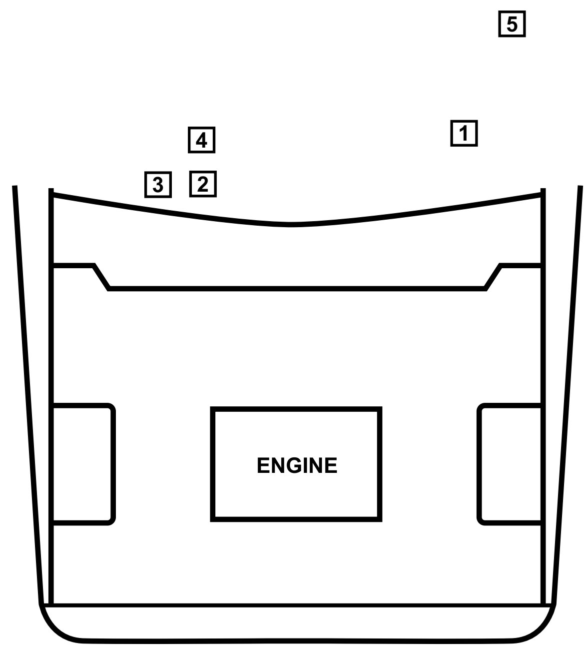
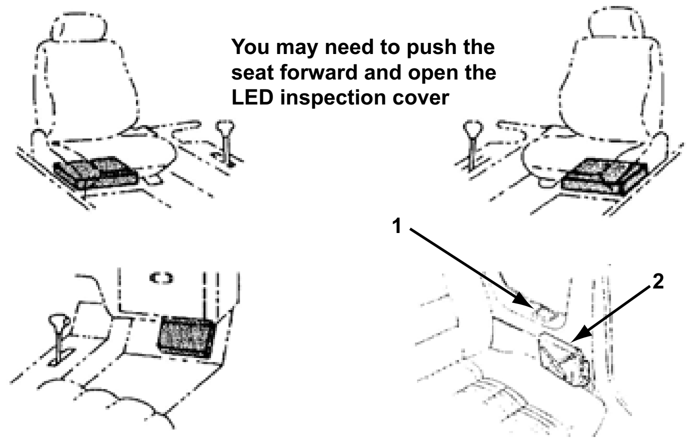


Figure 8-6 *Common ECM and LED locations*

Table 8-2 *Common ECM and LED locations*

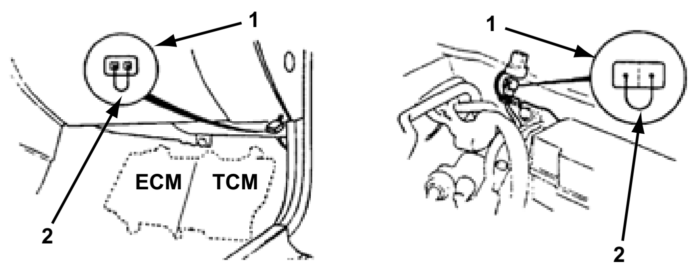
VEHICLE	YEAR	LOCATION	
Accord LXI	1986–89	1	Under seat
Civic	1985–87	4	Under seat
	1988–91	2	Under carpet
CRX	1985–87	4	Under seat
Prelude	1985–87	5	Under left rear ashtray
	1988–91	2	Under carpet



1— Remove ashtray to see LED flash

2— ECM

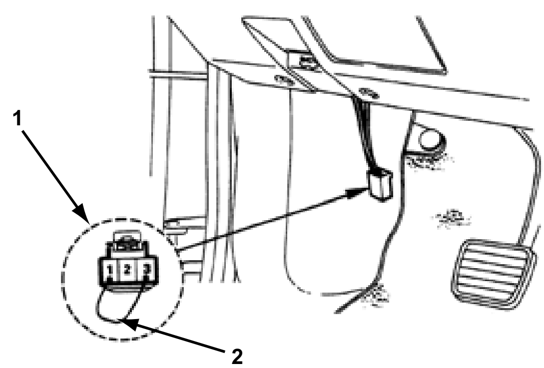
Figure 8-7 *Sample ECM locations*



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

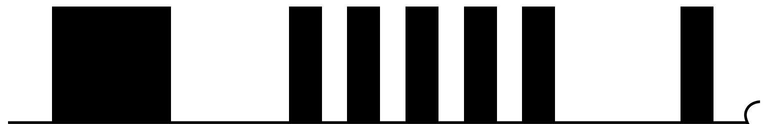


Figure 8-10 *Honda engine Code Type 02*

Table 8-3 *Honda engine Code Type 02*

Pattern:	Straight count
Read codes on:	Engine—Red LED on ECM; Trans—Red LED on TCM
Start codes by:	Turn the ignition on.
When done:	Turn the ignition off, then clear codes.
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.	

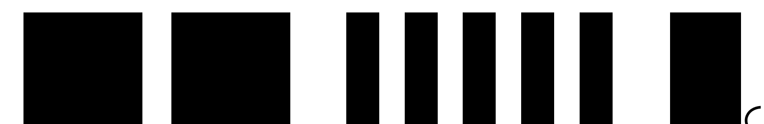


Figure 8-11 *Honda engine Code Type 03*

Table 8-4 *Honda engine Code Type 03*

Pattern:	Long and short
Read codes on:	Red LED on ECM; except 1990 and later Accord & Prelude flash codes on CHECK engine lamp on dash
Read codes on:	Red LED on TCM or gear indicator lamp on dash
Start codes by:	Turn the ignition on; except for 1990 and later Accord & Prelude, jumper the check connector, then ignition on.
When done:	Turn the ignition off, then clear codes.
One code displays at a time. Repair, clear codes and drive to check for codes.	

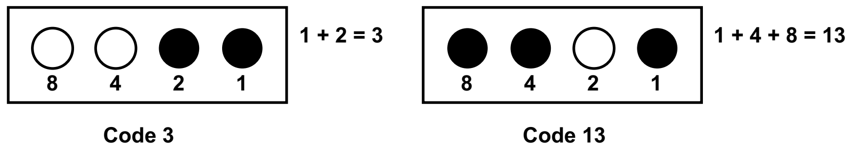


Figure 8-12 *Honda engine Code Type 04*

Table 8-5 *Honda engine Code Type 04*

Pattern:	Binary: LEDs assigned numbers 8, 4, 2, 1; add numbers for codes
Read codes on:	Four LEDs on ECM
Start codes by:	Turn the ignition on.
When done:	Turn the ignition off, then clear codes.
Only one code displayed at a time except on some late model cars. After repairing the problem, clear codes and drive car; then check for other 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 Rear Wheel ABS” on page 65
- “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

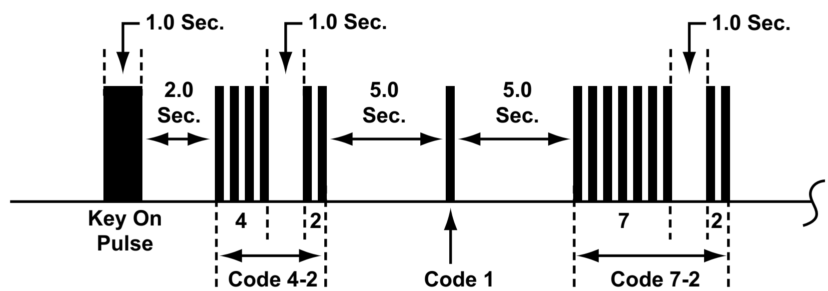


Figure 8-13 *Honda ABS Code Type 02*

Table 8-6 *Honda ABS Code Type 02*

Pattern:	Main code and sub-code
Read codes on:	ABS warning lamp
Start codes by:	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
When done:	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.

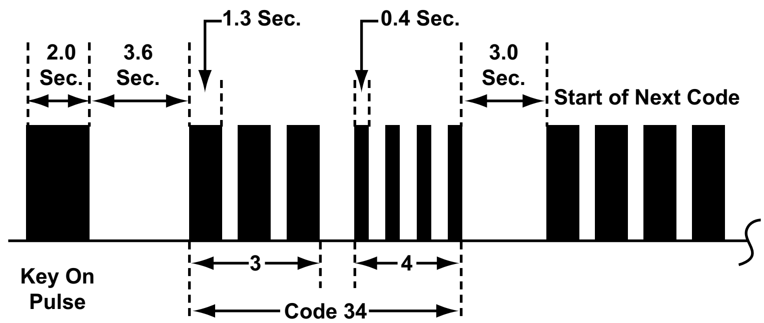


Figure 8-14 *Honda ABS Code Type 04*

Table 8-7 *Honda ABS Code Type 04*

Pattern:	10s and 1s
Read codes on:	ABS warning lamp
Start codes by:	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.
When done:	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.

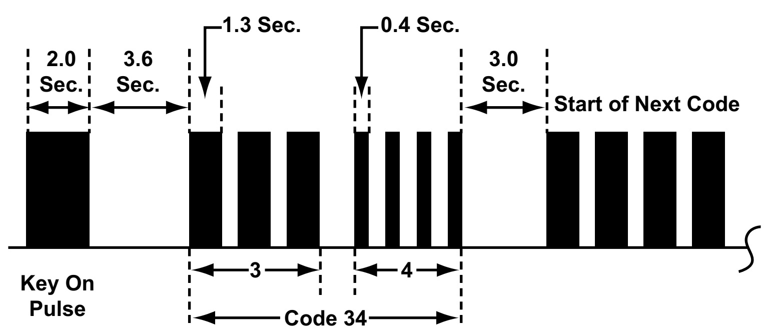


Figure 8-15 *Honda ABS Code Type 04a*

Table 8-8 *Honda ABS Code Type 04a*

Pattern:	10s and 1s
Read codes on:	ABS warning lamp
Start codes by:	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.
When done:	Clear codes by cycling the ignition on and off 20 times.

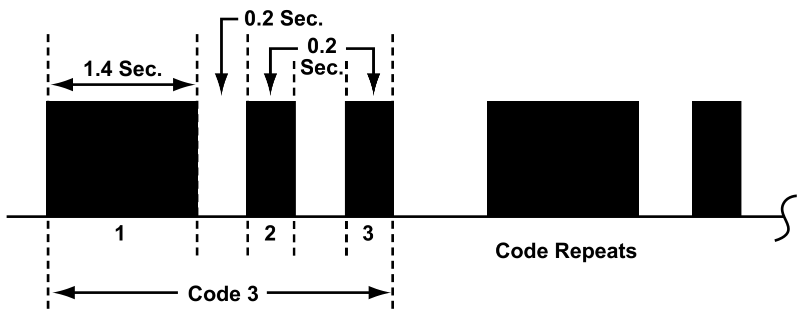


Figure 8-16 *Honda ABS Code Type 05a*

Table 8-9 *Honda ABS Code Type 05a*

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

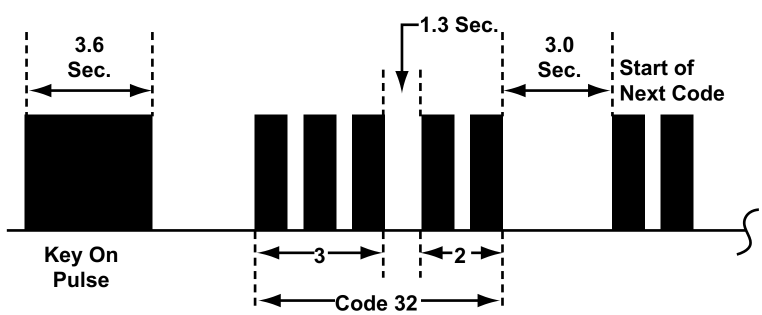


Figure 8-17 *Honda ABS Code Type 06*

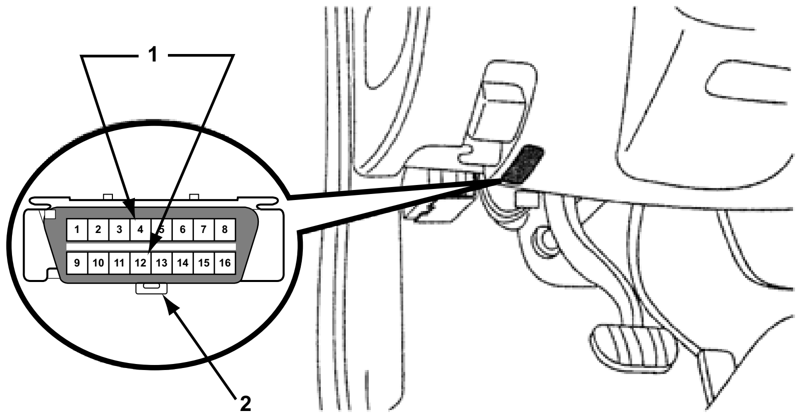
Table 8-10 *Honda ABS Code Type 06*

Pattern:	Main code and sub-code
Read codes on:	ABS warning lamp
Start codes by:	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.
When done:	Clear codes by removing the ABS B2 (15A) fuse from the ABS fuse box for 10 seconds.

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.



1— Data Link Connector (DLC)

2— Pins 4 and 12

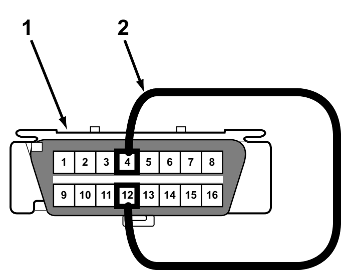
Figure 8-18 *1996–2002 Passport with RWAL system*

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.



1— DLC

2— Jump wire

Figure 8-19 *1996–2002 Passport with 4WAL system*

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

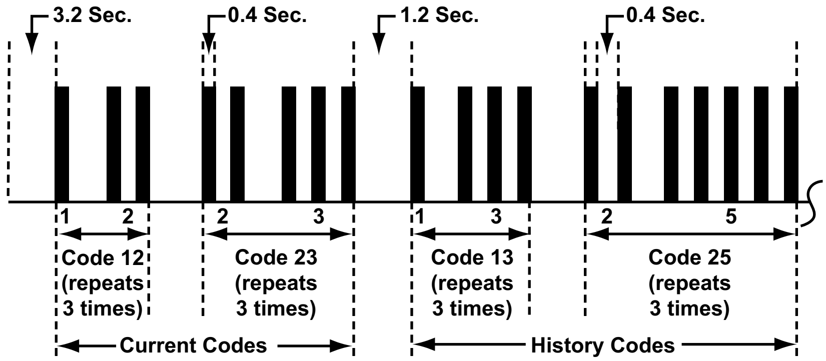


Figure 8-20 *Honda SRS Code Type 03*

Table 8-11 *Honda SRS Code Type 03*

Pattern:	10s and 1s
Read codes on:	SRS warning lamp
Start codes by:	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.
Clearing codes:	Clearing codes can only be done using the factory scan tool.
When done:	Turn the ignition off, disconnect the connectors, then clear codes.
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 12flashes first, then code 13, followed by the historical codes. The code cycle repeats as long as the system is in the diagnostic state.	

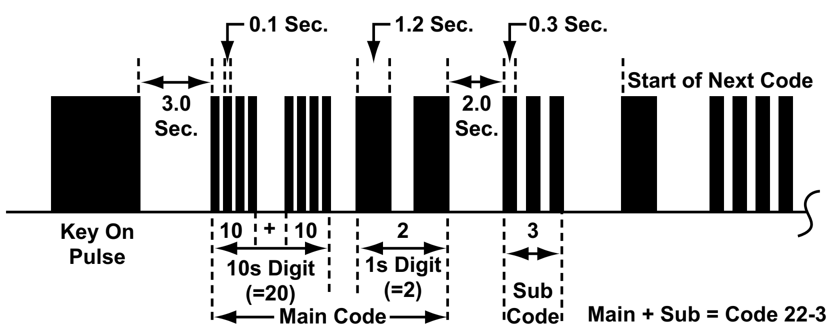


Figure 8-21 *Honda SRS Code Type 06*

Table 8-12 *Honda SRS Code Type 06*

Pattern:	Main code and sub-code
Read codes on:	SRS warning lamp
Start codes by:	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.
Clearing codes:	See “Code Clearing” on page 71.
When done:	Clear codes.
If the SCS connector is shorted and SRS has no stored DTC, the SRS light remains on continuously.	

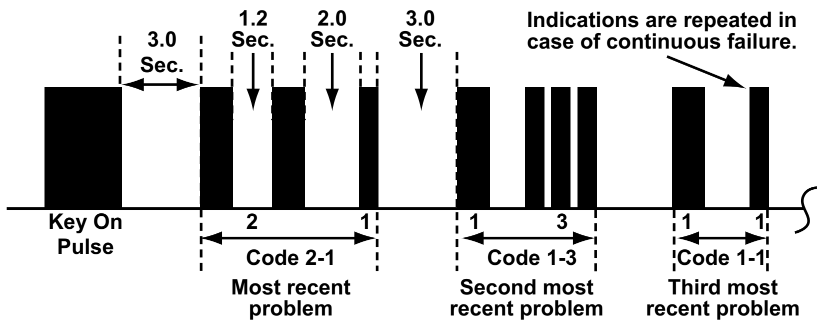


Figure 8-22 *Honda SRS Code Type 06 - Continuous Failure, SRS indicator blinks like this*

Table 8-13 *Honda SRS Code Type 06 - Continuous Failure*

Pattern:	Main code and sub-code
Read codes on:	SRS warning lamp
Start codes by:	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.
Clearing codes:	See “Code Clearing” on page 71.
When done:	Clear codes.
2001–04 Civic; 2002–04 CR-V, Insight, and S-2000; 2003–04 Element.	

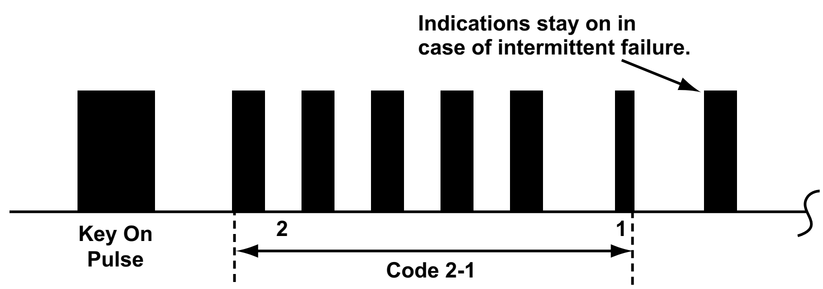


Figure 8-23 *Honda ABS Code Type 06 - Intermittent Failure, SRS indicator blinks like this*

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

Pattern:	Main code, sub-code, stays on
Read codes on:	SRS warning lamp
Start codes by:	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
Clearing codes:	See “Code Clearing” on page 71.
When done:	Clear codes.
2004 Civic, CR-V, Insight, and S-2000	

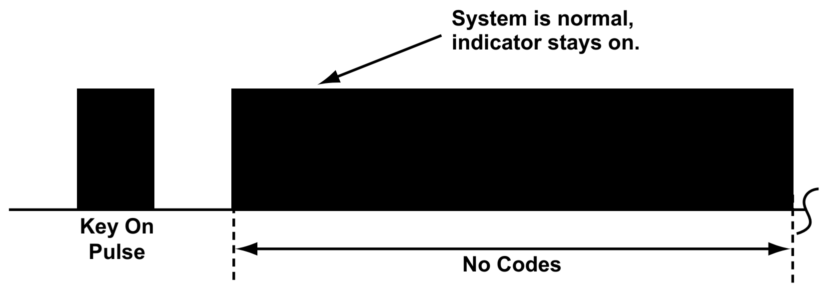


Figure 8-24 *Honda SRS Code Type 06 - Normal (no failure), SRS indicator stays on*

Table 8-15 *Honda SRS Code Type 06 - Normal (no failure)*

Pattern:	No code, stays on
Read codes on:	SRS warning lamp
Start codes by:	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.
Clearing codes:	See “Code Clearing” on page 71.
When done:	Clear codes.
2004 Civic, CR-V, Insight, and S-2000	

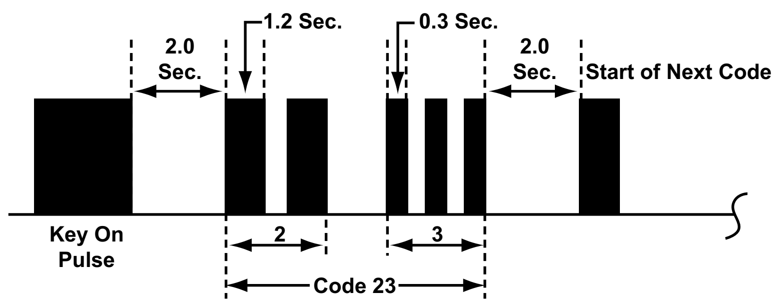
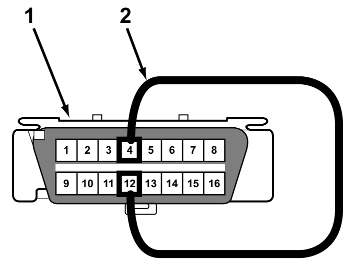


Figure 8-25 *Honda SRS Code Type 07*

Table 8-16 *Honda SRS Code Type 07*

Pattern:	Main code and sub-code
Read codes on:	SRS warning lamp
Start codes by:	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.
Clearing codes:	See “Code Clearing” on page 71.
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. Some models will flash SRS lamp continuously without pausing.
Computer can store up to three most recent codes.	



1— Data link connector (DLC)

2— Jumper wire

Figure 8-26 *1996–2002 Passport SRS code clearing*

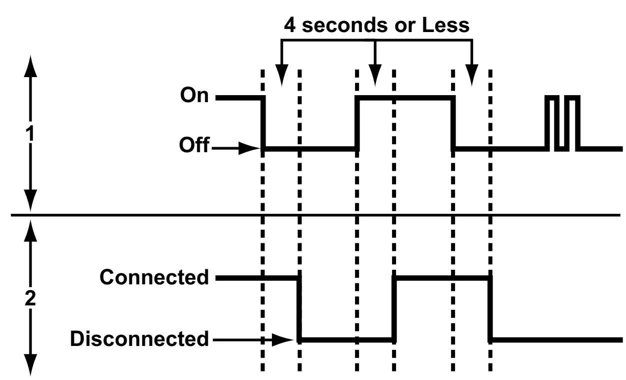
8.3.3 Code Clearing

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.

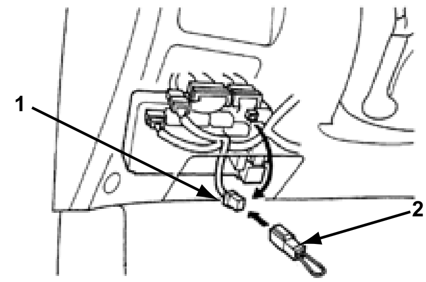
   The SRS lamp flashes twice to indicate memory has been erased.
7. Switch the ignition off and wait ten seconds.



1— SRS Indicator Lamp

2— MES Connector Terminal

Figure 8-27 *SRS code clearing*



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*

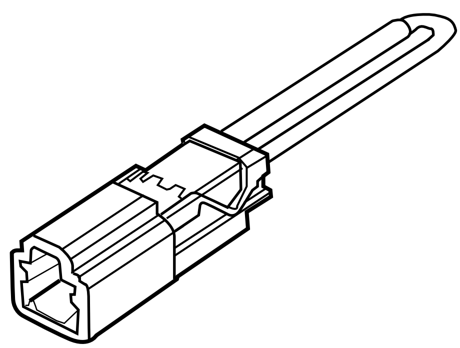
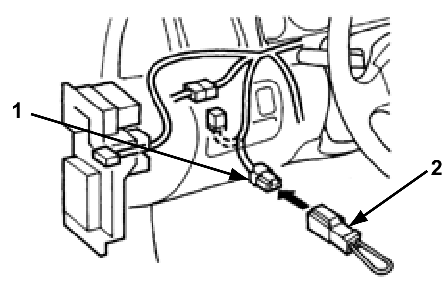


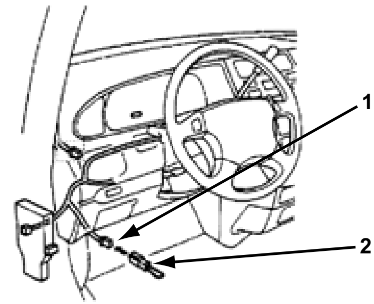
Figure 8-29 *SCS Service Connector Honda tool 07PAZ-0010100 (or use jumper wire equivalent)*



1— MES connector

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

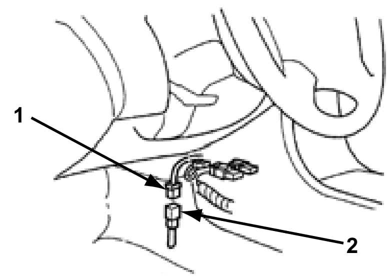
Figure 8-30 *1997–2001 Prelude SRS code clearing*



1— MES connector

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

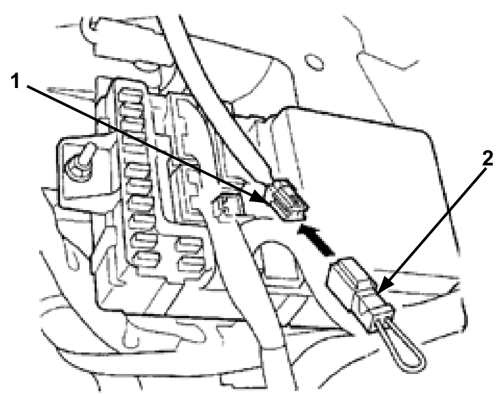
Figure 8-31 *1996–98 Odyssey, 1995–97 Accord SRS code clearing*



1— MES connector

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

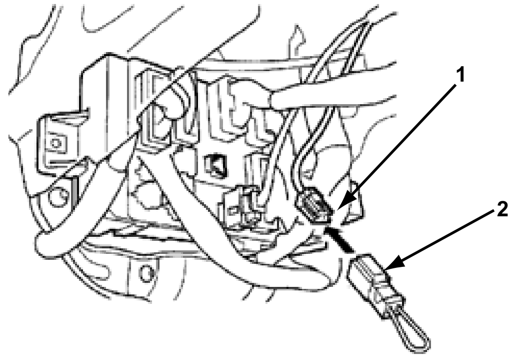
Figure 8-32 *1994–96 Prelude SRS code clearing*



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

2— MES connector

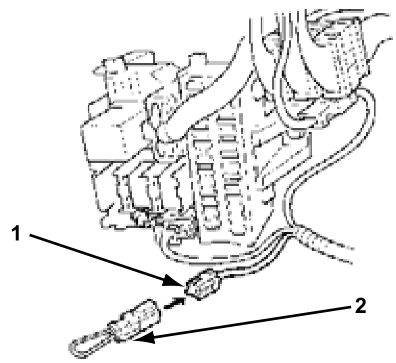
Figure 8-33 *1999–2002 Odyssey SRS code clearing (left side of dash)*



1— MES connector

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

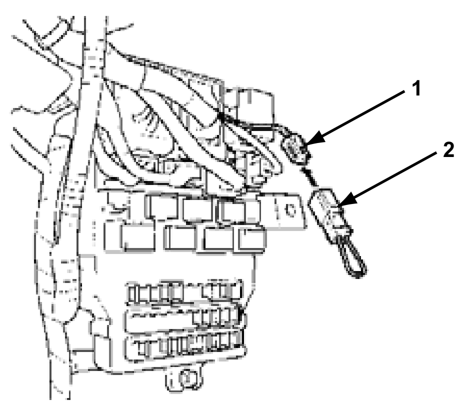
Figure 8-34 *1998–2003 Accord, 2000–03 S2000 SRS code clearing (left side of dash)*



1— MES connector

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

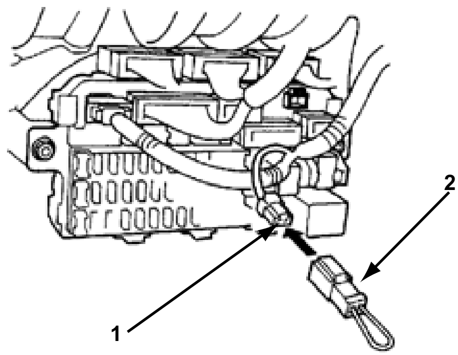
Figure 8-35 *2004 S2000 SRS code clearing (left side of dash)*



1— MES connector

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

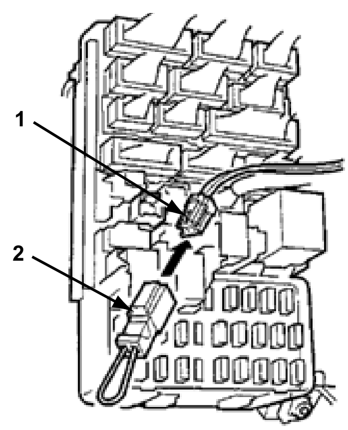
Figure 8-36 *2004 Accord SRS code clearing (left side of dash)*



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

2— MES connector

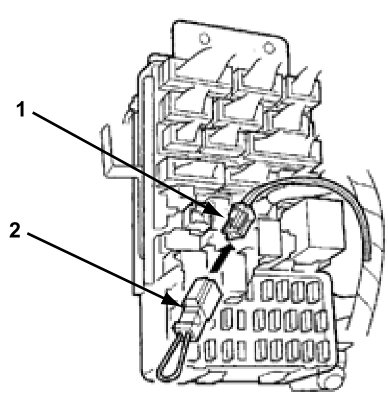
Figure 8-37 *1997–2001 CR-V SRS code clearing (left side of dash)*



1— MES connector

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

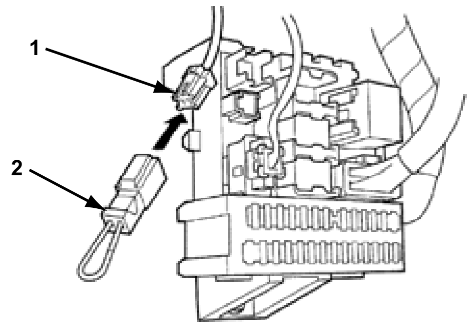
Figure 8-38 *2002–04 CR-V SRS code clearing (left side of dash)*



1— MES connector

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

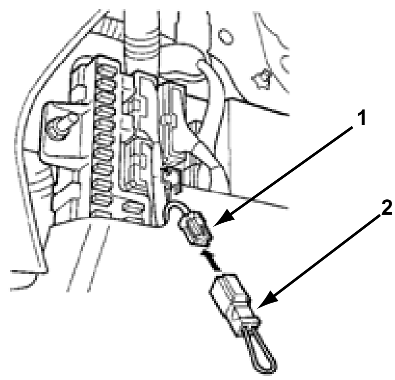
Figure 8-39 *2001–04 Civic, 2003–04 Element SRS code clearing*



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*

Chapter 9 Hyundai

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.

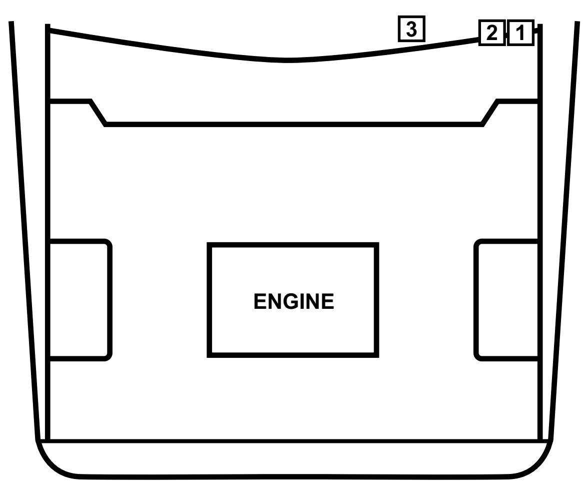


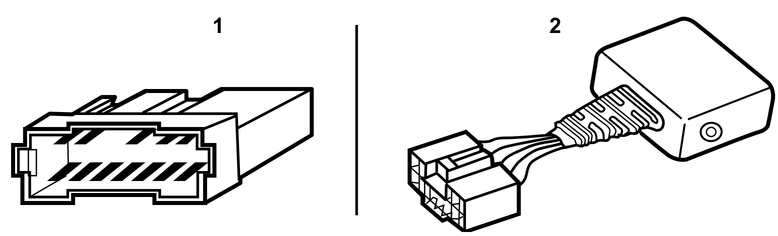
Figure 9-1 *Common connector locations*

Table 9-1 *Common connector locations*

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

To read codes from 1995 and earlier vehicles:

- Use the HYUN-2 adapter (Figure 9-2).



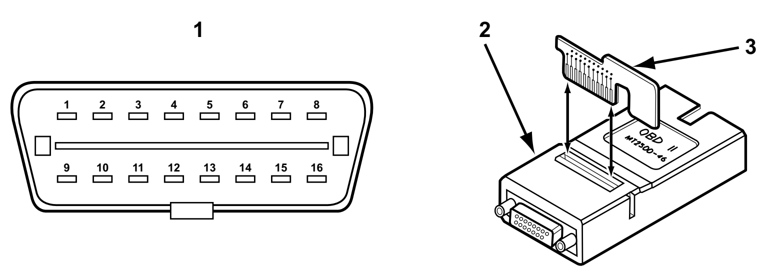
1— Connector

2— HYUN-2 adapter

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).



1— 16-pin DLC

2— Personality Key™ device

3— OBD-II adapter

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

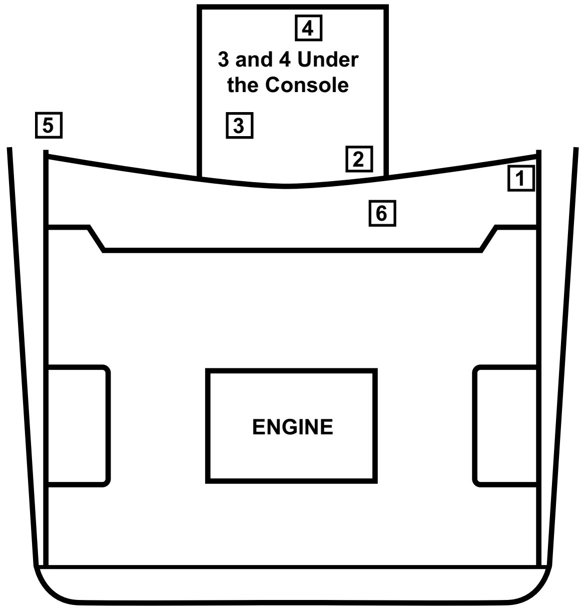


Figure 10-1 *Isuzu common engine connector location*

Table 10-1 *Common engine connector locations*

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

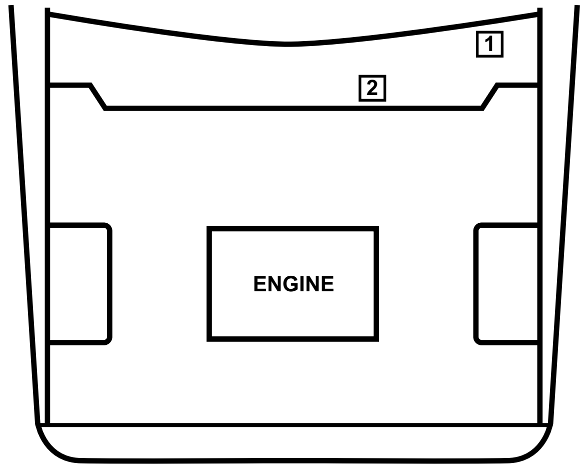


Figure 10-2 *Common transmission connector locations*

Table 10-2 *Common transmission connector locations*

VEHICLE	YEAR	CONNECTOR LOCATION
Amigo	1990–94	1
Impulse	1990–92	1
Pickup	1990–95	1
Rodeo	1990–95	1
Stylus	1990–93	1
Trooper	1990–91	1
	1992–94	2

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

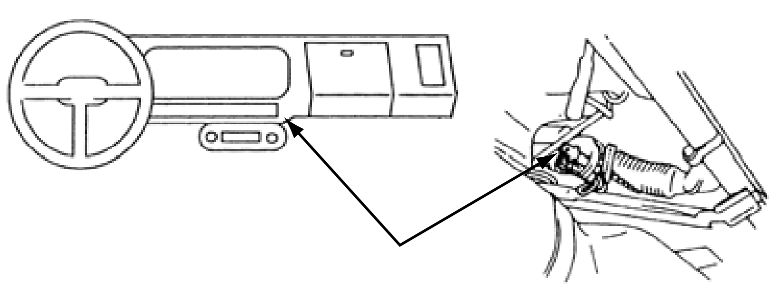
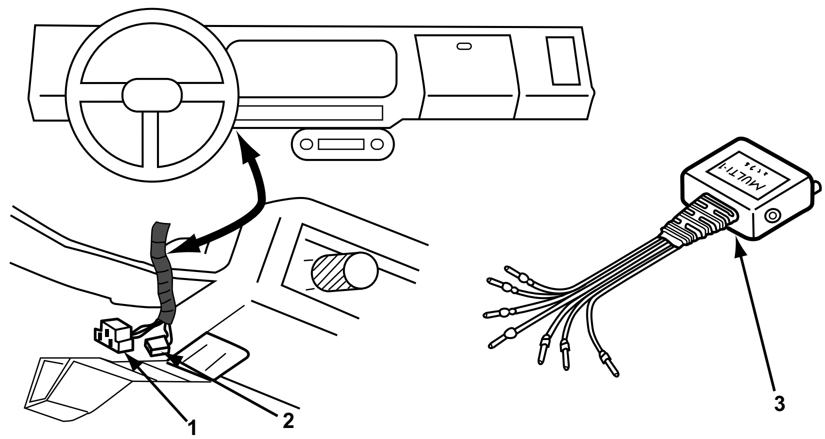


Figure 10-3 *1984–1985 Isuzu Trooper diagnostic connector*

To read codes from 1986–87 Trooper:

- Connect the MULTI-1 adapter to the ALDL or diagnostic connector (Figure 10-4 on page 83).



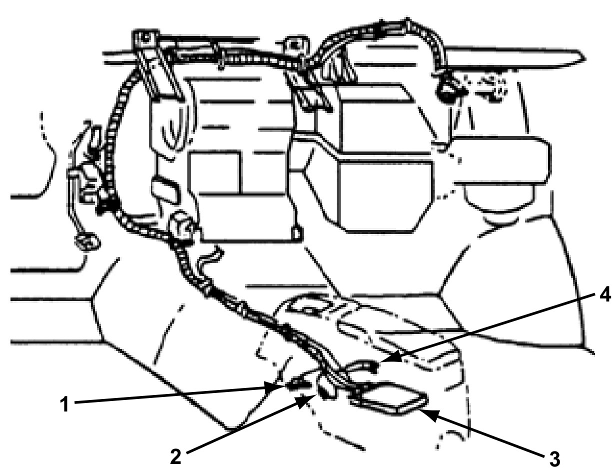
1— ALDL connector

2— Diagnostic connector

3— MULTI-1 adapter

Figure 10-4 *1986–87 Trooper connectors and adapter*

Diagnostic connector locations for the 1988–91 Trooper are shown in Figure 10-5.



1— ALDL connector

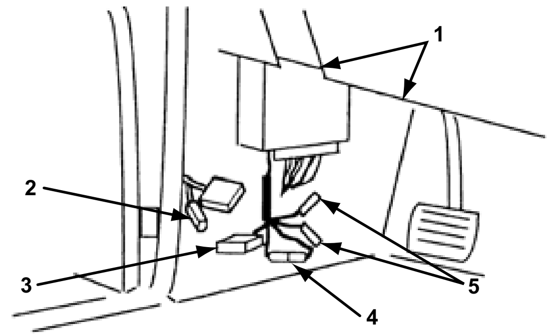
2— Distributor set timing connector

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).

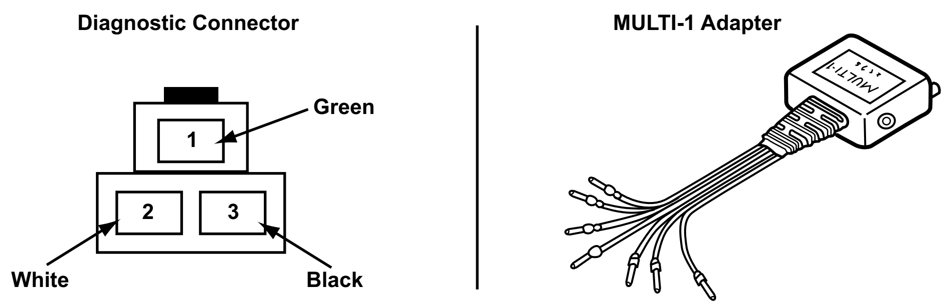
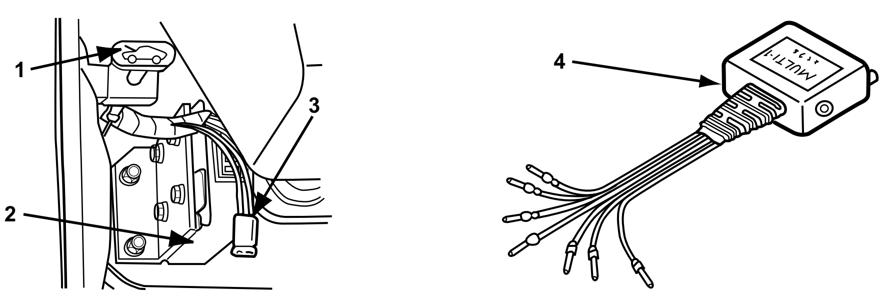


Figure 10-7 *1984–95 Pickup 1988–95 Amigo, and 1991–95 Rodeo connector and adapter*



1— Hood release

2— ECM

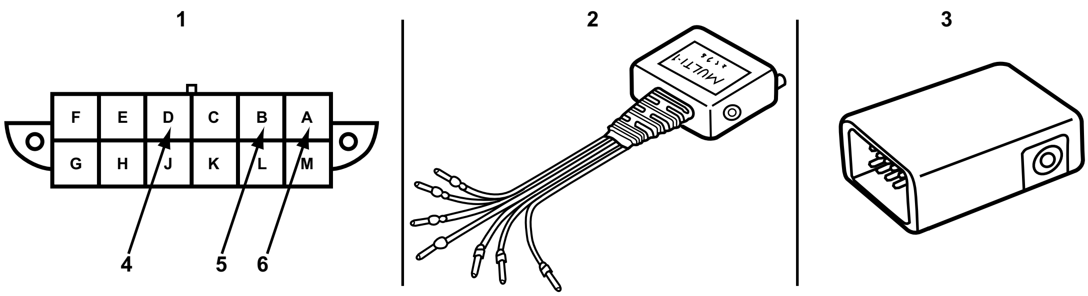
3— Diagnostic connector

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.

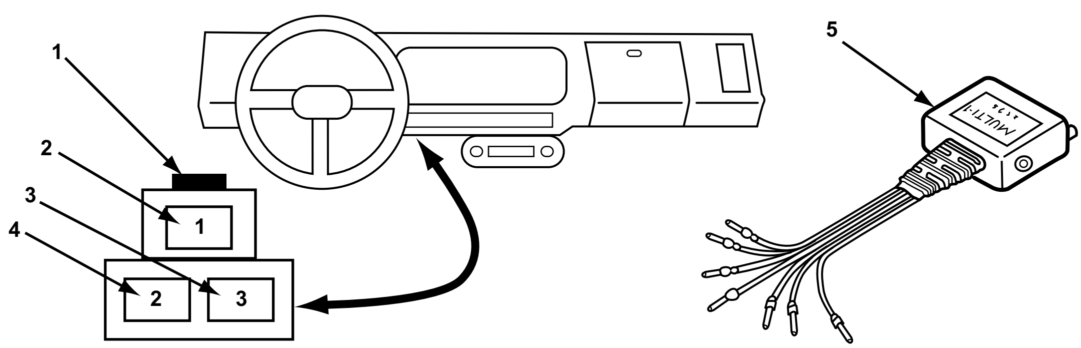


1— Diagnostic connector
2— MULTI-1 adapter
3— GM-1 adapter
4— Green MULTI-1 wire
5— White MULTI-1 wire
6— Black MULTI-1 wire

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).

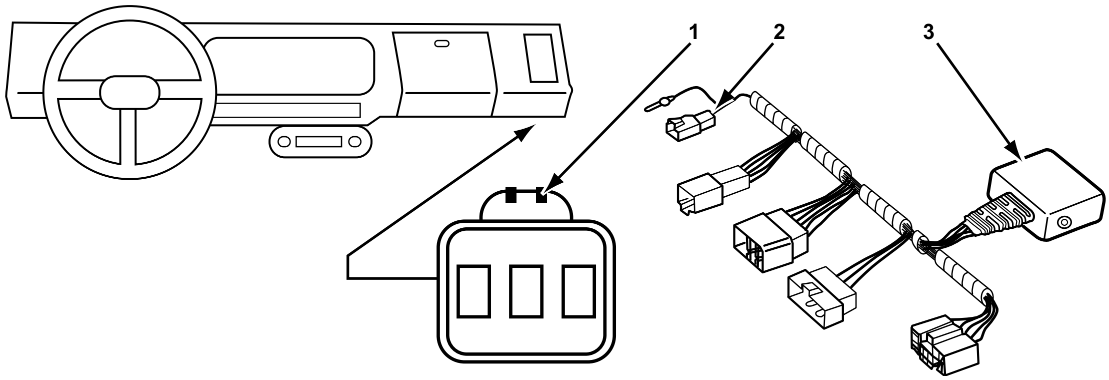


1— Diagnostic connector
2— Black MULTI-1 wire
3— Green MULTI-1 wire
4— White MULTI-1 wire
5— MULTI-1 adapter

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).



1— Diagnostic connector

2— MULTI-2-D

3— MULTI-2 adapter

Figure 10-11 *1985½–89 I-Mark, 1990 and later Impulse connector and adapter*

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.

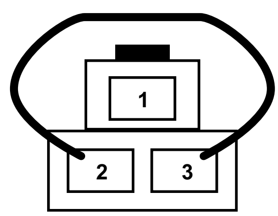


Figure 10-12 *1988–89 Impulse jump pins*

To read codes from 1985½–89 I-Mark and 1990 and later Impulse (optional):

- Jump pins as shown in Figure 10-13.

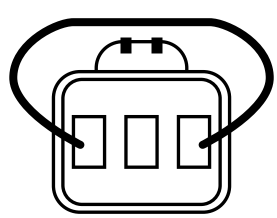


Figure 10-13 *1985½–89 I-Mark, 1990 and later Impulse jump wire*

Code Type 05

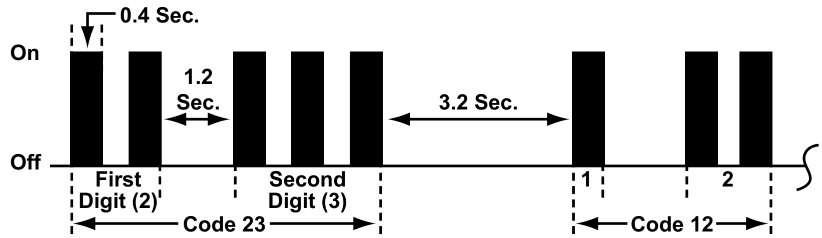


Figure 10-14 *Isuzu engine Code Type 05*

Table 10-3 *Engine Code Type 05*

Pattern:	10s and 1s
Read codes on:	Check Engine lamp
Start codes by:	Connect two diagnostic connector terminals or jumper two terminals in a connector and turn the ignition on.
When done:	Turn the ignition off, disconnect the connectors, and clear codes.
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.	

10.1.3 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.

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.

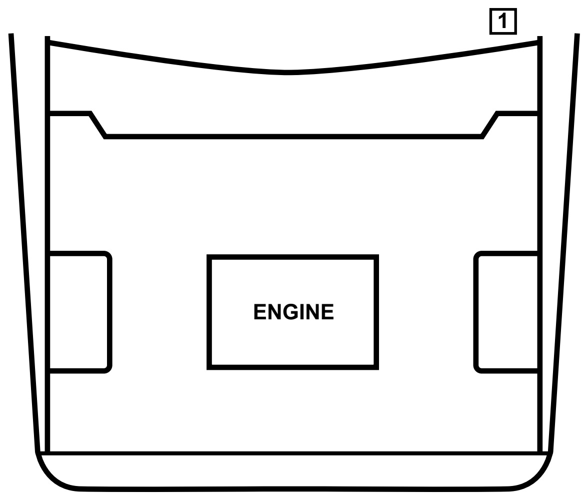


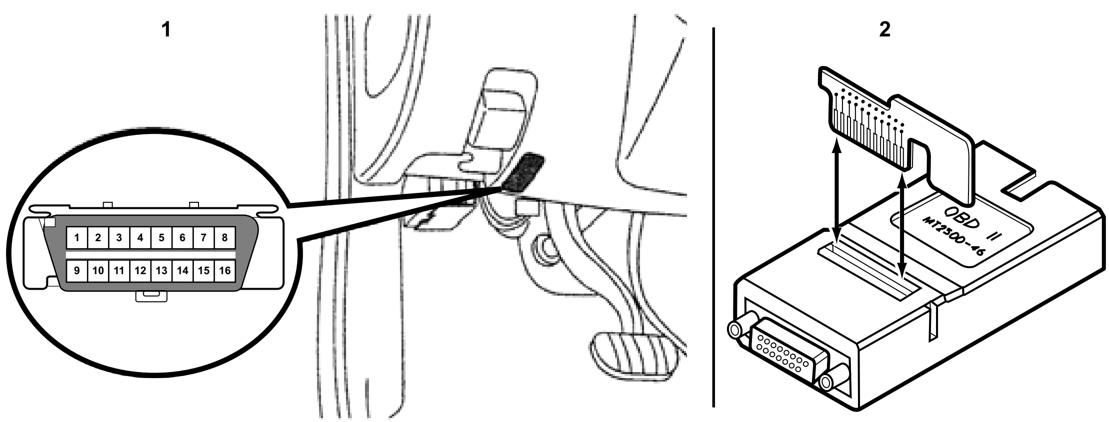
Figure 10-15 *Isuzu common ABS connector locations*

Table 10-4 *Common ABS connector location*

VEHICLE	YEAR	CONNECTOR LOCATION
Amigo	1990–94	1
Impulse	1990–92	1
Pickup	1990–95	1
Rodeo	1990–95	1
Stylus	1990–93	1

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).



1— 16-pin DLC

2— OBD-II adapter

Figure 10-16 *2003–06 Ascender, 2006 I-280 and I-350 ABS connector*

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).

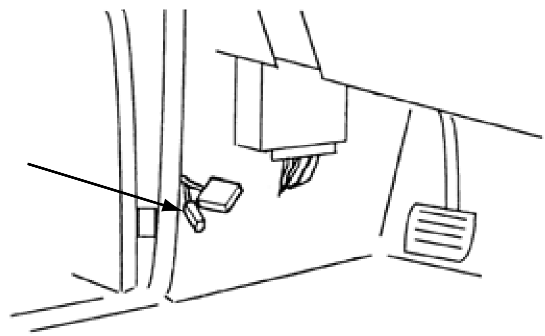


Figure 10-17 *1991–95 Rodeo, 1990–95 Pickup, and 1992–94 Amigo1-pin RWAL diagnostic connector*

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.

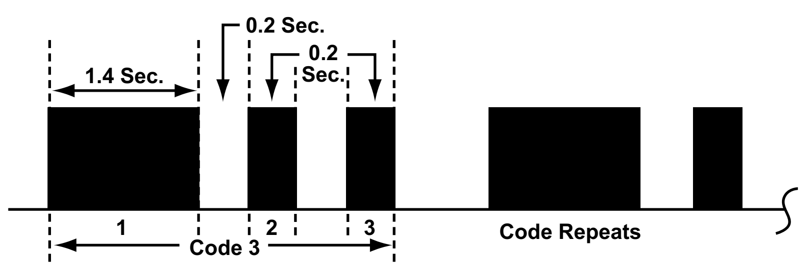


Figure 10-18 *Isuzu RWAL ABS Code Type*

Table 10-5 *Isuzu RWAL ABS Code Type*

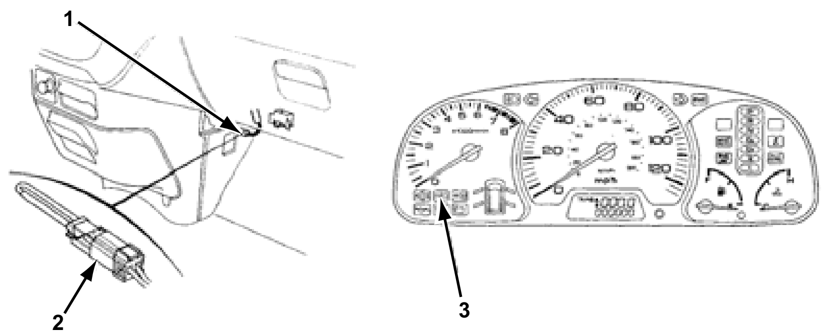
Pattern:	Straight Count
Read codes on:	Rr Antilock or ABS indicator lamp
Start codes by:	With ignition switch on and indicator illuminated, jumper ABS diagnostic connector terminal to ground. First flash may be long or short. Include the long or short first flash as part of code number count. (Figure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

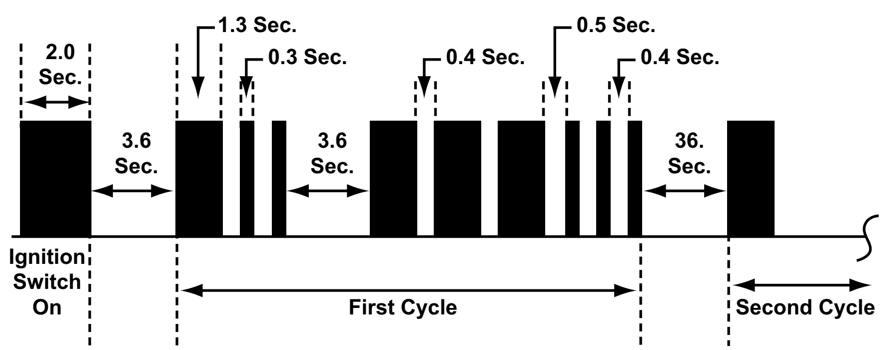


Figure 10-20 *Isuzu ABS Code Type 02*

Table 10-6 *Isuzu ABS Code Type 02*

Pattern:	Long/Short (Main code/sub-code)
Read codes on:	ABS indicator lamp
Start codes by:	With ignition switch off, connect SCS service connector (OEM#07PAZ-0010100) or jumper wire to 2-pin ABS service connector. Turn ignition switch on without the brake pedal depressed. Depressing brake pedal will initiate DTC erasure mode.
Clear codes by:	Follow the procedure in the “Clearing ABS Codes” section of this manual. Procedure includes connecting the SCS service connector or jumper wire to the 2-pin ABS service check connector, pressing & releasing the brake pedal several times while monitoring the ABS indicator lamp.
When done:	Turn the ignition off and disconnect the SCS service connector or jumper wire.

Code Type 05a

To read ABS codes from an 2002–04 Axiom, 1996–2002 Trooper, 1999–2001 Rodeo or 1999–2001 Vehicross:

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

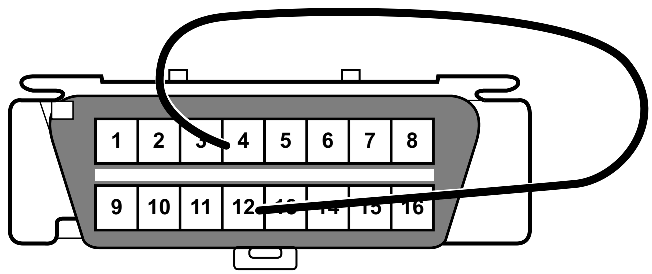


Figure 10-21 *16-pin connector jump wire*

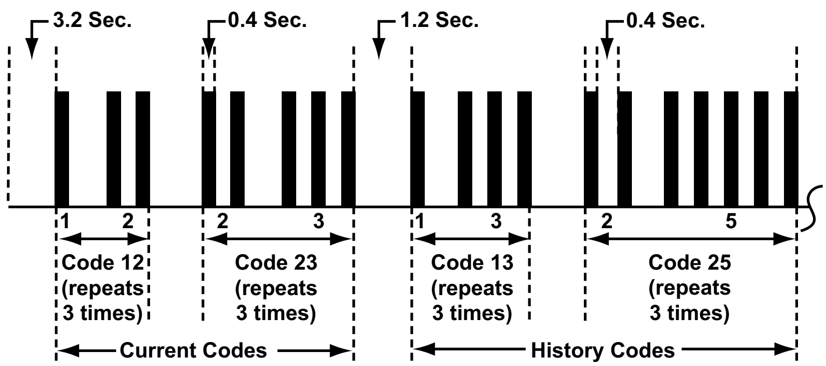


Figure 10-22 *Isuzu ABS CodeType 05a*

Table 10-7 *Isuzu ABS Code Type 05a*

Pattern:	10s and 1s
Read codes on:	ABS warning lamp
Start codes by:	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.
Clear codes by:	Within three seconds after entering the diagnostic mode, pulsate the brake switch on and off at least six times.
When done:	Turn the ignition off, disconnect the connectors, and clear codes.
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.

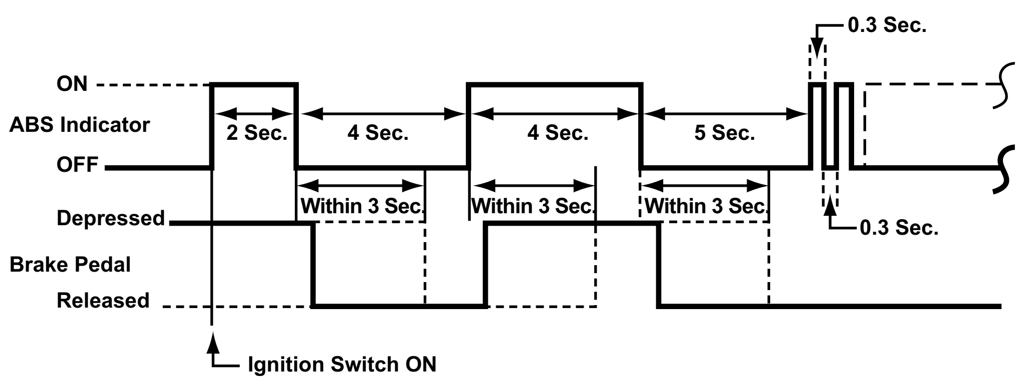


Figure 10-23 *1996–99 Isuzu Oasis ABS DTC erasure mode*

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)

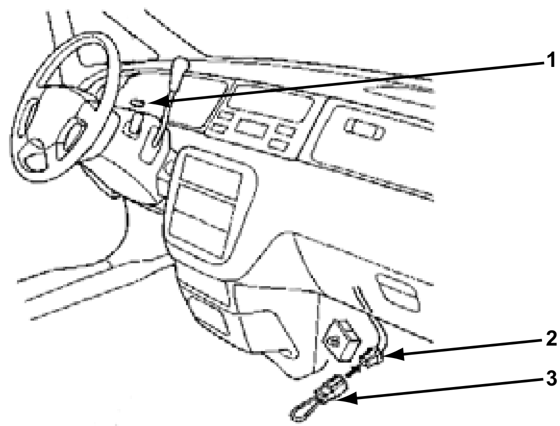
Isuzu models use 2 types of SRS codes:

- 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.

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



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*

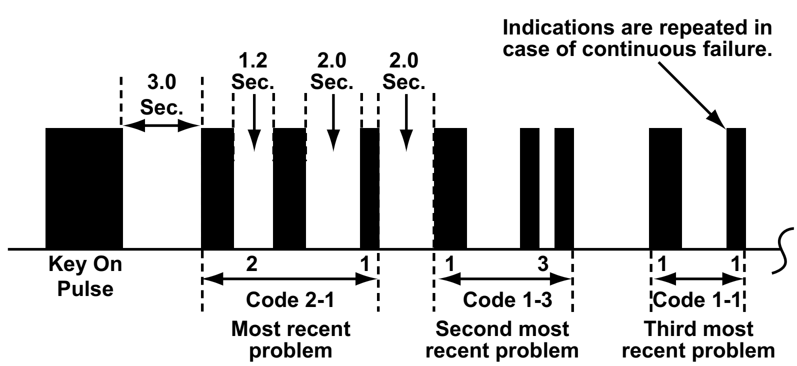


Figure 10-25 *Isuzu SRS Code Type 02a: Continuous Failure, SRS indicator flashes like this*

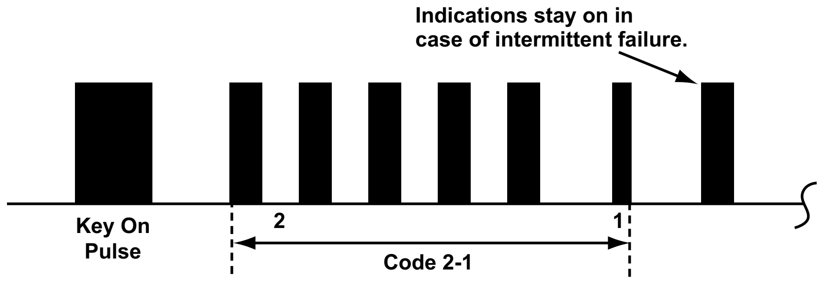


Figure 10-26 *Isuzu SRS Code Type 02a: Intermittent Failure, SRS indicator flashes like this*

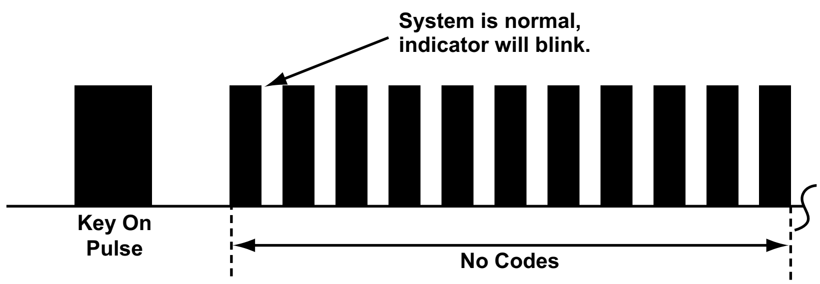


Figure 10-27 *Isuzu SRS Code Type 02a: Normal (no failure), SRS indicator flashes like this*

Table 10-8 *Isuzu SRS Code Type 02a*

Pattern:	Long/Short (Main code/sub-code)
Read codes on:	SRS indicator lamp
Start codes by:	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.
Clear codes by:	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.
When done:	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.
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.

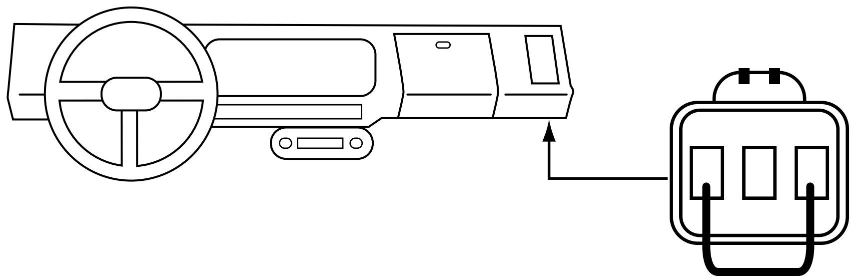


Figure 10-28 *Isuzu vehicles with orange SRS diagnostic connector and jumper pins*

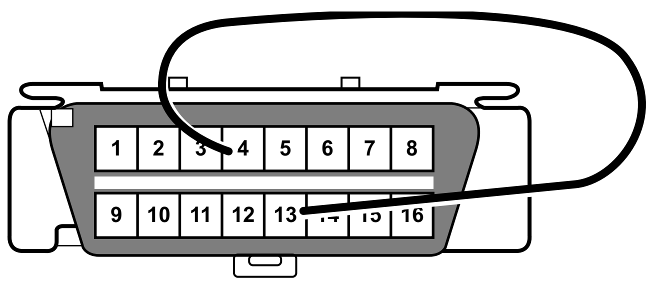
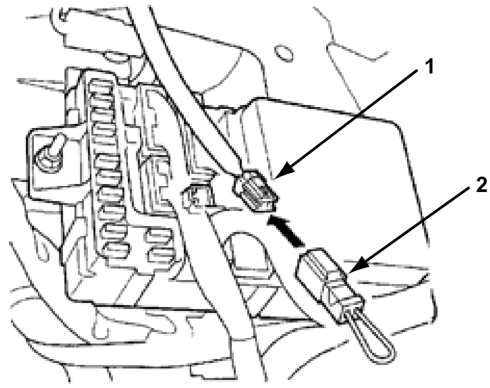


Figure 10-29 *1996 and newer Isuzu vehicles with 16-pin OBDII style connector and jumper wire*

Table 10-9 *Isuzu SRS Code Type 03*

Pattern:	10s and 1s
Read codes on:	INFL REST or SRS indicator lamp
Start codes by:	With ignition switch on, jumper two terminals in a diagnostic connector together. Only current codes will be flashed. (Figure 10-28, Figure 10-29)
Clear codes by:	Codes cannot be cleared manually on these vehicles. A factory scan tool must be used to clear SRS codes.
When done:	Disconnect jumper & turn ignition off.
Each code is displayed one time before moving on to the next code. After all of the codes have 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



1— MES (Memory Erase Signal) connector

2— SCS service connector

Figure 10-30 *1996–99 Oasis SRS code clearing (left side of dash)*

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 the used for testing the transfer case, BCM, and IPC.

Chapter 11 Kia

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

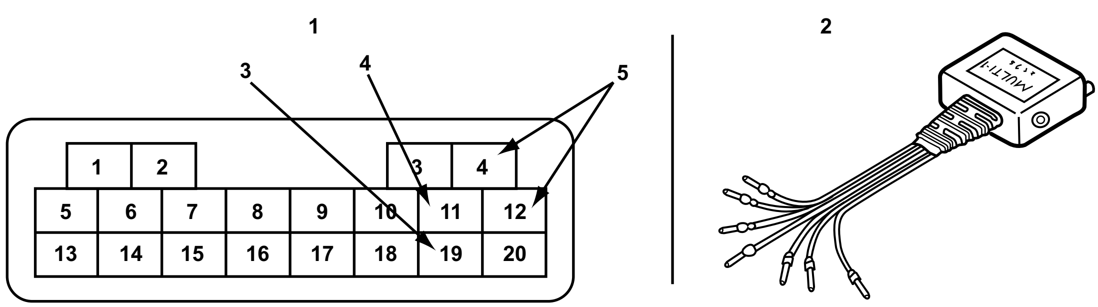
Kia engine, transmission, ABS, and airbag testing includes:

- “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).



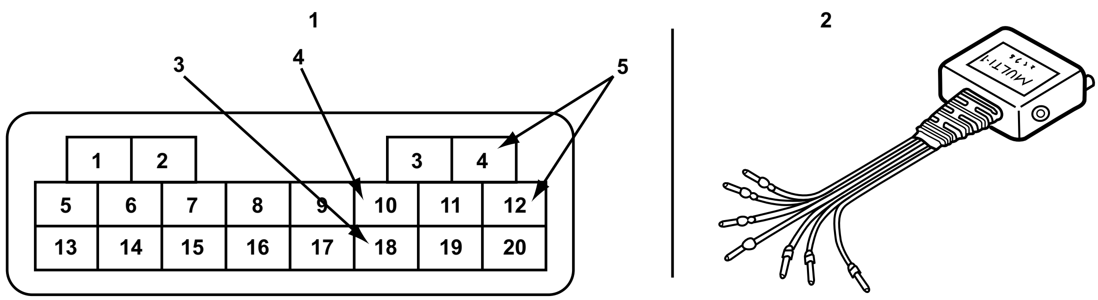
1— 20-pin connector
2— MULTI-1 adapter
3— Red MULTI-1 wire
4— Blue MULTI-1 wire
5— Black MULTI-1 wire

Figure 11-1 *20-pin DLC and MULTI-1 adapter—engine codes*

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).

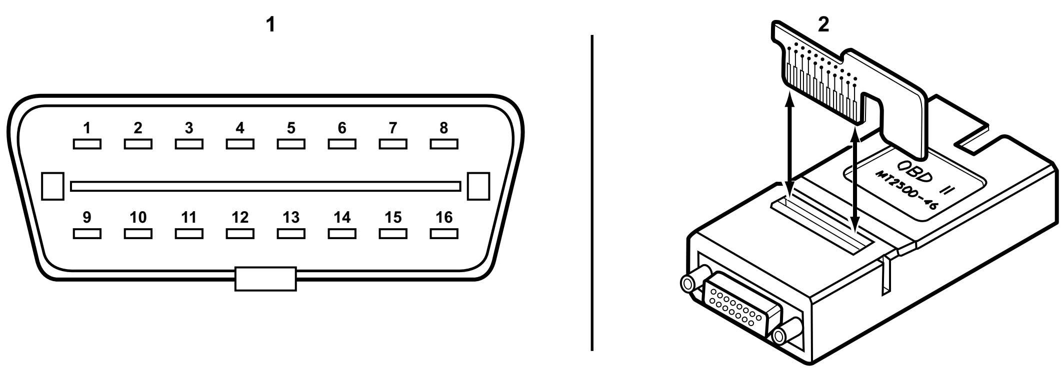


1— 20-pin connector
2— MULTI-1 adapter
3— Red MULTI-1 wire
4— Blue MULTI-1 wire
5— Black MULTI-1 wire

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).

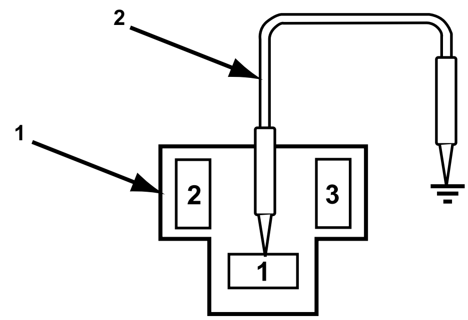


1— 16-pin DLC
2— OBD-II adapter

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.



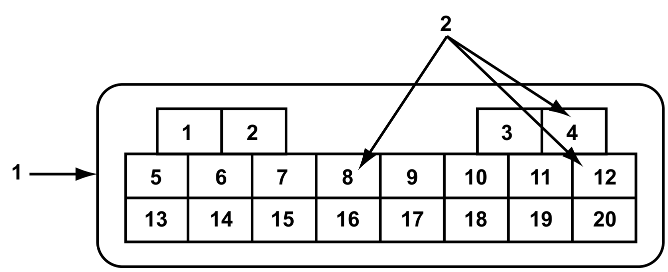
1— 3-pin connector

2— Fused jump wire

Figure 11-4 *1994–2001 Sportage 3-pin ABS check connector*

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.



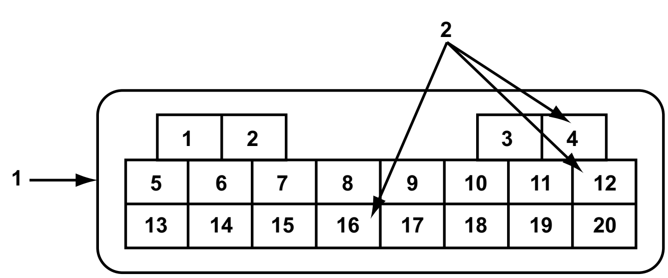
1— 20-pin connector

2— Jump wires

Figure 11-5 *20-pin DLC—jump pins for ABS codes*

To read 2000–01 Spectra and Sephia ABS codes:

- Connect pin 16 to ground (pins 4 or 12) as shown in Figure 11-6.



1— 20-pin connector

2— Jump wires

Figure 11-6 *20-pin DLC—jump pins for ABS codes*

11.1.2 Manual ABS Code Reading

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

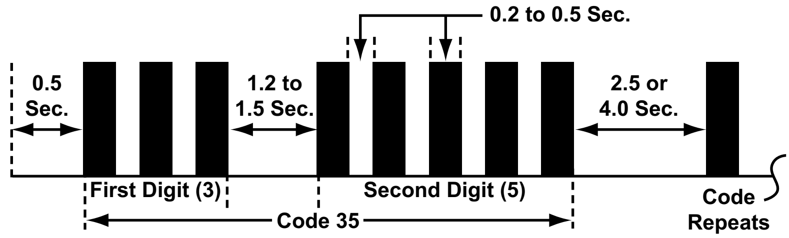


Figure 11-7 *Kia ABS Code Type 13*

Table 11-1 *Kia ABS Code Type 13*

Pattern:	Straight count
Read codes on:	Flashes ABS lamp
Start codes by:	Jumper the ABS and ground terminals in the 20-pin connector or jumper Terminal 1 to ground in the 3-pin ABS connector.
When done:	Turn the ignition off and clear codes.
After fixing problem, clear codes and drive car; then check for other codes.	

Mazda

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).

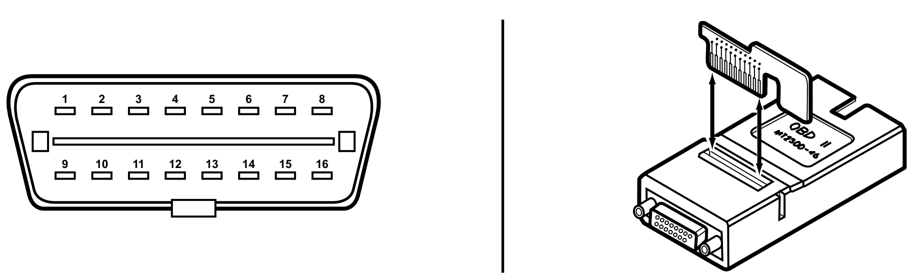


Figure 12-1 *16-pin connector and OBD-II adapter with Personality Key™ device*

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.

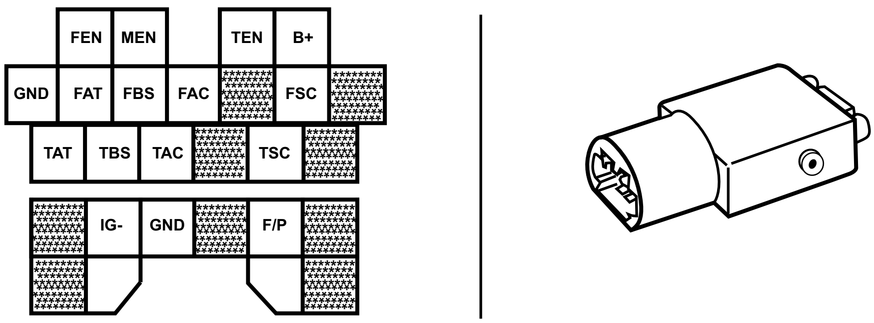


Figure 12-2 *17-pin underhood connector and MAZDA-1 adapter*

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

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

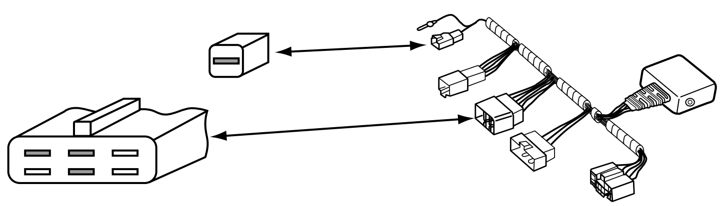


Figure 12-3 *6-pin and 1-pin connectors and MULTI-2 adapter*

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.

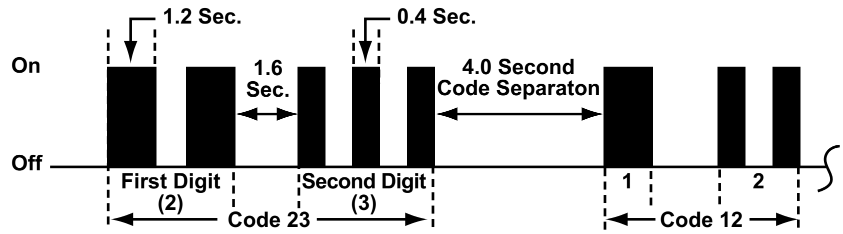


Figure 12-4 *Mazda engine, transmission, and ABS flash codes*

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.

Table 12-1 *Individual switch test instructions*

SWITCH	TEST INSTRUCTIONS
Clutch	With the key on and engine off, Switch State alternates High/Low as the clutch is depressed and released.
Neutral	Switch State alternates High/Low when switching from a drive state to a park/neutral state.
Inhibitor	(A/T only) Make sure the engine is off. Switch State alternates High/Low as the transmission is placed in gear and returned to neutral.
Idle	Switch State alternates High/Low as the accelerator pedal is pressed and released.
Head lamp	Switch State alternates High/Low as the head lamps are turned on and off. Turn off the head lamps after the test.
Brake Lamp	Switch State alternates High/Low as the brake pedal is pressed and released.
Blower	Turn the blower switch to the high position. Switch State alternates High/Low as the blower switch position changes. Turn the blower off after the test.
A/C	With the blower set to low, Switch State alternates High/Low as the A/C is turned on and off. Turn off the blower and air conditioner after the test.
Rear Defroster	Switch State alternates High/Low as the rear defroster is turned on and off. Turn off the rear defroster after the test.
Water Thermo	Switch State alternates High/Low as the water thermo switch is disconnected. Reconnect the switch after the test.

NOTE:
If coolant is at operating temperature, the LED is always on.

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:

1. Select **Wiggle (Engine Running)**.

   The test instruction screen displays.
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.

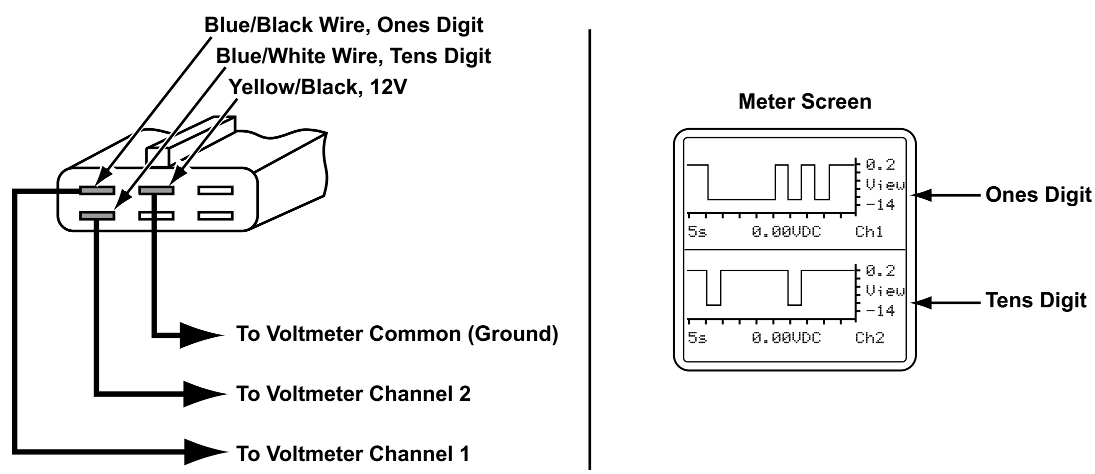


Figure 12-5 *Connecting a Dual Trace Graphic Meter to a 1987 626 transmission connection*

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).

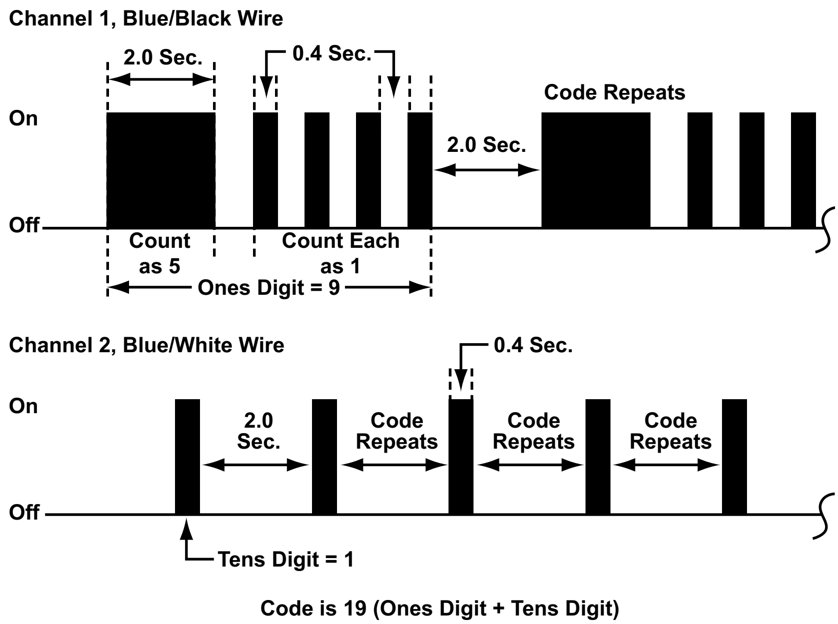


Figure 12-6 *1987 626 transmission manual flash codes*

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.

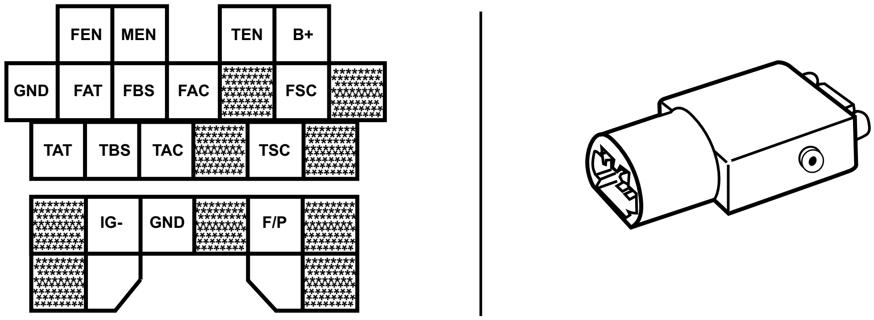
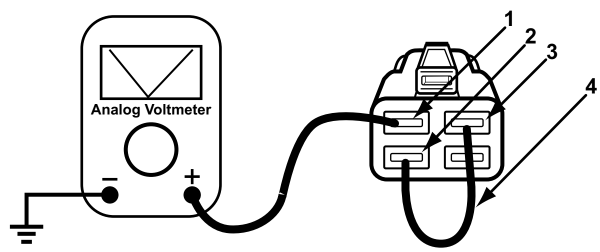


Figure 12-7 *17-pin underhood connector and MAZDA-1 adapter*

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.

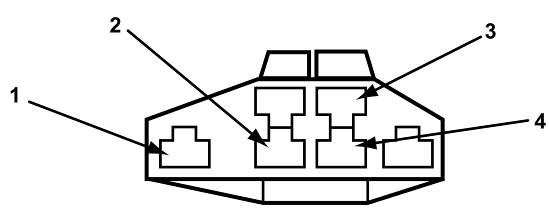


1— FBS (Green/Red)
2— TBS (Green Black)
3— GND (Black)
4— Jump wire

Figure 12-8 *Analog voltmeter and terminal on 1988-1992 626/MX6*

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

Figure 12-9 *1993–94 Navajo with 4WAL*

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.

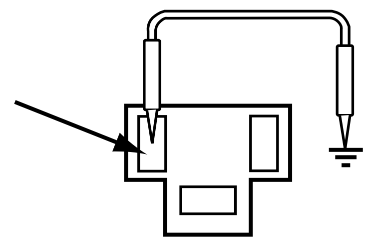


Figure 12-10 *Terminal C on 1990–93 B-Series and MPV*

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.

Chapter 13 Mitsubishi

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.

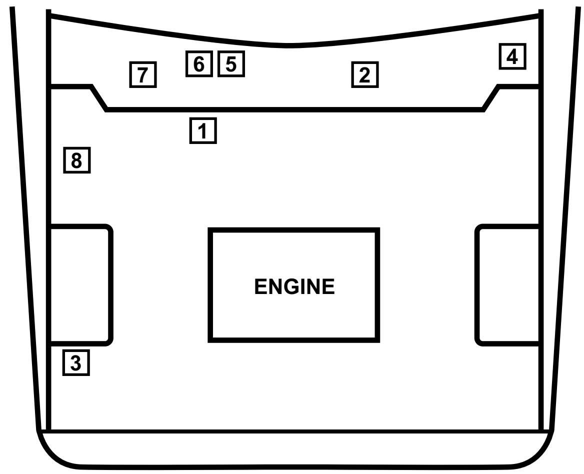


Figure 13-1 *Common connector locations*

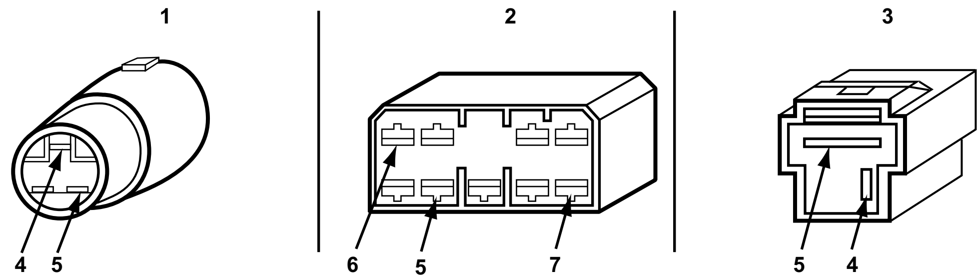
Table 13-1 *Common connector locations*

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

Connecting to 1987 and Earlier Vehicles

To read codes from most 1987 and earlier vehicles:

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



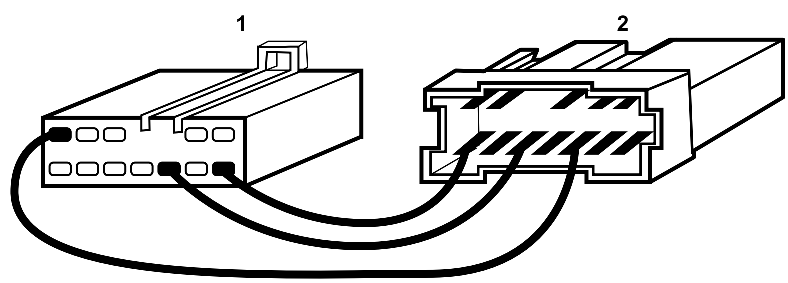
1— **3-pin connector—**located on the inner right front fender
2— **9-pin connector—**located in glovebox, next to the latch
3— **2-pin connector—**located under the dash or in engine compartment
4— **Green (preferable) or Yellow**
5— **Black**
6— **Engine: Green (preferable) or Yellow**
7— **Transmission: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



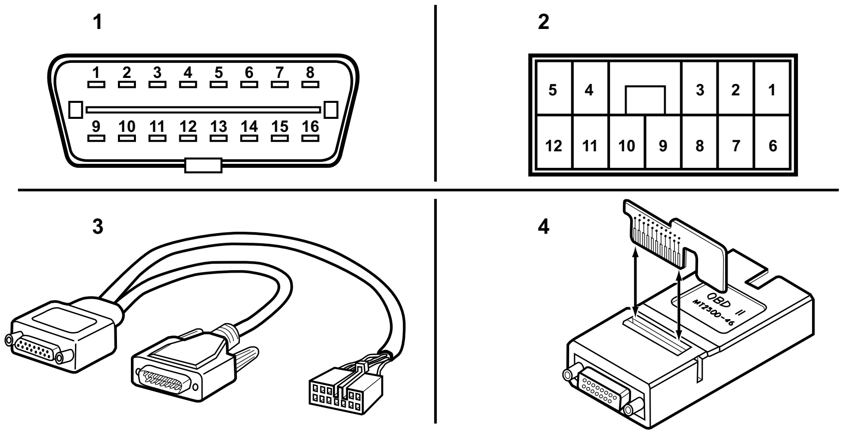
1— **HYUN-2 adapter**
2— **Connector**

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).



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

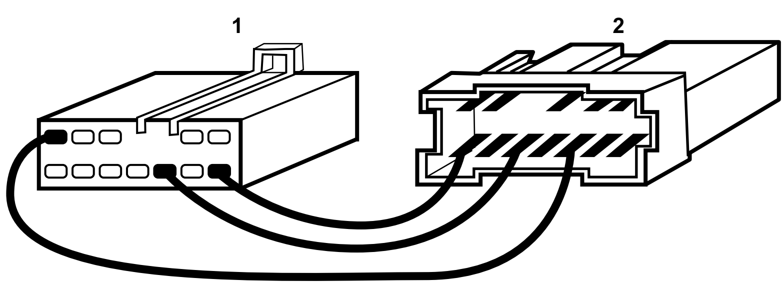
Figure 13-4 *connectors and adapters for most OBD-II vehicles*

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



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.

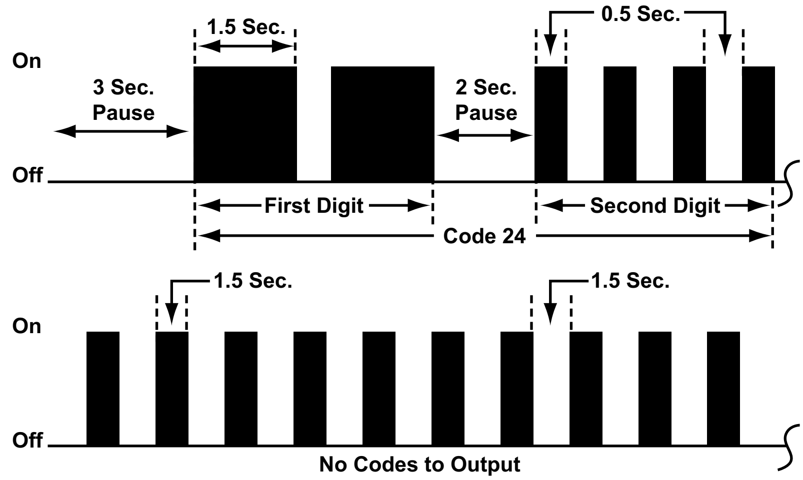


Figure 13-6 *Mitsubishi transmission Code Type 11*

Table 13-2 *Mitsubishi transmission Code Type 11*

Pattern:	For code output: long and short For no code output: repeating straight count
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.

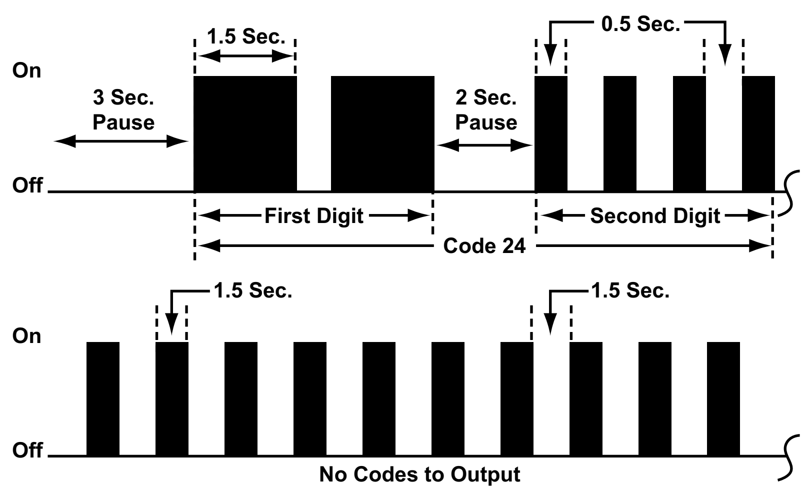


Figure 13-7 *Mitsubishi ABS Code Type 11*

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.

Chapter 14 Nissan and Infiniti

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:

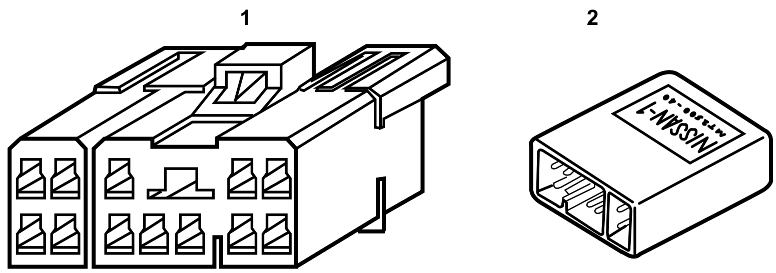
- “Code Reading Connectors and Locations” on page 124
- “Code Types 07” on page 125
- “Functional Tests” on page 129

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.



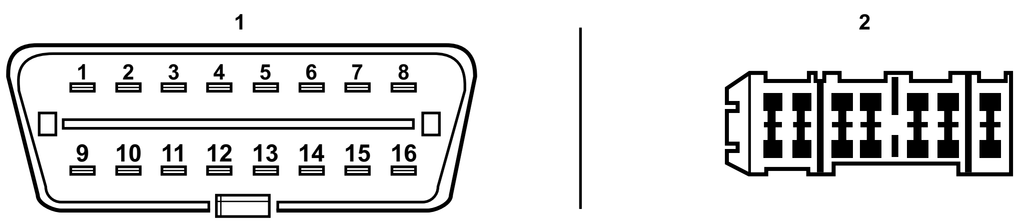
1— Diagnostic connector

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

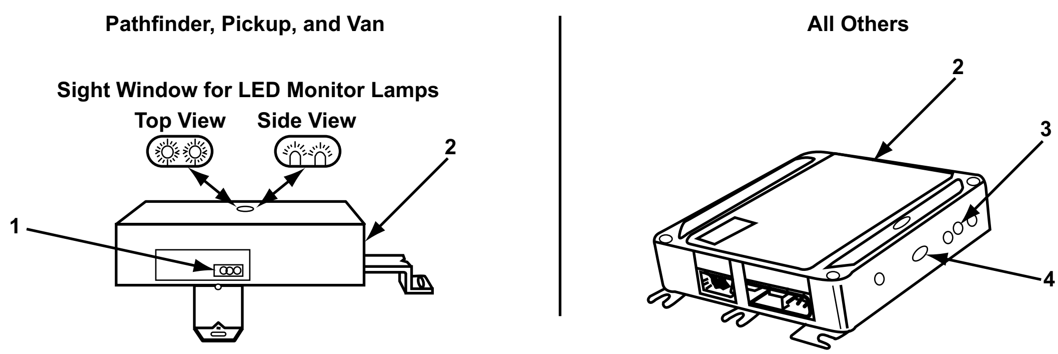
Both code types flash 2-digit (10s and 1s) codes.

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*

SWITCH	MODE
Rotary Switch	Clockwise = diagnostic mode
	Counterclockwise = normal vehicle operation
Slide Switch	On = diagnostic mode
	Off = normal vehicle operation



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).

For example: Red–Red–pause–Green–Green–Green indicates code 23.

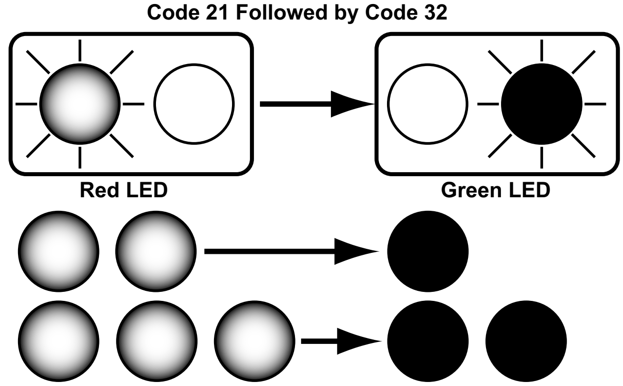


Figure 14-4 *Nissan Code Type 07a—five mode system*

Table 14-2 *Nissan Code Type 07a*

Used on:	Nissan (1990 and earlier models)
Pattern:	10s and 1s
Read codes on:	Red LED (10s) and green LED (1s) on ECM
Start codes by:	Follow the appropriate diagnostic code reading procedure.
When done:	Turn the ignition off, turn the diagnostic switch off or counterclockwise, and clear codes.
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.	

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.

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).

For example: Long–Long–Long–pause–Short–Short indicates code 32.

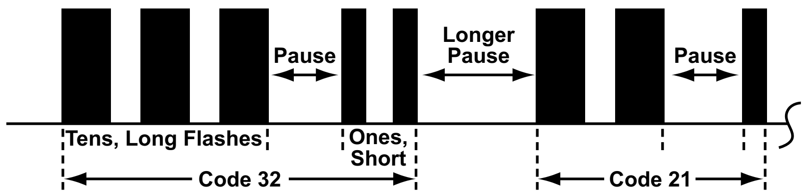


Figure 14-5 *Nissan Code Type 07b*

Table 14-3 *Nissan Code Type 7b*

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

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.

   For example: Long–Long–Long–pause–Short–Short indicates code 32.
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.

NOTE:
When the timer reaches 0:00 it does not reset.

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).

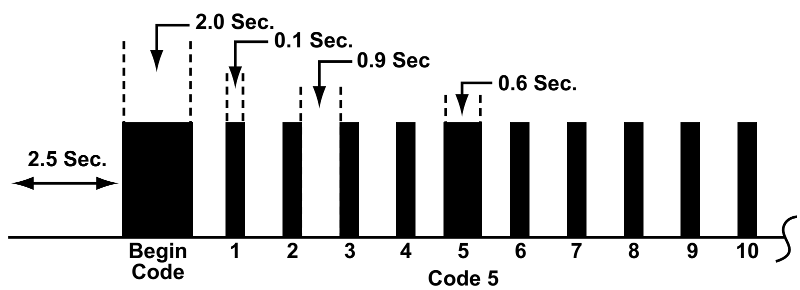


Figure 14-6 *Nissan Code Type 07c*

Table 14-4 *Nissan Code Type 7c*

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

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.

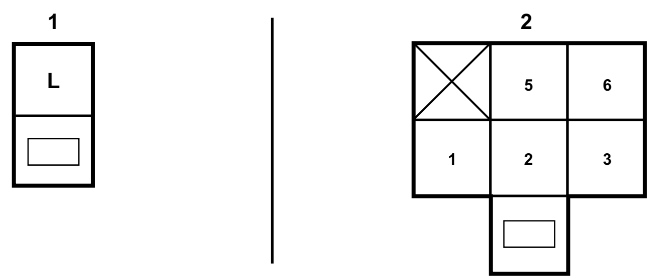
14.3 Testing Antilock Brake Systems (ABS)

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

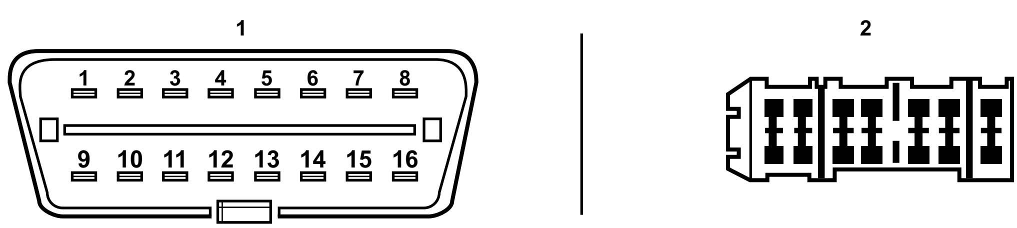
Nissan and Infiniti ABS systems use several types of connectors for code reading and functional tests. Most 2000 and later Nissan and Infiniti ABS codes can be read and cleared using the OBD-II connector in Figure 14-8. Other systems require a jumping pins on a test connector.



1— **1-pin check connector**—jumper terminal L to ground

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

Figure 14-7 *Nissan diagnostic connectors*



1— **16-pin DLC**—jumper terminal 9 to ground

2— **14-pin DLC**—jumper terminal 9 to ground

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.

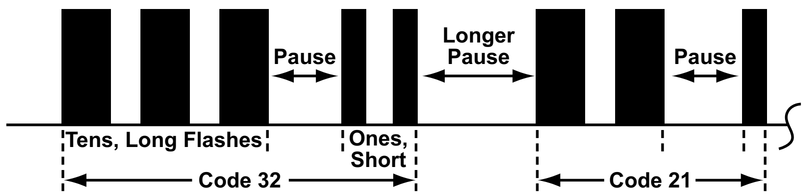


Figure 14-9 *Nissan ABS codes*

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).

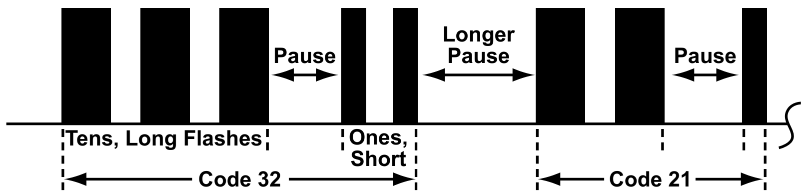


Figure 14-10 *Nissan Code Type 07b*

Table 14-5 *Nissan Code Type 7b*

Used on:	Nissan (most 1990 and later models)
Pattern:	10s and 1s—Long and short
Read codes on:	Check Engine lamp (or LED on ECM)
Start codes by:	Follow the appropriate diagnostic code reading procedure.

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 ia 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.

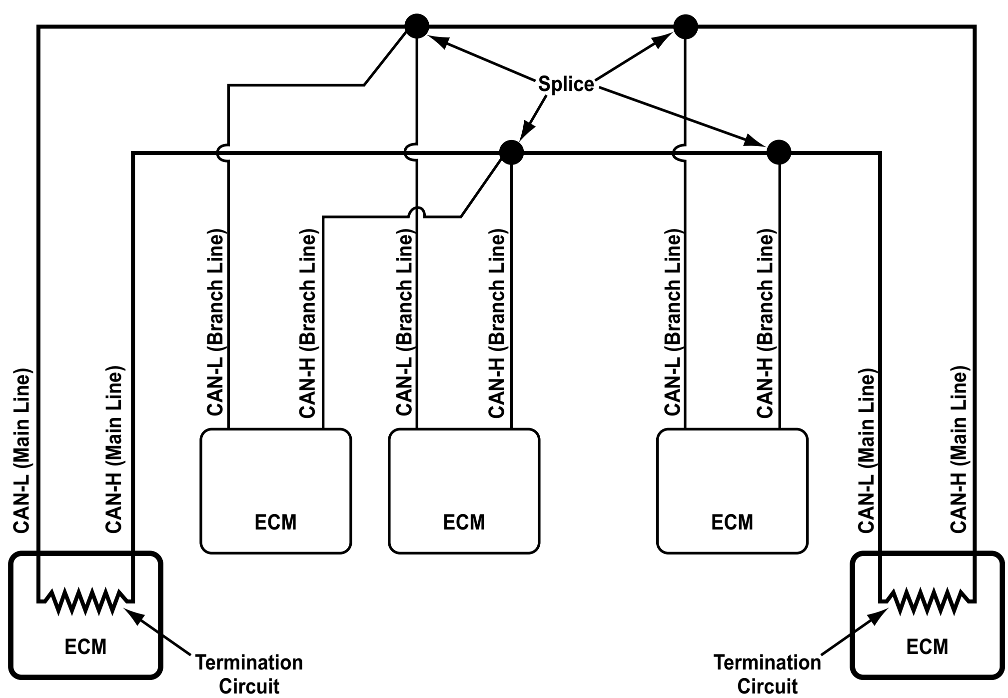


Figure 14-11 *Sample CAN schematic*

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*

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

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

Signal	Control Unit				
	ECM	BCM	M&A	ABS	IPDM-E
A/C Compressor feedback	T		R		
A/C Compressor request	T				R
Accelerator pedal position	T			R	
ASCD CRUISE lamp	T		R		
ASCD SET lamp	T		R		
Cooling fan speed request	T				R
Engine coolant temperature	T		R		
Engine speed	T		R	R	
Fuel consumption monitor	T		R		
Malfunction indicator lamp	T		R		
A/C switch	R	T			
Blower fan motor switch	R	T			
Buzzer output		T	R		
Day time running light request		T			R
Door switch		T	R		R
Front wiper request		T			R
High beam request		T	R		R
Horn chirp		T			R

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

Signal	Control Unit				
	ECM	BCM	M&A	ABS	IPDM-E
Ignition switch		T			R
Low beam request		T			R
Position lights request		T	R		R
Rear window defogger switch		T			R
Sleep request 1		T	R		
Sleep request 2		T			R
Theft warning horn request		T			R
Tire pressure		T	R		
Turn indicator		T	R		
Wake up request 1		T	R		
Fuel level sensor	R		T		
Seat belt buckle switch		R	T		
Vehicle speed sensor	R	R	T		
			R	T	
ABS warning lamp			R	T	
Brake warning lamp			R	T	
Front wiper stop position		R			T
High beam status	R				T
Hood switch		R			T
Low beam status	R				T
Rear window defogger control switch	R				T

Table 14-8 *CAN Type 2 and 3 communication signal identification (part 1 of 3)*

Signal	Control Unit					
	ECM	TCM	BCM	M&A	ABS	IPDM-E
A/C Compressor feedback	T			R		
A/C Compressor request	T					R
Accelerator pedal position	T	R			R	
ASCD CRUISE lamp	T			R		
ASCD OD cancel request	T	R				
ASCD operation	T	R				
ASCD SET lamp	T			R		
Battery voltage	T	R				
Closed throttle position	T	R				
Cooling fan speed request	T					
Engine coolant temperature	T					R
Engine speed	T	R		R	R	
Fuel consumption monitor	T			R		

Table 14-8 *CAN Type 2 and 3 communication signal identification (part 2 of 3)*

Signal	Control Unit					
	ECM	TCM	BCM	M&A	ABS	IPDM-E
Malfunction indicator lamp	T			R		
Wide open throttle position	T	R				
A/T CHECK indicator lamp		T		R		
A/T position indicator		T		R	R	
A/T self-diagnosis	R	T				
Manual mode gear position		T		R		
Manual mode indicator		T		R		
Output shaft speed	R	T				
Turbine speed	R	T				
A/C switch	R		T			
Blower fan motor switch	R		T			
Buzzer output			T	R		
Day time running light request			T			R
Door switch			T	R		R
Front wiper request			T			R
High beam request			T	R		R
Horn chirp			T			R
Ignition switch			T			R
Low beam request			T			R
Position lights request			T	R		R
Rear window defogger switch			T			R
Sleep request 1			T	R		
Sleep request 2			T			R
Theft warning horn request			T			R
Tire pressure			T	R		
Turn indicator			T	R		
Wake up request 1			T	R		
Fuel level sensor	R			T		
Manual mode shift down		R		T		
Manual mode shift up		R		T		
Manual mode		R		T		
Not manual mode		R		T		
Seat belt buckle switch			R	T		
Stop lamp switch		R		T		
Vehicle speed sensor	R	R	R	T		
				R	T	
A/T shift schedule change demand		R			T	
ABS operation		R			T	
ABS warning lamp				R	T	

Table 14-8 *CAN Type 2 and 3 communication signal identification (part 3 of 3)*

Signal	Control Unit					
	ECM	TCM	BCM	M&A	ABS	IPDM-E
Brake warning lamp				R	T	
SLIP indicator lamp				R	T	
TSC OFF indicator lamp				R	T	
Front wiper stop position			R			T
High beam status	R					T
Hood switch			R			T
Low beam status	R					T
Rear window defogger control switch	R					T

Table 14-9 *CAN Type 4 and 5 communication signal identification (part 1 of 2)*

Signal	Control Unit						
	ECM	ABS	TCM	BCM	M&A	STRG	IPDM-E
A/C Compressor feedback	T				R		
A/C Compressor request	T						R
Accelerator pedal position	T	R	R				
ASCD CRUISE lamp	T				R		
ASCD OD cancel request	T		R				
ASCD operation	T		R				
ASCD SET lamp	T				R		
Battery voltage	T		R				
Closed throttle position	T		R				
Cooling fan speed request	T						R
Engine coolant temperature	T				R		
Engine speed	T	R	R		R		
Fuel consumption monitor	T				R		
Malfunction indicator lamp	T				R		
Wide open throttle position	T		R				
A/T shift schedule change demand		T	R				
ABS operation		T	R				
ABS warning lamp		T			R		
Brake warning lamp		T			R		
SLIP indicator lamp		T			R		
VCD OFF indicator lamp		T			R		
Vehicle speed sensor		T			R		
	R		R	R	T		
A/T CHECK indicator lamp			T		R		
A/T position indicator		R	T		R		

Table 14-9 *CAN Type 4 and 5 communication signal identification (part 2 of 2)*

Signal	Control Unit						
	ECM	ABS	TCM	BCM	M&A	STRG	IPDM-E
A/T self-diagnosis	R		T				
Manual mode gear position			T		R		
Manual mode indicator			T		R		
Output shaft speed	R		T				
Turbine speed	R		T				
A/C switch	R			T			
Blower fan motor switch	R			T			
Buzzer output				T	R		
Day time running light request				T			R
Door switch				T	R		R
Front wiper request				T			R
High beam request				T	R		R
Horn chirp				T			R
Ignition switch				T			R
Low beam request				T			R
Position lights request				T	R		R
Rear window defogger switch				T			R
Sleep request 1				T	R		
Sleep request 2				T			R
Theft warning horn request				T			R
Tire pressure				T	R		
Turn indicator				T	R		
Wake up request 1				T	R		
Fuel level sensor	R				T		
Manual mode shift down			R		T		
Manual mode shift up			R		T		
Manual mode			R		T		
Not manual mode			R		T		
Seat belt buckle switch				R	T		
Stop lamp switch			R		T		
Steering angle sensor		R				T	
Front wiper stop position				R			T
High beam status	R						T
Hood switch				R			T
Low beam status	R						T
Rear window defogger control switch	R						T

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

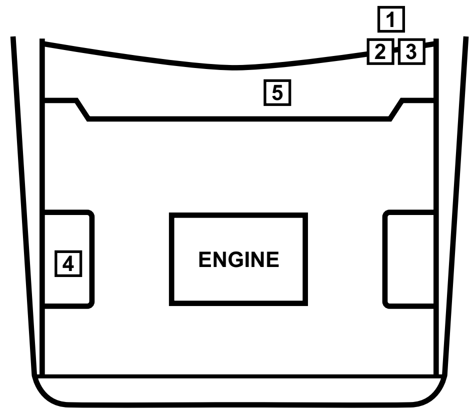


Figure 15-1 *Carbureted engine common connector locations*

Table 15-1 *Carbureted engine connector locations*

CONNECTOR	LOCATION
D-Check connectors	1 (next to ECM)
Check connectors 2 and 3	2 (next to ECM)
Check connector 4	3 (next to ECM)
Check connector 1	4 (R/F strut area)
ECM	5 (under steering column)

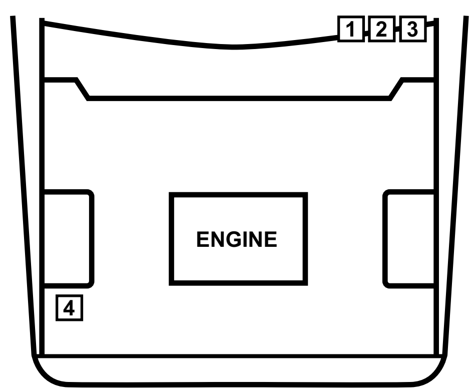


Figure 15-2 *1983–84 Turbo common connector locations*

Table 15-2 *1983–84 Turbo connector locations*

CONNECTOR	LOCATION
ECM	1 (under steering column)
D-Check connectors	2 (next to ECM)
Check connectors 1, 2, and 3	3 (next to ECM)
Check connector 4	4 (front of R/F strut tower)

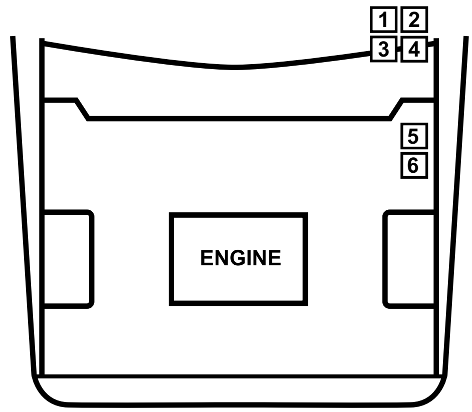


Figure 15-3 *Justy common connector locations*

Table 15-3 *Justy connector locations*

CONNECTOR	LOCATION
ECVT D-Check and Read Memory connectors	1 (by ECVT module)
ECM D-Check and Read Memory connectors	2 (by ECM module)
ECVT control module	3 (left of ECM)
ECM control module	4 (left of steering column)
9-pin diagnostic connector	5 (left of fire wall area)
6-pin and 9-pin diagnostic connectors	6 (left of fire wall area)

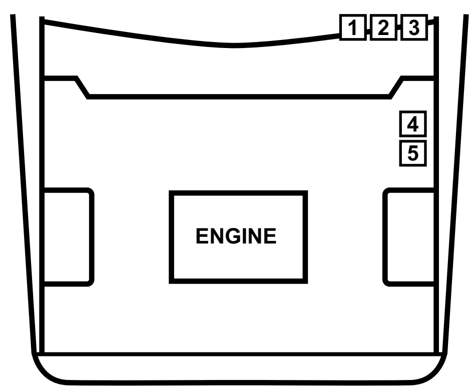


Figure 15-4 *Loyale common connector locations*

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

CONNECTOR	LOCATION
ECM	1 (under steering column)
D-Check & Read Memory connectors—carbureted, some MPFI and SPI	2 (next to ECM connector)
17-pin or 13-pin Check connector	3 (next to ECM connector)
*Transmission control module (TCM) is located inside the left quarter panel (4EAT only).	

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

CONNECTOR	LOCATION
17-pin or 13-pin Check connector (alternate location) & D-Check connectors	4 (left side of fire wall area)
9-pin Check connector (some models)	5 (left side of fire wall area)
*Transmission control module (TCM) is located inside the left quarter panel (4EAT only).	

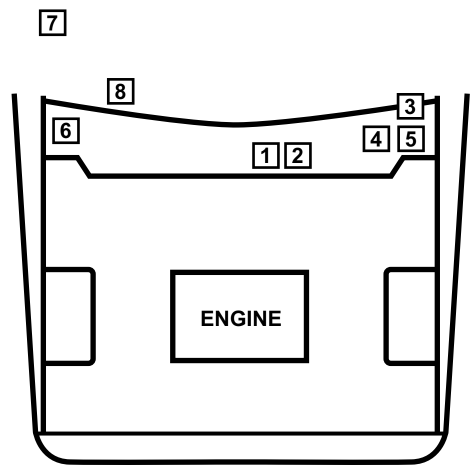


Figure 15-5 *1990–94 Legacy and 1993–95 Impreza 1.8L common connector locations*

Table 15-5 *Legacy and Impreza 1.8L connector locations*

VEHICLE	YEAR	CONNECTOR	LOCATION
Impreza 1.8L	1993–94	ECM	5 (left side of steering column)
	1993–95	22-pin	1 (left side of heater box)
		9-pin	2 (left side of heater box)
		D-Check and Read Memory for engine and transmission	3 (under left side of dash)
		TCM	4 (left side of steering column)
		ABS controller	7 (under R/F seat carpet)
	1995	ECM	8 (under right side of passenger carpet)
Legacy	1990–94	22-pin	2 (left side of heater box)
		D-Check and Read Memory for engine and transmission	3 (under left side of dash)
		TCM	4 (left side of steering column)
		ECM	5 (left side of steering column)
		9-pin	2 (left side of heater box)
		ABS controller	7 (under R/F seat carpet)

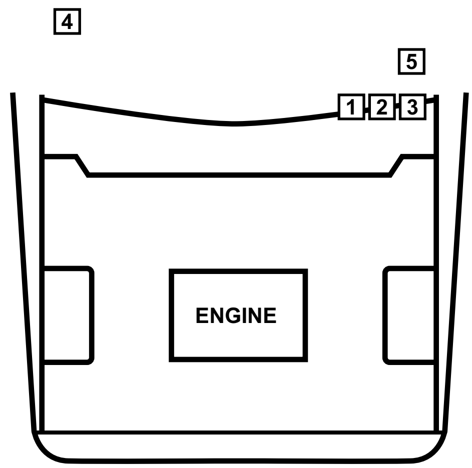


Figure 15-6 *SVX common connector locations*

Table 15-6 *SVX connector locations*

CONNECTOR	LOCATION
TCM	1 (under left side of dash)
ECM	2 (under left side of dash)
10-pin and 20-pin connectors	3 (left side of kickpanel)
ABS control unit	4 (under RF seat)
9-pin Check connector and diagnostic connector	5 (left side of kick panel)

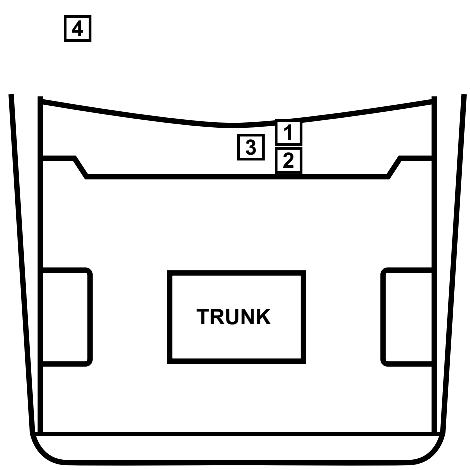


Figure 15-7 *XT and XT6 common connector locations*

Table 15-7 *XT and XT6 connector locations*

CONNECTOR	LOCATION
D-Check connector; 9-pin Check connector	1
Read Memory connector	2 (by ECM)
MPFI controller	3 (in trunk below rear window)
TCM and power steering controller connector (under left rear quarter-window)	4

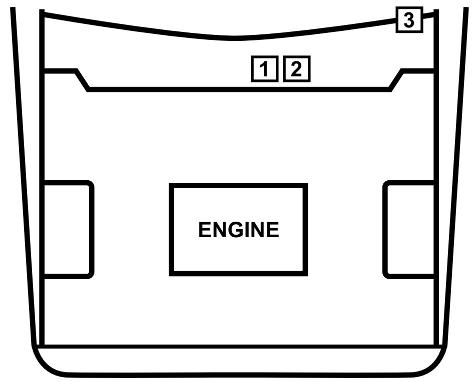


Figure 15-8 *1995 Legacy, 1995 Impreza 2.2L and 1996-06 Subaru common connector locations*

Table 15-8 *1995 Legacy, Impreza 2.2L and 1996 to 2006 connector location*

VEHICLE	YEAR	CONNECTOR	LOCATION
Legacy and Impreza 2.2L	1995	ABS diagnosis connector	1 (left side of heater box)
		16-pin OBD-II connector for engine and transmission	2 (under left side of dash)
		Airbag (SRS) diagnosis connector	3 (under left side of dash)
All Models	1996-04	ABS diagnosis connector	1 (left side of heater box)
		16-pin OBD-II connector for engine and transmission	2 (under left side of dash)
		Airbag (SRS) diagnosis connector	3 (under left side of dash)
All except Legacy	2005-06	16-pin OBD-II connector for engine, transmission and ABS	2 (under left side of dash)
		Airbag (SRS) diagnosis connector	3 (under left side of dash)
Legacy		16-pin OBD-II connector for engine, transmission, ABS and airbag	1 (left side of heater box)

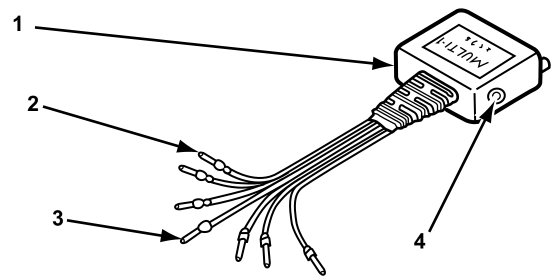
15.1.2 Connecting the Scan Tool to the Vehicle

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).



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)

Figure 15-9 *MULTI-1 adapter*

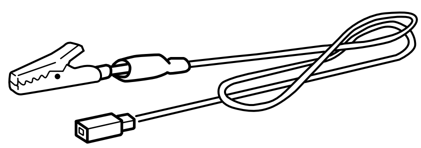


Figure 15-10 *Ground adapter*

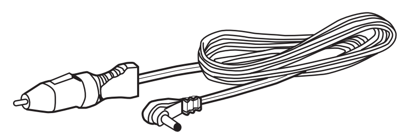


Figure 15-11 *Lighter power cable*

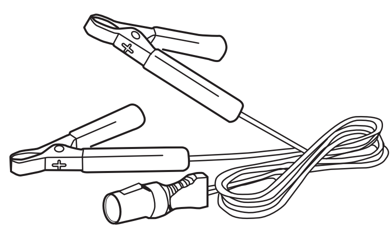
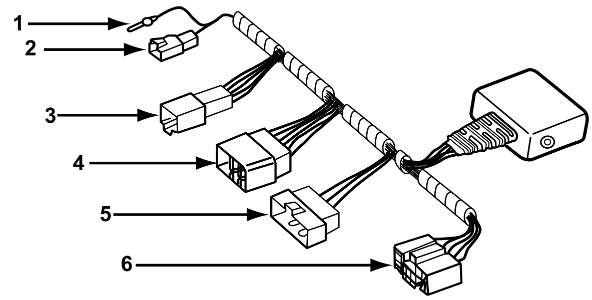


Figure 15-12 *Battery power cable*

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.

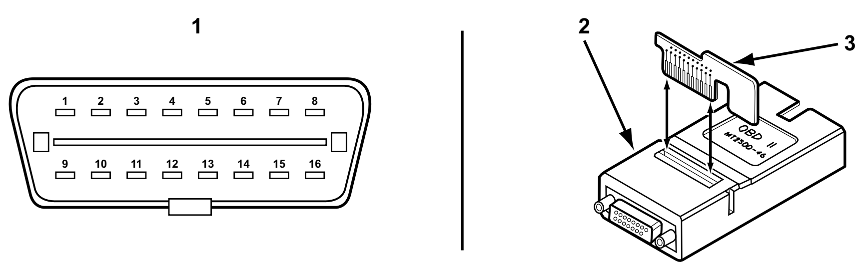


Figure 15-14 *OBD-II adapter and Personality Key™*

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 15-9 *Subaru Vehicle Connections Table (part 1 of 9)*

Vehicle Identification Number				Adapter				User’s Manual Section and Figure Numbers			
Year	Model	Engine	Fuel System	MULTI-1	MULTI2C	Power Pac	OBD-II	Reading Codes Connector	D-Check Connectors	Read Memory Connectors	Code Reading Connector Locations
1983	Brat	1.8L H4	2BBL	X				Figure 15-19	Figure 15-33		Table 15-1
		1.8L H4T	MFI	X				Figure 15-15	Figure 15-35		Table 15-2
	Hardtop	All	All	X				Figure 15-19	Figure 15-33		Table 15-1
	Hatchback	All	All	X				Figure 15-19	Figure 15-33		Table 15-1
	Sedan	All	All	X				Figure 15-19	Figure 15-33		Table 15-1
	Wagon	1.8L H4	1BBL	X				Figure 15-19	Figure 15-33		Table 15-1
		1.8L H4	2BBL	X				Figure 15-19	Figure 15-33		Table 15-1
		1.8L H4T	MFI	X				Figure 15-15	Figure 15-35		Table 15-2
1984	Brat	1.8L H4	2BBL	X				Figure 15-28	Figure 15-34		Table 15-1
		1.8L H4-T	MFI	X				Figure 15-16	Figure 15-35		Table 15-2
	Hardtop	1.6L H4	2BBL	X				Figure 15-28	Figure 15-34		Table 15-1
		1.8L H4	1BBL	X				Figure 15-28	Figure 15-34		Table 15-1
		1.8L H4	2BBL	X				Figure 15-28	Figure 15-34		Table 15-1
		1.8L H4-T	MFI	X				Figure 15-16	Figure 15-35		Table 15-2
	Hatchback	All	All	X				Figure 15-28	Figure 15-34		Table 15-1
	Sedan	All	All	X				Figure 15-28	Figure 15-34		Table 15-1
	Wagon	1.8L H4	1BBL	X				Figure 15-28	Figure 15-34		Table 15-1
		1.8L H4	2BBL	X				Figure 15-28	Figure 15-34		Table 15-1
		1.8L H4-T	MFI	X				Figure 15-16	Figure 15-35		Table 15-2
1985	Brat	All	All	X				Figure 15-21	Figure 15-36		Table 15-4
	Hatchback	All	All	X				Figure 15-21	Figure 15-36		Table 15-1
	Sedan	1.8L H4	2BBL	X				Figure 15-21	Figure 15-36		Table 15-1
		1.8L H4	MFI	X				Figure 15-29	Figure 15-35		Table 15-4
		1.8L H4-T	MFI	X				Figure 15-29	Figure 15-35		Table 15-4
	Wagon	1.8L H4	2BBL	X				Figure 15-21	Figure 15-36		Table 15-1
		1.8L H4	MFI	X				Figure 15-29	Figure 15-35		Table 15-4
	XT	1.8L H4	MFI	X				Figure 15-29	Figure 15-37		Table 15-7
		1.8L H4-T	MFI	X				Figure 15-29	Figure 15-37		Table 15-7

Table 15-9 *Subaru Vehicle Connections Table (part 2 of 9)*

Vehicle Identification Number				Adapter				User's Manual Section and Figure Numbers			
Year	Model	Engine	Fuel System	MULTI-1	MULTI2C	Power Pac	OBD-II	Reading Codes Connector	D-Check Connectors	Read Memory Connectors	Code Reading Connector Locations
1986	Brat	All	All	X				Figure 15-26, Figure 15-27	Figure 15-36		Table 15-4
	Coupe	1.8L H4	2BBL	X				Figure 15-21	Figure 15-36		Table 15-1
		1.8L H4	SPI	X				Figure 15-22, Figure 15-23	Figure 15-38	Figure 15-38	Table 15-4
		1.8L H4-T	MFI	X				Figure 15-29	Figure 15-35		Table 15-4
	Sedan	1.8L H4	2BBL	X				Figure 15-21	Figure 15-36		Table 15-1
		1.8L H4	SPI	X				Figure 15-22, Figure 15-23	Figure 15-38	Figure 15-38	Table 15-4
		1.8L H4-T	MFI	X				Figure 15-29	Figure 15-35		Table 15-4
	Wagon	1.8L H4	2BBL	X				Figure 15-21	Figure 15-36		Table 15-1
		1.8L H4	SPI	X				Figure 15-22, Figure 15-23	Figure 15-38	Figure 15-38	Table 15-4
		1.8L H4-T	MFI	X				Figure 15-29	Figure 15-35		Table 15-4
	XT	1.8L H4	MFI	X				Figure 15-29	Figure 15-37		Table 15-7
		1.8L H4-T	MFI	X				Figure 15-29	Figure 15-37		Table 15-7
1987	Brat	All	All	X				Figure 15-26, Figure 15-27	Figure 15-36		Table 15-4
	Coupe	1.8L H4	2BBL	X				Figure 15-21	Figure 15-36		Table 15-1
		1.8L H4	SPI	X				Figure 15-24, Figure 15-25	Figure 15-40	Figure 15-40	Table 15-4
		1.8L H4-T	MFI	X				Figure 15-21	Figure 15-35		Table 15-4
	Hatchback	1.8L H4	2BBL	X				Figure 15-21	Figure 15-36		Table 15-1
		1.8L H4	2BBL	X				Figure 15-26, Figure 15-27	Figure 15-36		Table 15-1
	Justy	All	All	X				Figure 15-20	Figure 15-39	Figure 15-39	Table 15-3
	Sedan	1.8L H4	2BBL	X				Figure 15-21	Figure 15-36		Table 15-1
		1.8L H4	SPI	X				Figure 15-24, Figure 15-25	Figure 15-40	Figure 15-40	Table 15-4
		1.8L H4-T	MFI	X				Figure 15-21	Figure 15-35		Table 15-4
	Wagon	1.8L H4	2BBL	X				Figure 15-21	Figure 15-36		Table 15-1
		1.8L H4	SPI	X				Figure 15-24, Figure 15-25	Figure 15-40	Figure 15-40	Table 15-4
		1.8L H4-T	MFI	X				Figure 15-21	Figure 15-35		Table 15-4
	XT	1.8L H4	MFI	X				Figure 15-21	Figure 15-41	Figure 15-41	Table 15-7
		1.8L H4-T	MFI	X				Figure 15-21	Figure 15-41	Figure 15-41	Table 15-7

Table 15-9 *Subaru Vehicle Connections Table (part 3 of 9)*

Vehicle Identification Number				Adapter				User's Manual Section and Figure Numbers			
Year	**Model**	**Engine**	**Fuel System**	**MULTI-1**	**MULTI2C**	**Power Pac**	**OBD-II**	**Reading Codes Connector**	**D-Check Connectors**	**Read Memory Connectors**	**Code Reading Connector Locations**
1988	Coupe	1.8L H4	SPI	X				Figure 15-24, Figure 15-25	Figure 15-40	Figure 15-40	Table 15-4
1988	Coupe	1.8L H4-T	MFI	X				Figure 15-30	Figure 15-42	Figure 15-42	Table 15-4
1988	Hatchback	All	All	X				Figure 15-26, Figure 15-27	Figure 15-36		Table 15-1
1988	Justy	All	All	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-3
1988	Sedan	1.8L H4	SPI	X				Figure 15-24, Figure 15-25	Figure 15-40	Figure 15-40	Table 15-4
1988	Sedan	1.8L H4-T	MFI	X				Figure 15-30	Figure 15-42	Figure 15-42	Table 15-4
1988	Wagon	1.8L H4	SPI	X				Figure 15-24, Figure 15-25	Figure 15-40	Figure 15-40	Table 15-4
1988	Wagon	1.8L H4-T	MFI	X				Figure 15-30	Figure 15-42	Figure 15-42	Table 15-4
1988	XT	All	All	X				Figure 15-24, Figure 15-25	Figure 15-41	Figure 15-41	Table 15-7
1989	Coupe	1.8L H4	SPI	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
1989	Coupe	1.8L H4-T	MFI	X				Figure 15-30	Figure 15-42	Figure 15-42	Table 15-4
1989	Hatchback	All	All	X				Figure 15-26, Figure 15-27	Figure 15-36		Table 15-1
1989	Justy	All	All	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-3
1989	Sedan	1.8L H4	SPI	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
1989	Sedan	1.8L H4-T	MFI	X				Figure 15-30	Figure 15-42	Figure 15-42	Table 15-4
1989	Touring Wagon	1.8L H4	SPI	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
1989	Touring Wagon	1.8L H4-T	MFI	X				Figure 15-30	Figure 15-42	Figure 15-42	Table 15-4
1989	Wagon	1.8L H4	SPI	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
1989	Wagon	1.8L H4-T	MFI	X				Figure 15-30	Figure 15-42	Figure 15-42	Table 15-4
1989	XT	All	All	X				Figure 15-21	Figure 15-41	Figure 15-41	Table 15-7

Table 15-9 *Subaru Vehicle Connections Table (part 4 of 9)*

Vehicle Identification Number				Adapter				User's Manual Section and Figure Numbers			
Year	Model	Engine	Fuel System	MULTI-1	MULTI2C	Power Pac	OBD-II	Reading Codes Connector	D-Check Connectors	Read Memory Connectors	Code Reading Connector Locations
1990	Coupe	All	SPI	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
		All	MFI	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-4
	Justy	1.2L L3	2BBL	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-3
		1.2L L3	MFI			X		Power Pac	Figure 15-42	Figure 15-42	Table 15-3
	Legacy Touring Wagon	All	All	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-5
	Legacy Wagon	All	All	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-5
	Sedan	All	SPI	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
		All	MFI	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-4
	Touring Wagon	All	SPI	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
		All	MFI	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-4
	Wagon	All	SPI	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
		All	MFI	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-4
	XT	All	All	X				Figure 15-17, Figure 15-18	Figure 15-41	Figure 15-41	Table 15-7
1991	Justy	1.2L L3	2BBL	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-3
		1.2L L3	MFI			X		Power Pac	Figure 15-42	Figure 15-42	Table 15-3
	Legacy Wagon	All	All	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-5
	Sedan	1.8L H4	SPI	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
		2.2L H4	MFI	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-4
	Wagon	All	All	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
	XT	All	All	X				Figure 15-21	Figure 15-41	Figure 15-41	Table 15-7

Table 15-9 *Subaru Vehicle Connections Table (part 5 of 9)*

Vehicle Identification Number				Adapter				User's Manual Section and Figure Numbers			
Year	Model	Engine	Fuel System	MULTI-1	MULTI2C	Power Pac	OBD-II	Reading Codes Connector	D-Check Connectors	Read Memory Connectors	Code Reading Connector Locations
1992	Justy	1.2L L3	2BBL	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-3
		1.2L L3	MFI			X		Power Pac	Figure 15-42	Figure 15-42	Table 15-3
	Legacy Wagon	All	All	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-5
	Sedan	1.8L H4-T	MFI	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-4
		1.8L H4	SPI	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
		2.2L H4	MFI	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-4
		2.2L H4-T	MFI	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-4
	SVX	All	All			X		Power Pac	Figure 15-43	Figure 15-43	Table 15-6
	Wagon	1.8L H4-T	MFI	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-4
		1.8L H4	SPI	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
1993	Impreza Wagon	All	All			X		Power Pac	Figure 15-42	Figure 15-42	Table 15-5
	Justy	1.2L L3	2BBL	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-3
		1.2L L3	MFI			X		Power Pac	Figure 15-42	Figure 15-42	Table 15-3
	Legacy Wagon	All	All	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-5
	Sedan	1.8L H4	MFI			X		Power Pac	Figure 15-42	Figure 15-42	Table 15-4
		1.8L H4	SPI	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
		2.2L H4	MFI	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-4
		2.2L H4-T	MFI	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-4
	SVX	All	All			X		Power Pac	Figure 15-43	Figure 15-43	Table 15-6
	Wagon	All	All	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4

Table 15-9 *Subaru Vehicle Connections Table (part 6 of 9)*

Vehicle Identification Number				Adapter				User's Manual Section and Figure Numbers			
Year	**Model**	**Engine**	**Fuel System**	**MULTI-1**	**MULTI2C**	**Power Pac**	**OBD-II**	**Reading Codes Connector**	**D-Check Connectors**	**Read Memory Connectors**	**Code Reading Connector Locations**
1994	Impreza Wagon	All	All			X		Power Pac	Figure 15-42	Figure 15-42	Table 15-5
	Justy	1.2L L3	2BBL	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-3
		1.2L L3	MFI			X		Power Pac	Figure 15-42	Figure 15-42	Table 15-3
	Legacy Wagon	All	All	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-5
	Sedan	1.8L H4	MFI			X		Power Pac	Figure 15-42	Figure 15-42	Table 15-4
		1.8L H4	SPI	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
		2.2L H4	MFI	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-4
		2.2L H4-T	MFI	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-4
	SVX	All	All			X		Power Pac	Figure 15-43	Figure 15-43	Table 15-6
	Wagon	All	All	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
1995	Impreza Coupe	1.8L H4	MFI			X		Power Pac	Figure 15-42	Figure 15-42	Table 15-5
		2.2L H4	MFI				X	Figure 15-31			Table 15-5
	Impreza Sedan	1.8L H4	MFI			X		Power Pac	Figure 15-42	Figure 15-42	Table 15-5
		2.2L H4	MFI				X	Figure 15-31			Table 15-5
	Impreza Wagon	1.8L H4	MFI			X		Power Pac	Figure 15-42	Figure 15-42	Table 15-5
		2.2L H4	MFI				X	Figure 15-31			Table 15-5
	Legacy Sedan	All	All				X	Figure 15-31			Table 15-8
	Legacy Wagon	All	All				X	Figure 15-31			Table 15-8
	SVX	All	All			X		Power Pac	Figure 15-43	Figure 15-43	Table 15-6
1996 to 2005	All	All	All				X	Figure 15-31			Table 15-8
1996	Impreza Coupe	All	All					OBD-II			
	Impreza Sedan	All	All					OBD-II			
	Impreza Wagon	All	All					OBD-II			
	Legacy Outback	All	All					OBD-II			
	Legacy Sedan	All	All					OBD-II			
	Legacy Wagon	All	All					OBD-II			
	SVX	All	All					OBD-II			

Table 15-9 *Subaru Vehicle Connections Table (part 7 of 9)*

Vehicle Identification Number				Adapter				User's Manual Section and Figure Numbers			
Year	Model	Engine	Fuel System	MULTI-1	MULTI2C	Power Pac	OBD-II	Reading Codes Connector	D-Check Connectors	Read Memory Connectors	Code Reading Connector Locations
1997	Impreza Coupe	All	All					OBD-II			
	Impreza Sedan	All	All					OBD-II			
	Impreza Wagon	All	All					OBD-II			
	Legacy Outback	All	All					OBD-II			
	Legacy Sedan	All	All					OBD-II			
	Legacy Wagon	All	All					OBD-II			
	SVX	All	All					OBD-II			
1998	Impreza Coupe	All	All					OBD-II			
	Impreza Sedan	All	All					OBD-II			
	Legacy Outback	All	All					OBD-II			
	Legacy Sedan	All	All					OBD-II			
	Legacy Wagon	All	All					OBD-II			
	Wagon	All	All					OBD-II			
1999	Impreza Coupe	All	All					OBD-II			
	Impreza Sedan	All	All					OBD-II			
	Legacy Outback	All	All					OBD-II			
	Legacy Sedan	All	All					OBD-II			
	Legacy Wagon	All	All					OBD-II			
	Wagon	All	All					OBD-II			
2000	Impreza Coupe	All	All					OBD-II			
	Impreza Sedan	All	All					OBD-II			
	Legacy Sedan	All	All					OBD-II			
	Legacy Wagon	All	All					OBD-II			
	Wagon	All	All					OBD-II			

Table 15-9 *Subaru Vehicle Connections Table (part 8 of 9)*

Vehicle Identification Number				Adapter				User's Manual Section and Figure Numbers			
Year	Model	Engine	Fuel System	MULTI-1	MULTI2C	Power Pac	OBD-II	Reading Codes Connector	D-Check Connectors	Read Memory Connectors	Code Reading Connector Locations
2001	Forester	All	All					OBD-II			
	Impreza Coupe	All	All					OBD-II			
	Impreza Sedan	All	All					OBD-II			
	Impreza Wagon	All	All					OBD-II			
	Legacy Sedan	All	All					OBD-II			
	Legacy Wagon	All	All					OBD-II			
2002	Forester	All	All					OBD-II			
	Impreza Sedan	All	All					OBD-II			
	Impreza Wagon	All	All					OBD-II			
	Legacy/ Outback Sedan	All	All					OBD-II			
	Legacy/ Outback Wagon	All	All					OBD-II			
2003	Baja	All	All					OBD-II			
	Forester	All	All					OBD-II			
	Impreza Sedan	All	All					OBD-II			
	Impreza Wagon	All	All					OBD-II			
	Legacy/ Outback Sedan	All	All					OBD-II			
	Legacy/ Outback Wagon	All	All					OBD-II			
2004	Baja	All	All					OBD-II			
	Forester	All	All					OBD-II			
	Impreza Sedan	All	All					OBD-II			
	Impreza Wagon	All	All					OBD-II			
	Legacy/ Outback Sedan	All	All					OBD-II			
	Legacy/ Outback Wagon	All	All					OBD-II			

Table 15-9 *Subaru Vehicle Connections Table (part 9 of 9)*

Vehicle Identification Number				Adapter				User's Manual Section and Figure Numbers			
Year	**Model**	**Engine**	**Fuel System**	**MULTI-1**	**MULTI2C**	**Power Pac**	**OBD-II**	**Reading Codes Connector**	**D-Check Connectors**	**Read Memory Connectors**	**Code Reading Connector Locations**
2005	Baja	All	All					OBD-II			
	Forester	All	All					OBD-II			
	Impreza Sedan	All	All					OBD-II			
	Impreza Wagon	All	All					OBD-II			
	Legacy/ Outback Sedan	All	All					OBD-II			
	Legacy/ Outback Wagon	All	All					OBD-II			
2006	B9 Tribeca	All	All					OBD-II			
	Baja	All	All					OBD-II			
	Forester	All	All					OBD-II			
	Impreza Sedan	All	All					OBD-II			
	Impreza Wagon	All	All					OBD-II			
	Legacy/ Outback Sedan	All	All					OBD-II			
	Legacy/ Outback Wagon	All	All					OBD-II			

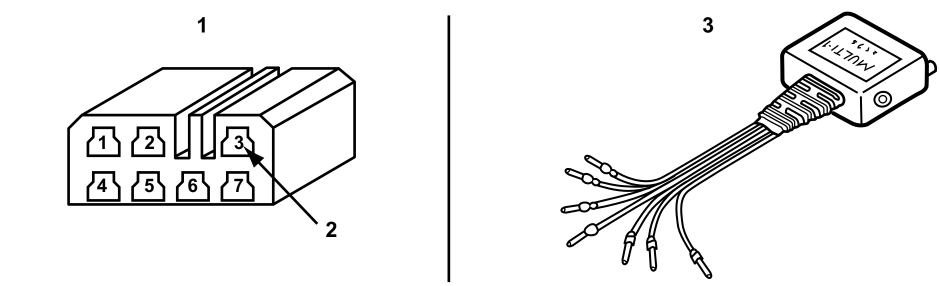
Subaru Vehicle Connection Diagrams

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.



1— 7-pin Check connector (color: brown)

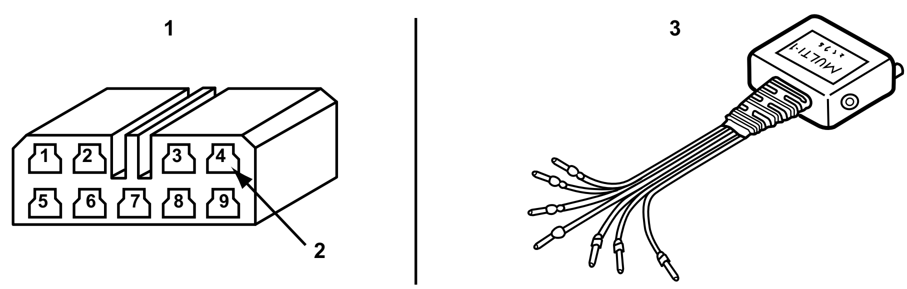
2— Pin 3 (connect the MULTI-1 blue wire here)

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)

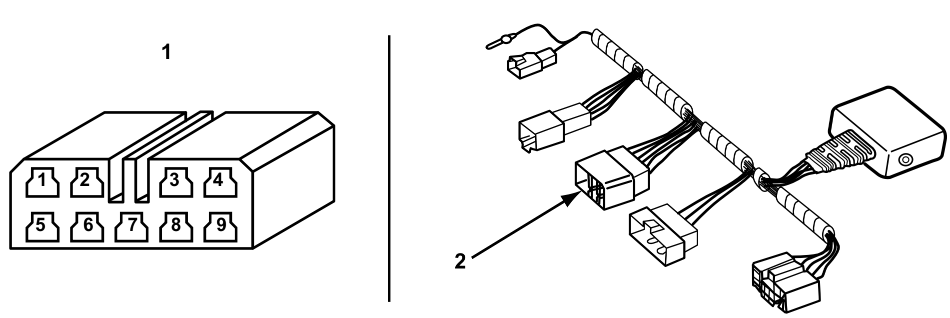
2— Pin 4 (connect the MULTI-1 blue wire here)

3— MULTI-1 adapter

Figure 15-16 *Yellow 9-pin Check connector*

To read codes on vehicles with a 9-pin Check connector:

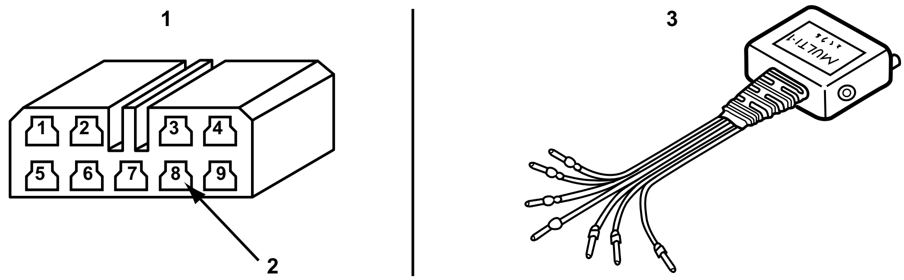
- Codes can be read using a MULTI-2C or a MULTI-1 adapter. To read codes, connect the MULTI-2C adapter to the Check connector (Figure 15-17) or connect the blue wire of the MULTI-1 adapter to pin 8 of the Check connector (Figure 15-18).



1— 9-pin Check connector (color: varies)

2— MULTI-2 adapter

Figure 15-17 *9-pin Check connector and MULTI-2C*



1— 9-pin Check connector (color: varies)

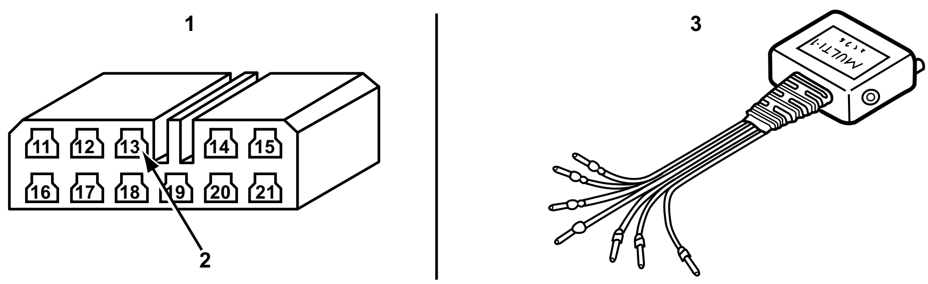
2— Pin 8 (connect the MULTI-1 blue wire here)

3— MULTI-1 adapter

Figure 15-18 *9-pin Check connector and MULTI-1*

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).



1— 11-pin Check connector (color: brown)

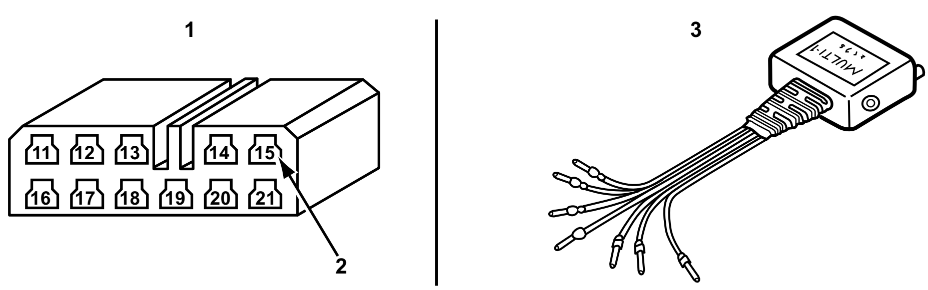
2— Pin 13 (connect the MULTI-1 blue wire here)

3— MULTI-1 adapter

Figure 15-19 *11-pin Check connector*

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).



1— 11-pin Check connector (color: varies)

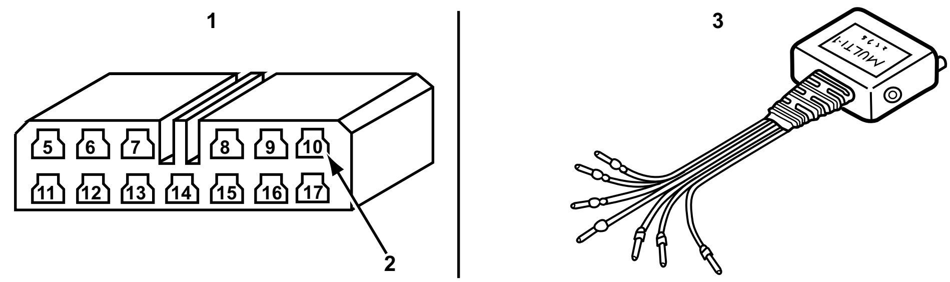
2— Pin 15 (connect the MULTI-1 blue wire here)

3— MULTI-1 adapter

Figure 15-20 *11-pin Check Connector*

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).

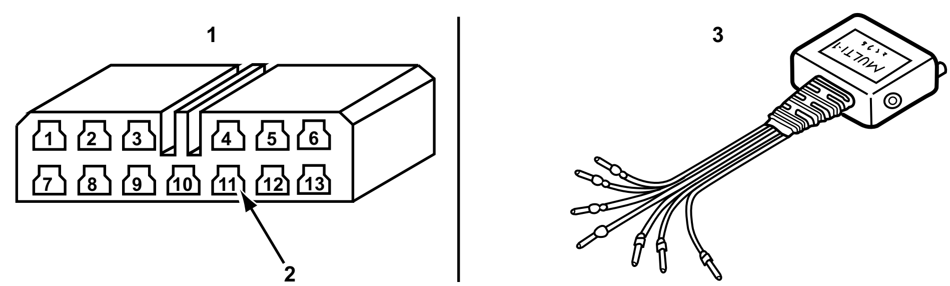


1— 13-pin Check connector (color: yellow)
2— Pin 10 (connect the MULTI-1 blue wire here)
3— MULTI-1 adapter

Figure 15-21 *13-pin Check connector*

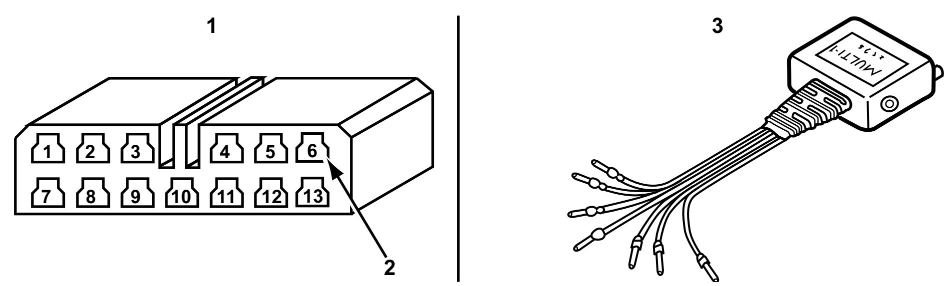
To read codes on vehicles with a 13-pin Check connector:

- 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).



1— 13-pin Check connector (color: natural)
2— Pin 11 (connect the MULTI-1 blue wire here)
3— MULTI-1 adapter

Figure 15-22 *13-pin Check connector*

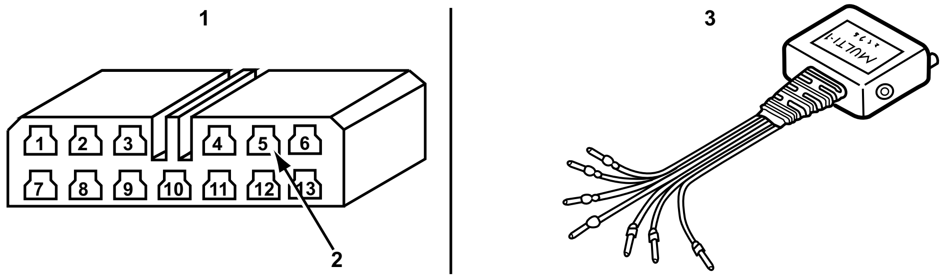


1— 13-pin Check connector (Color: yellow)
2— Pin 6 (connect the MULTI-1 blue wire here)
3— MULTI-1 adapter

Figure 15-23 *13-pin Check connector*

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).

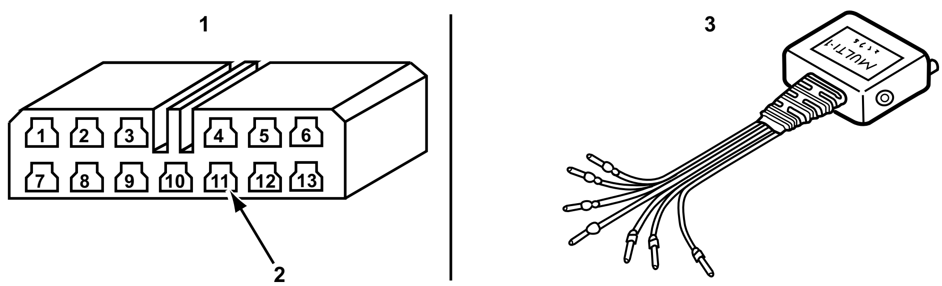


1— 13-pin Check connector (color: black, location: under hood)

2— Pin 5 (connect the MULTI-1 blue wire here)

3— MULTI-1adapter

Figure 15-24 *13-pin Check connector*



1— 13-pin Check connector (color: varies, location: under dash or inside trunk)

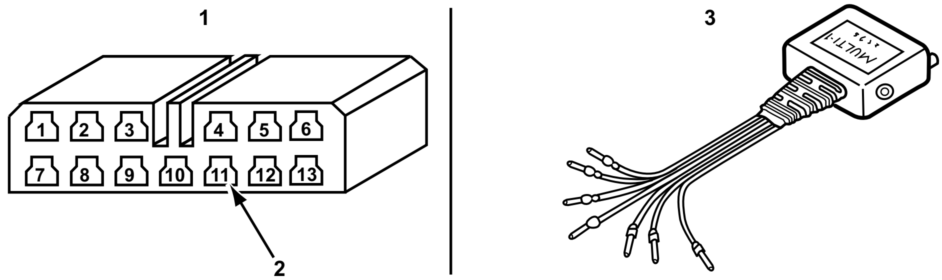
2— Pin 11 (Connect the MULTI-1 blue wire here)

3— MULTI-1 adapter

Figure 15-25 *13-pin Check connector*

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).

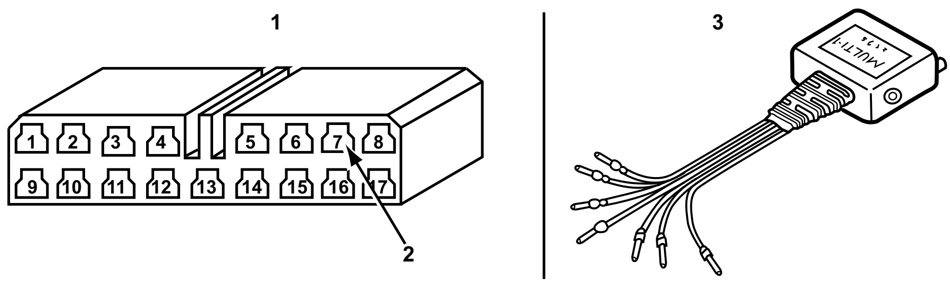


1— 13-pin Check connector (color: varies)

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)

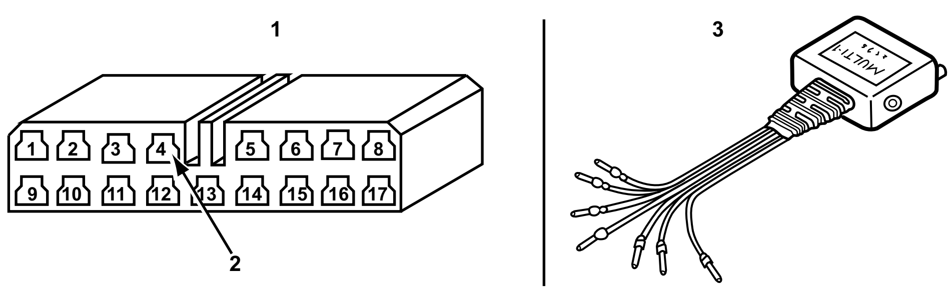
2— Pin 7 (connect the MULTI-1 blue wire here)

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)

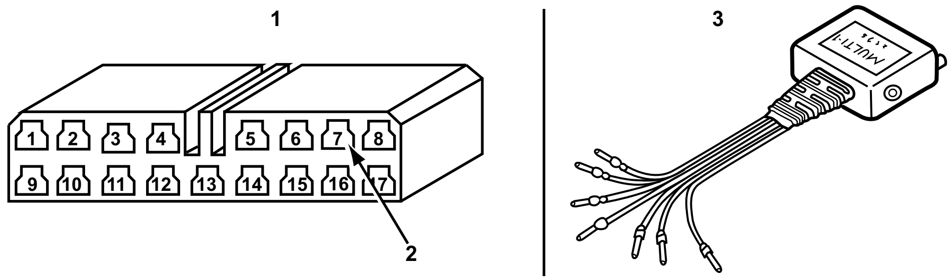
2— Pin 4 (connect the MULTI-1 blue wire here)

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).



1— 17-pin Check connector (color: yellow)

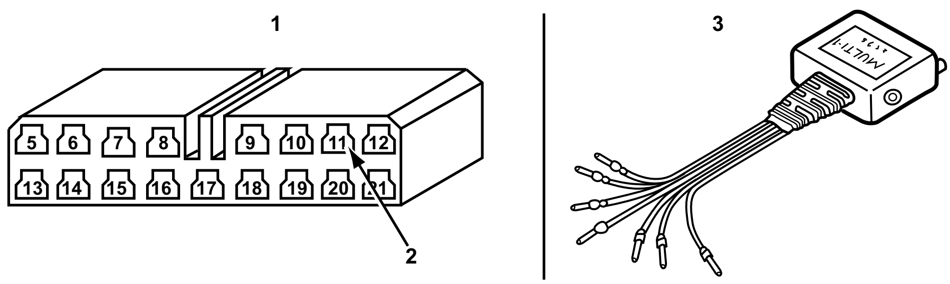
2— Pin 7 (connect the MULTI-1 blue wire here)

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).



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*

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).

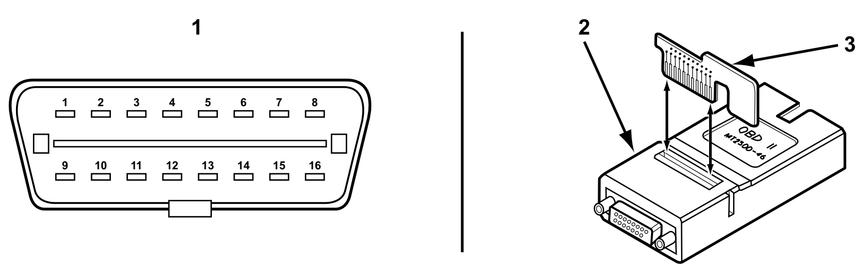


Figure 15-31 *16-pin OBD-II connector with adapter and Personality Key™ device*

1— 16-pin DLC

2— OBD-II adapter with Personality Key™

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.

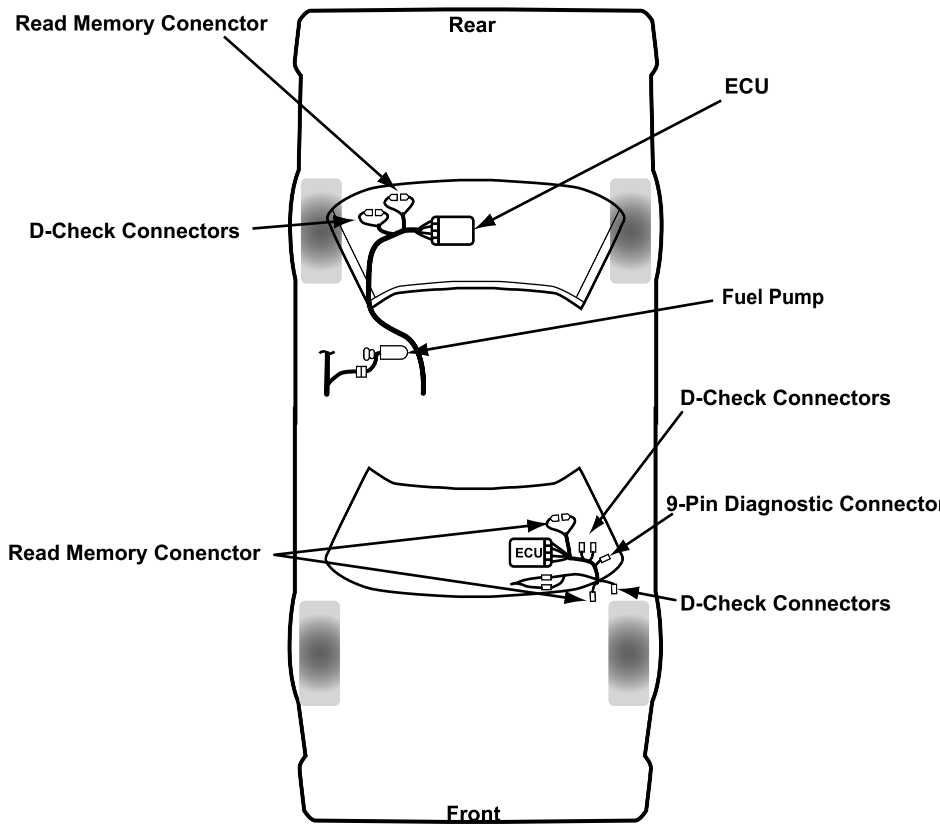


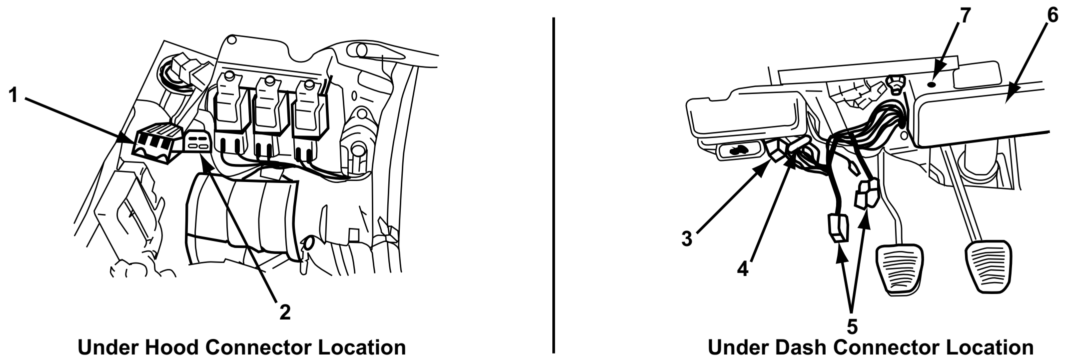
Figure 15-32 *Common locations for D-Check and Read Memory connectors*

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)

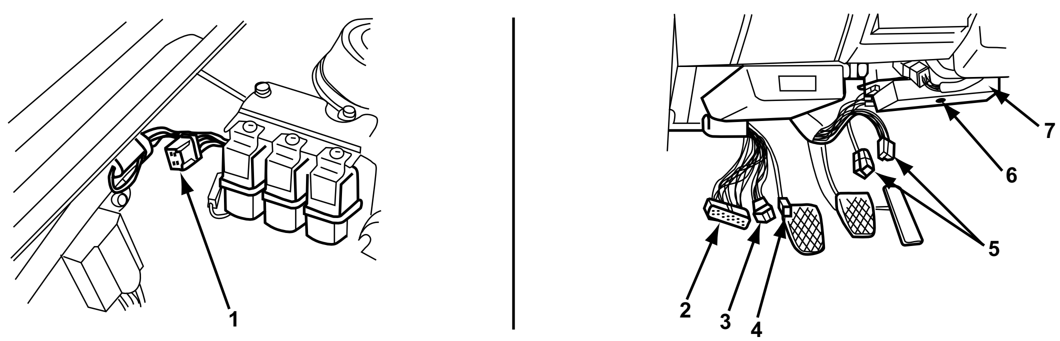
- “1987–94 SPI connectors” on page 170 (Figure 15-40)
- “1987-91 XT models (connector in the trunk)” on page 171 (Figure 15-41)
- “1988–94 Justy Carbureted, 1990-94 Justy MFI, 1990-94 Legacy, and 1987–94 L-Series” on page 171 (Figure 15-42)
- “1992-95 SVX models (connectors in left kick panel)” on page 172 (Figure 15-43)

Vehicles without ECM Memory (D-Check Only)



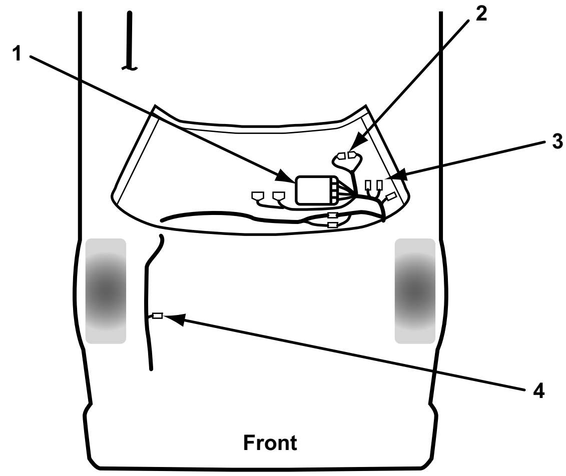
1— Check connector 2
2— Check connector 1
3— Check connector 4
4— Check connector 3
5— D-Check connectors
6— ECU
7— ECU LED

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*



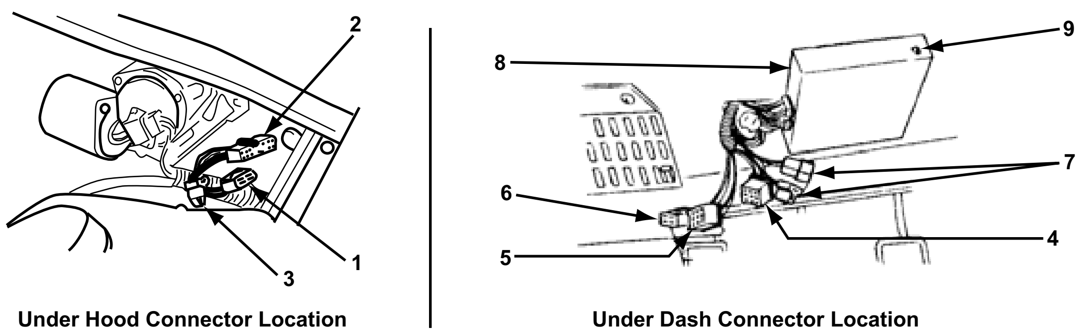
1— ECM

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*



1— Check connector 1

2— Check connector 2

3— Check connector 3

4— Check connector 4

5— Check connector 5

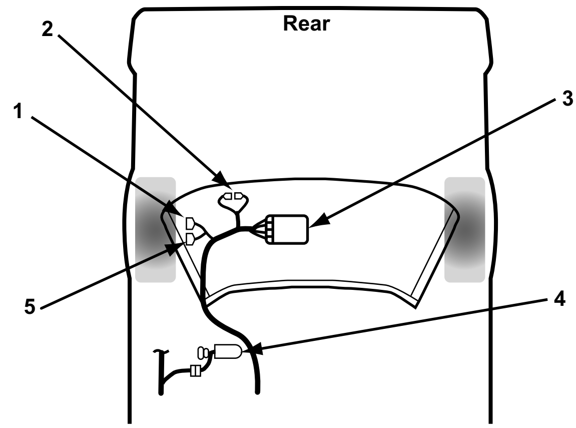
6— Check connector 6

7— D-Check connectors

8— ECU

9— ECU LED

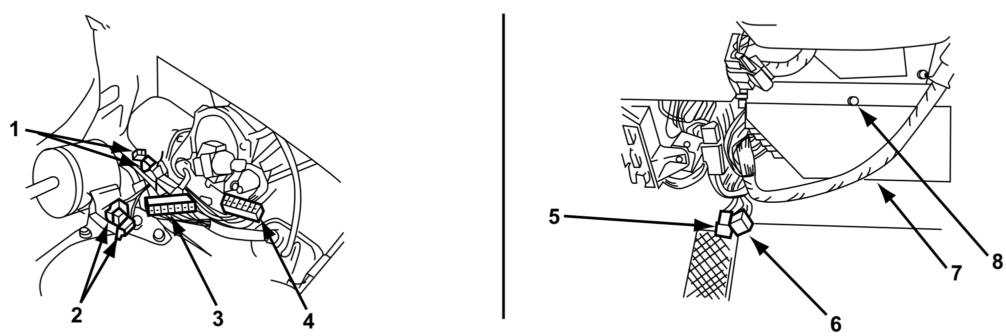
Figure 15-36 *1985–89 ECC overhead cam*



1— Check connector 1
2— D-Check connectors
3— ECM
4— Fuel pump
5— Check connector 2

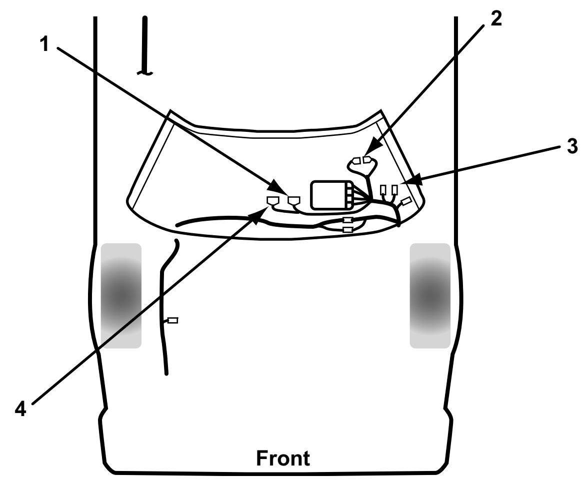
Figure 15-37 *1986–87 XT*

Vehicles with ECM Memory (D-Check and Read Memory)



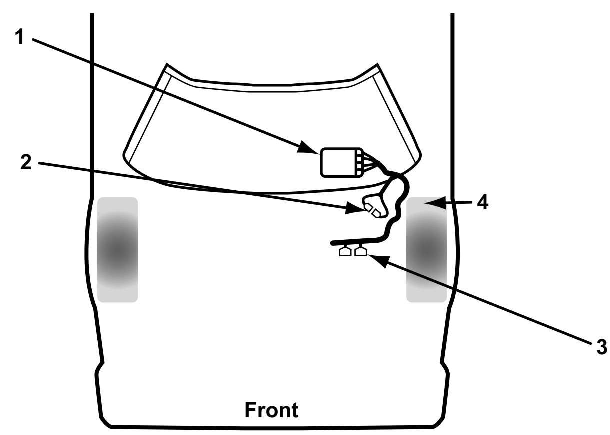
1— Read Memory connectors
2— D-Check connectors
3— Check connector 3
4— Check connector 4
5— Check connector 1
6— Check connector 2
7— ECU
8— ECU LED

Figure 15-38 *1986 SPI connectors*



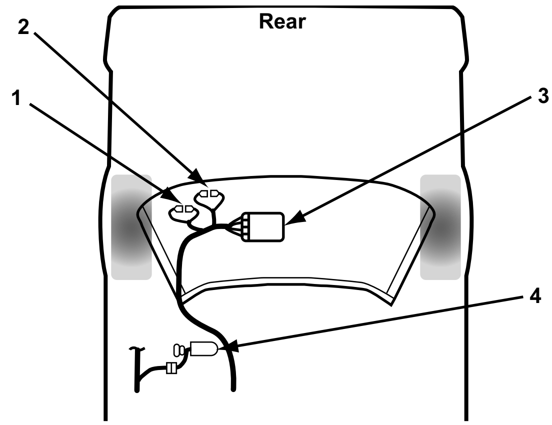
1— Fuel pump relay
2— Read Memory connectors
3— D-Check connectors
4— Ignition relay

Figure 15-39 *1987 Justy*



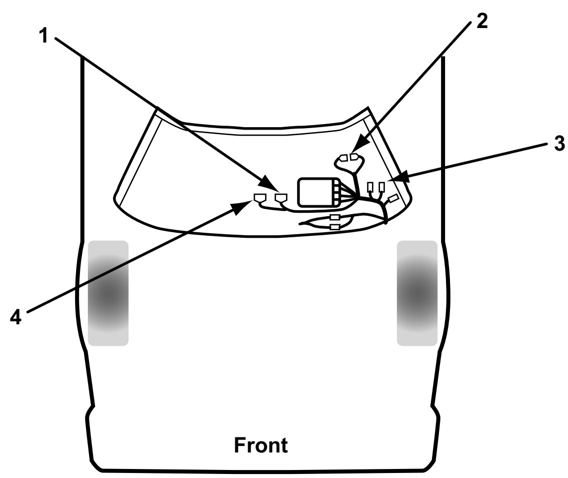
1— ECM and Check connector (under dash)
2— Read Memory connectors (under hood)
3— D-Check connectors (under hood)
4— Check connectors (under dash and under hood)

Figure 15-40 *1987–94 SPI connectors*



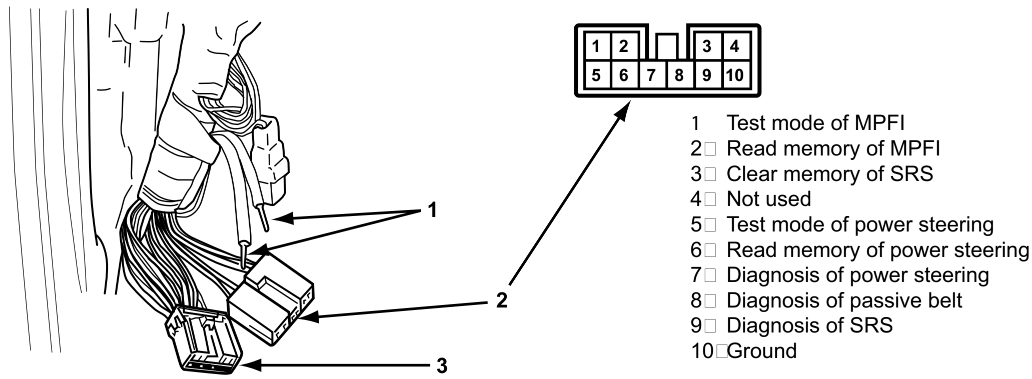
1— Read Memory connectors
2— D-Check connectors
3— ECM
4— Fuel pump

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

Figure 15-42 *1988–94 Justy Carbureted, 1990-94 Justy MFI, 1990-94 Legacy, and 1987–94 L-Series*



1— Diagnosis terminals

2— Select monitor connector (Yellow)

3— Diagnosis connector (Black)

Figure 15-43 *1992-95 SVX models (connectors in left kick panel)*

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.

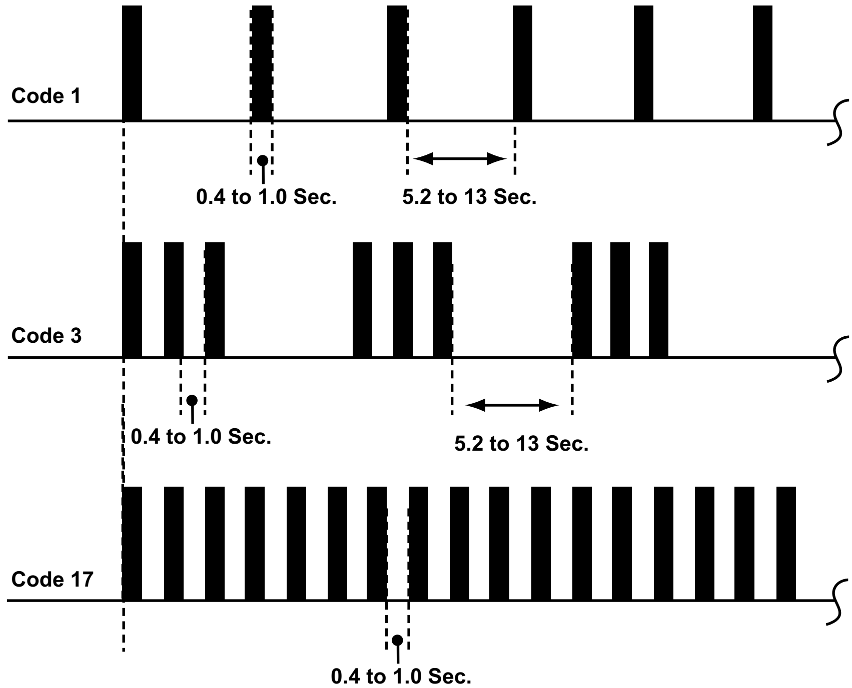


Figure 15-44 *Subaru Code Type 08 (Straight Count)*

Table 15-10 *Subaru Code Type 08 (Straight Count)*

Pattern:	A straight counting of the number of flashes
Read codes on:	ABS LED under right front seat
Start codes by:	Counting flashes of LED after the ABS lamp has illuminated.
When done:	Clear codes occurs every time the ignition switch is turned off.

Code Type 08a

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.

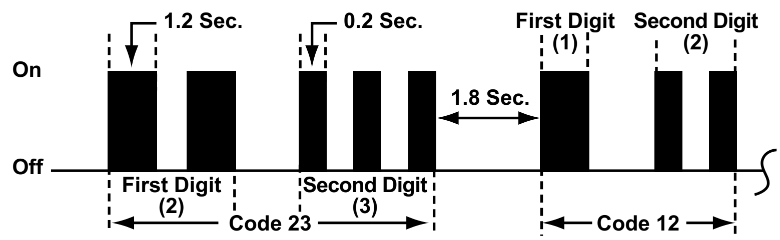


Figure 15-45 *Subaru Code Type 08a*

Table 15-11 *Subaru Code Type 08a*

Pattern:	Long and short
Read codes on:	Check Engine lamp for engines; panel lamp for transmissions
Start codes by:	Follow the appropriate Subaru procedure.
When done:	Clear codes according to the Subaru procedure.

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–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.

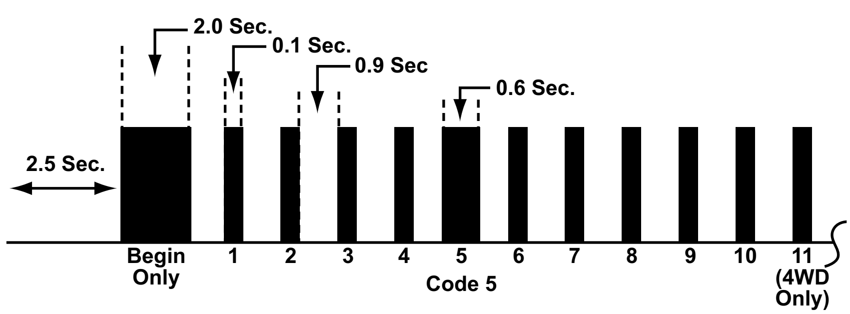


Figure 15-46 *Subaru Code Type 08b*

Table 15-12 *Subaru Code Type 08b*

Pattern:	Long flash
Read codes on:	POWER lamp on instrument panel
Start codes by:	Follow the appropriate Subaru procedure.
When done:	Clear codes according to the Subaru procedure.
10 (or 11) short flashes is pass code.	

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.

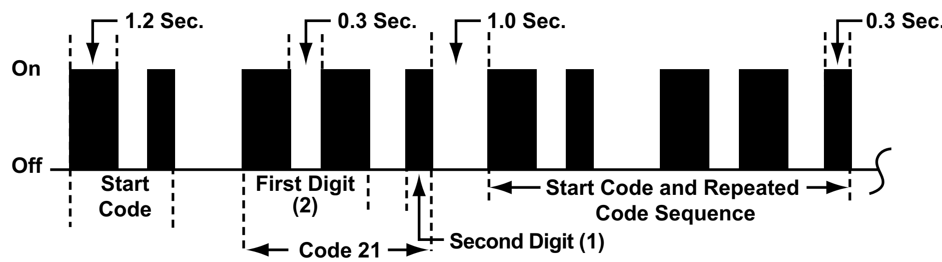


Figure 15-47 *Subaru Code Type 08c*

Table 15-13 *Subaru Code Type 08c*

Pattern:	Long and short
Read codes on:	ABS, airbag (SRS) Warning Light on instrument panel
Start codes by:	Follow the appropriate Subaru procedure.
When done:	Clear codes according to the Subaru procedure.

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.

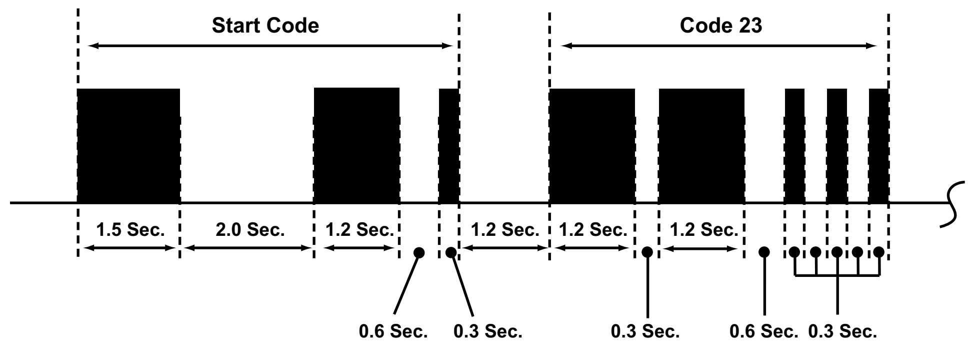


Figure 15-48 *Subaru Code Type 08d*

Table 15-14 *Subaru Code Type 08d*

Pattern:	Long and Short
Read codes on:	ABS or TCS light on instrument panel
Start codes by:	Follow the appropriate Subaru procedure.
When done:	Clear codes according to the Subaru procedure.

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)

Use this procedure to test the 4EAT transmission in 1990–1995 Legacy, 1992–1996 SVX, and 1993–95 Impreza.

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–to–Reverse–to–Neutral–to–Drive–to–Ds–to–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

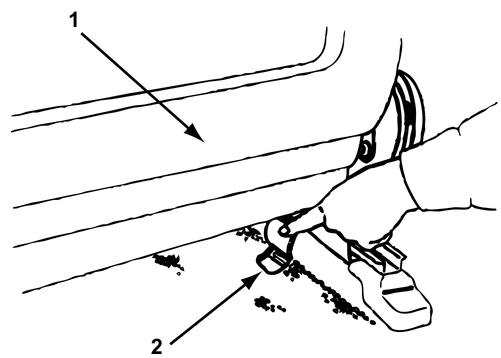
- 1990–1992 Legacy/Outback, Sedan and Wagon (Figure 15-49)
- 1992–1997 SVX (Figure 15-49)
- 1993–1994 Legacy/Outback, Sedan and Wagon (Figure 15-50)
- 1995–1996 Legacy/Outback, Sedan and Wagon w/o TCS (Figure 15-51)
- 1995–1996 Legacy/Outback, Sedan and Wagon with TCS (Figure 15-51)
- 1993–1996 Impreza 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.



1— Right front seat

2— LED

Figure 15-49 *1990-92 Legacy and 1992-97 SVX ABS LED location*

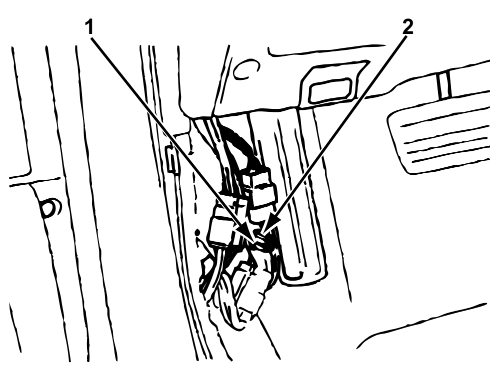
1993-94 Legacy/Outback, Sedan and Wagon

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



1— Terminal K

2— Terminal L

Figure 15-50 *1993–94 Legacy ABS Check connector location*

1995–96 Legacy/Outback, Sedan and Wagon w/o TCS
1997 (late)–99 Legacy/Outback, Sedan and Wagon
1998–04 Impreza Coupe, Sedan and Wagon
2001–04 Forester
2003–04 Baja

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:

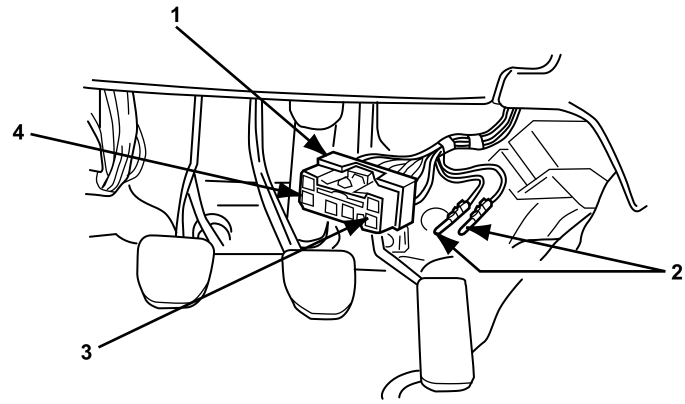
1. Locate the ABS diagnostic connector and diagnostic terminals near the heater assembly on the driver side (Figure 15-51).
2. Switch the ignition off.
3. Connect a diagnosis terminal to the diagnosis connector terminal 4.
4. Switch the ignition on.
5. Read the trouble codes on the TCS warning lamp (Code 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.



1— Diagnosis connector

2— Diagnosis terminals

3— Pin 6 (L Terminal)

4— Pin 3 (K Terminal)

5— Pin 4 (with TCS)

Figure 15-51 *1995-99 Legacy, 1998-04 Impreza, 2001-04 Forester and 2003-04 Baja ABS Diagnostic Connector Location*

1993–96 Impreza Coupe, Sedan and Wagon

To retrieve trouble codes:

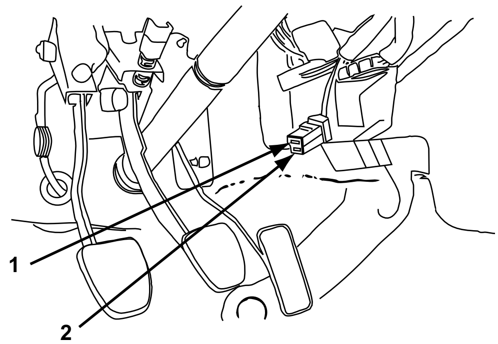
1. Locate the ABS diagnostic connector under the dash near the steering column (Figure 15-52).
2. Switch the ignition off.
3. Ground the ABS Check connector terminal L.
4. Switch the ignition on.
5. Read the trouble codes on the ABS warning lamp (Code Type 08c - Figure 15-47).

   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.



1— Terminal L

2— Terminal K

Figure 15-52 *1993–96 Impreza ABS Check connector location*

1997 Impreza Coupe, Sedan and Wagon
1997 (early) Legacy/Outback, Sedan and Wagon

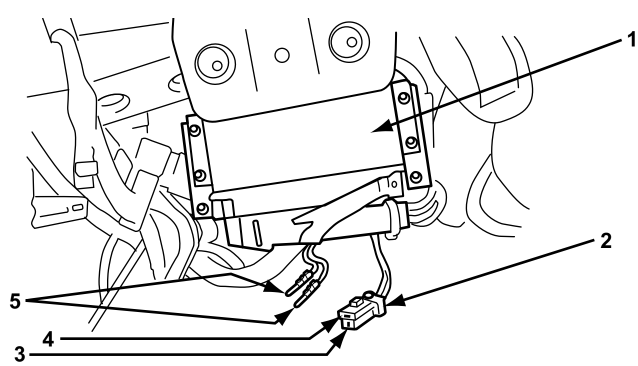
To retrieve trouble codes:

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.



1— ABS control module

2— ABS diagnosis connector

3— Terminal 2

4— Terminal 1

5— Diagnosis terminal

Figure 15-53 *1997 Impreza and 1997 (early) Legacy ABS diagnostic connector location*

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:

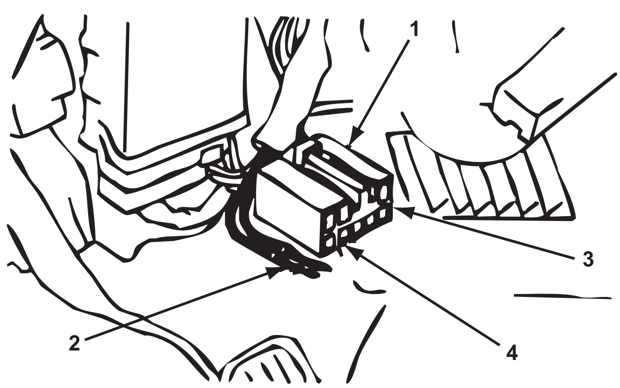
1. Locate the ABS diagnosis connector and diagnosis terminals near the heater assembly on the driver side (Figure 15-54).
2. Switch the ignition off.
3. Connect a diagnosis terminal to the diagnosis connector terminal 8.
4. Switch the ignition on.
5. Read the trouble codes on the ABS warning lamp (Code 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.



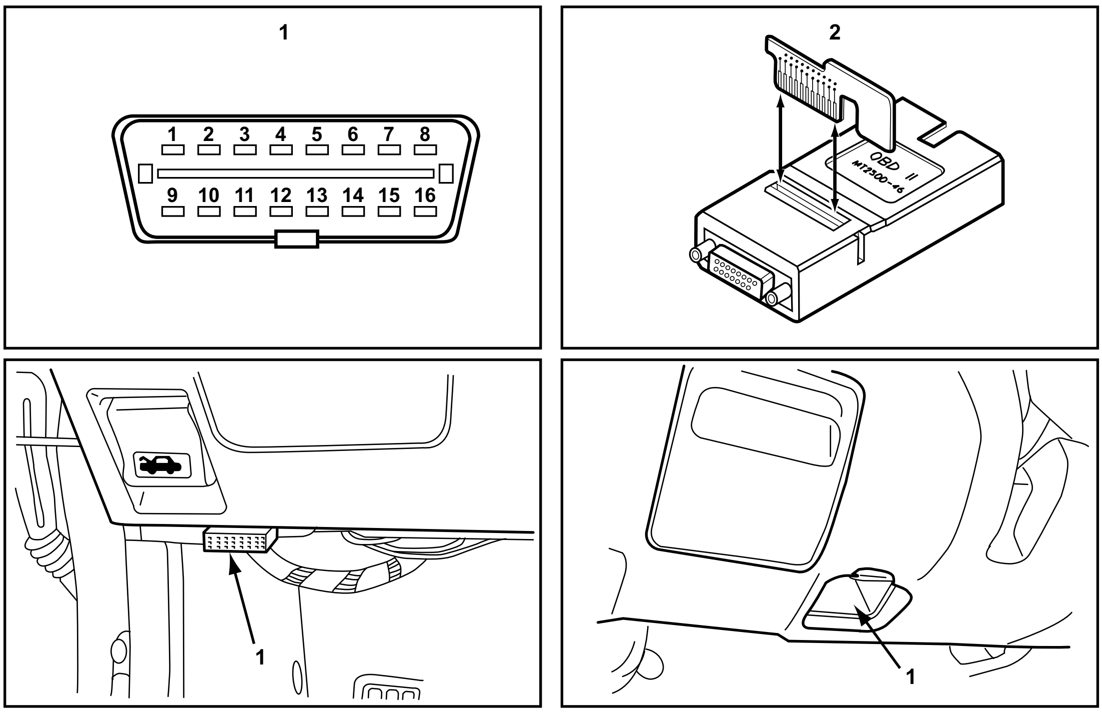
1— Diagnostic connector
2— Diagnosis terminal
3— 8 terminal
4— 5 terminal

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)

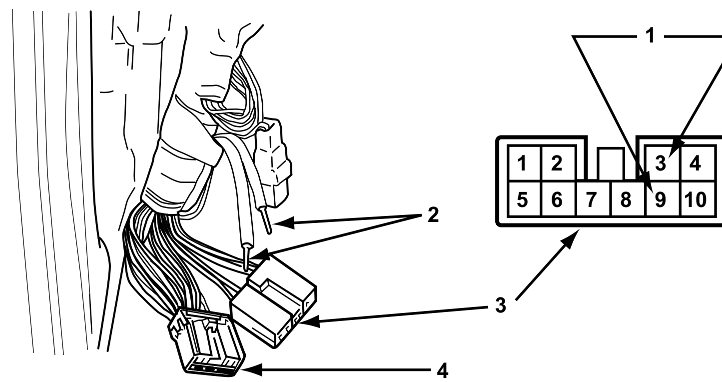
1992–97 SVX

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.



1— Pins 3 and 9

2— Diagnostic terminals

3— Airbag (SRS) Diagnostic connector (Black)

4— Subaru Select Monitor connector (yellow)

Figure 15-56 *SVX airbag*

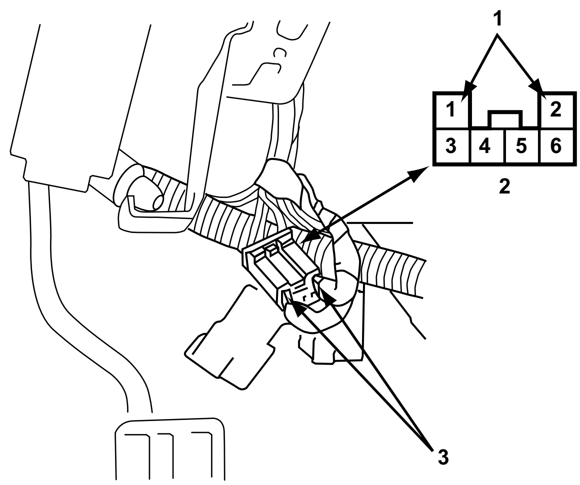
1995–1999 Legacy/Outback, Sedan and Wagon
1998–2004 Impreza Coupe, Sedan and Wagon
1998–2004 Forester and Wagon

To retrieve 1998–2004 Impreza, 1995–1999 Legacy, and 1998–2004 Forester SRS codes:

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.

To clear 1998–2004 Impreza, 1995–1999 Legacy, and 1998–2004 Forester SRS codes:

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.



1— Pins 1 and 2

2— Airbag (SRS) Diagnostic connector

3— Diagnostic terminals

Figure 15-57 *1998–2004 Impreza, 1995–99 Legacy, and 1998–2004 Forester Airbag (SRS) Diagnosis connector*

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.

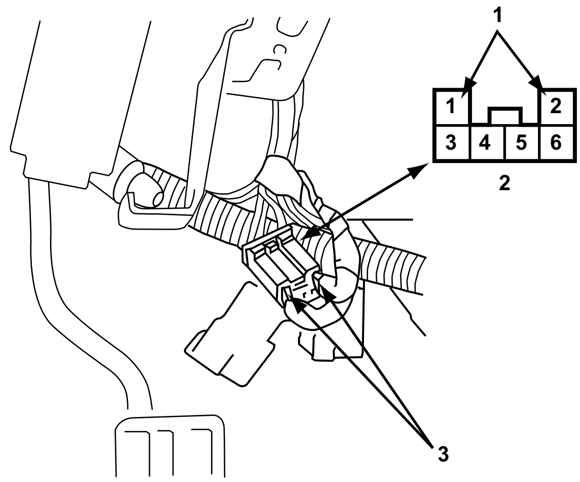


Figure 15-58 *2000–04 Legacy and 2003–06 Baja Airbag (SRS) Diagnosis connector*

1— Pins 2 and 3
2— Airbag (SRS) Diagnostic connector
3— Diagnostic terminals

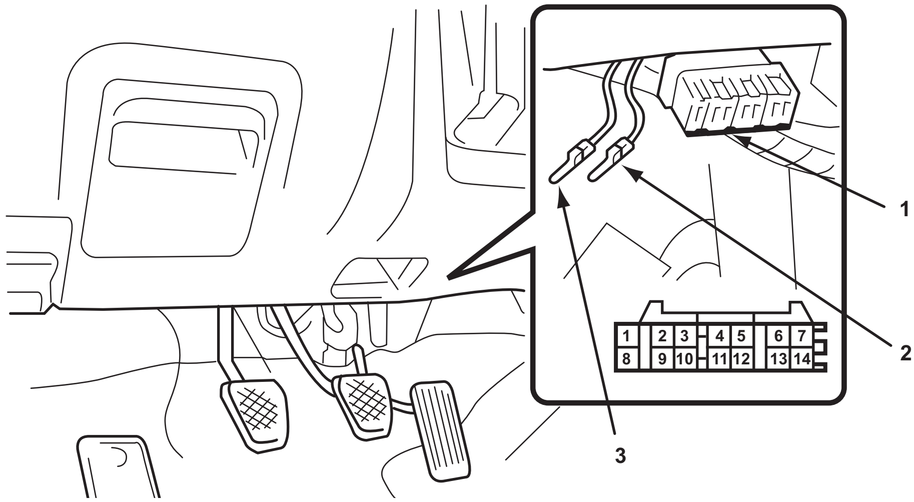
2005 Forester
2005 Impreza Sedan and Wagon

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.

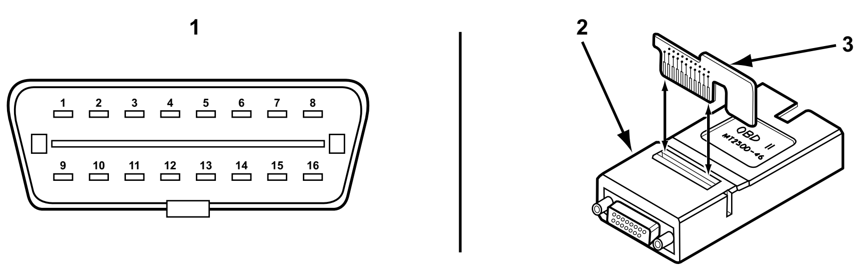


Figure 15-60 *16-Pin OBD-II connector and common locations*

1— 16-pin DLC

2— OBD-II adapter and Personality Key™

Chapter 16 Toyota, Lexus, and Scion

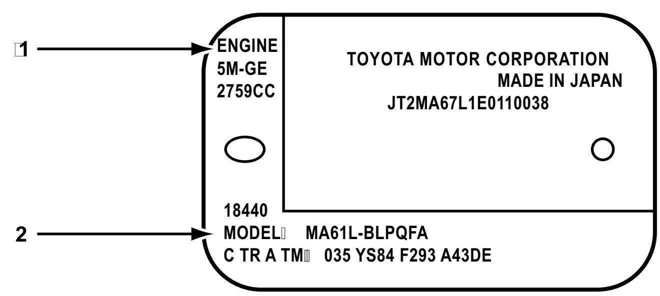
This chapter contains information for testing Toyota, Lexus and Scion vehicles. The following Toyota, Lexus and Scion systems may be available for testing:

- 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



1— Engine type

2— Model number

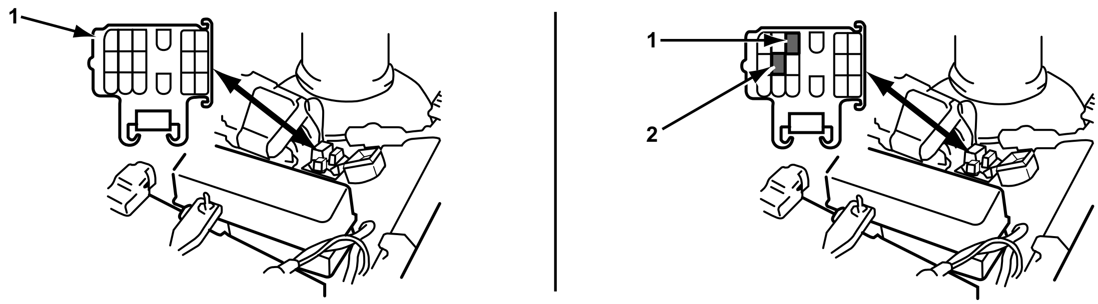
Figure 16-1 *Toyota vehicle nameplate*

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

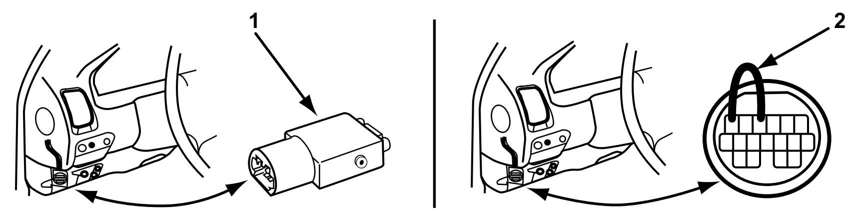
16.2.1 Code Reading Connectors and Locations



1— Use TOY-1 adapter

2— Optional: Jump E1 to T, T1, or TE1 to flash codes

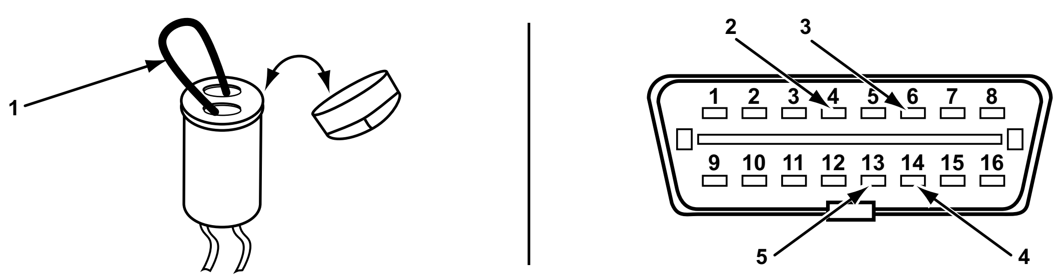
Figure 16-2 *Toyota/Lexus diagnostic connector requiring TOY-1 adapter*



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

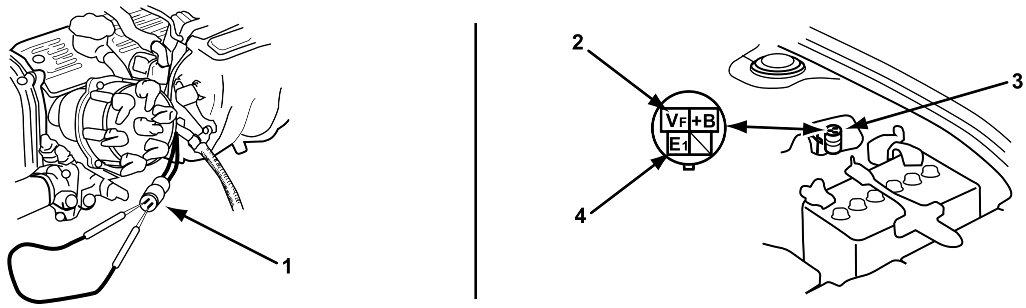
2— CG (Chassis Ground)

3— A/B

4— TS

5— TC

Figure 16-4 *Toyota/Lexus diagnostic connectors—other*



1— Check connector, short to activate code.

2— Blue

3— Service connector

4— Black

Figure 16-5 *1983–84 Supra and Cressida connectors—use MULTI-1 adapter*

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

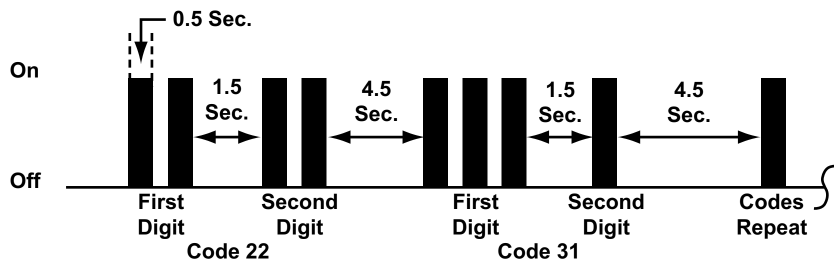


Figure 16-6 *Code Type 09*

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.

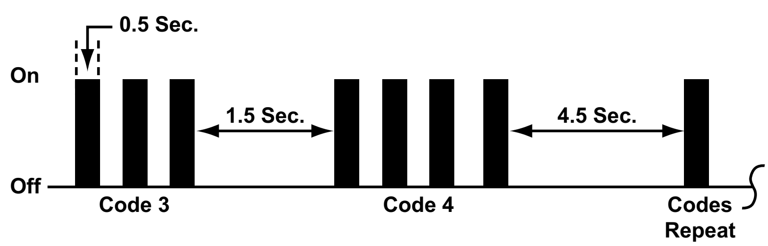


Figure 16-7 *Code Type 10*

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:

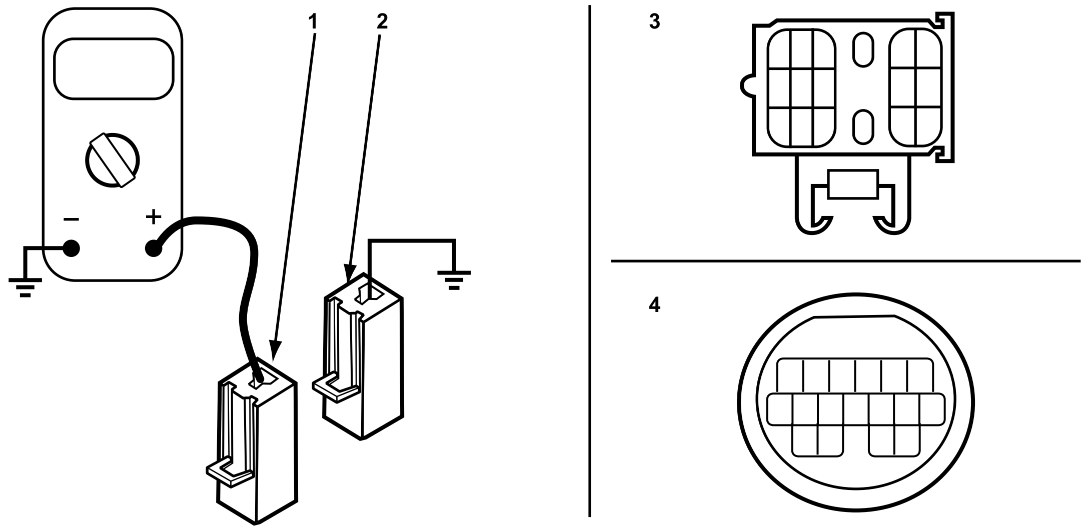
1. Select **Actuator Tests** > **Fuel Pump** from the Main Menu.
   A test initiation screen displays.
2. Select to initiate the test.
   “In Progress” flashes and an operational pump vibrates and makes noise for 30 seconds, after which time the test automatically shuts off.

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.



1— Positive meter lead to pin DG
2— Jump to ground (ignition and OD switches on)
3— Use TOY-1 adapter
4— Use TOY-2 adapter

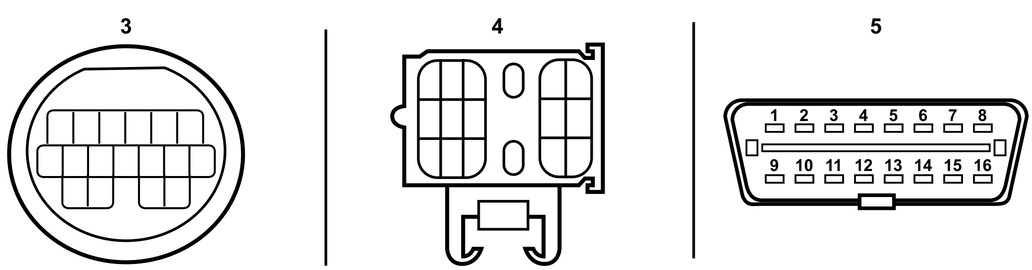
Figure 16-8 *Transmission connectors*

16.4 Testing ABS Systems

Toyota, Lexus and Scion ABS provides code information.

16.4.1 Code Reading Connectors

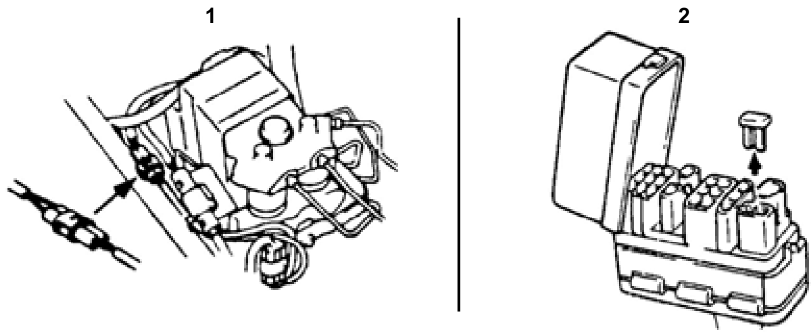
ABS diagnostic connectors are shown in Figure 16-9.



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).

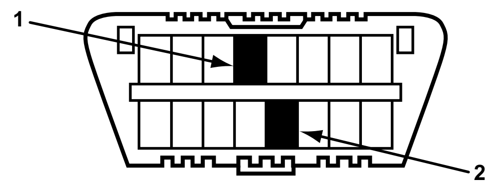


Figure 16-11 *DLC3*

1— Terminal # 4 - CG
2— Terminal #13 - TC

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.

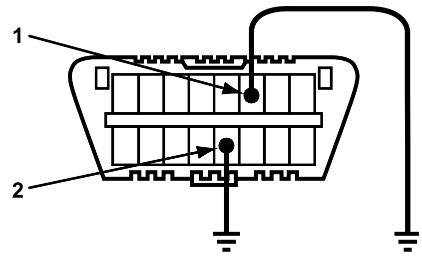
NOTE:
A discharged battery or a faulty airbag sensor assembly may cause low source voltage.

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)



1— Terminal # 6 - A/B

2— Terminal #13 - Tc

Figure 16-12 *Ground DCL3 terminals*

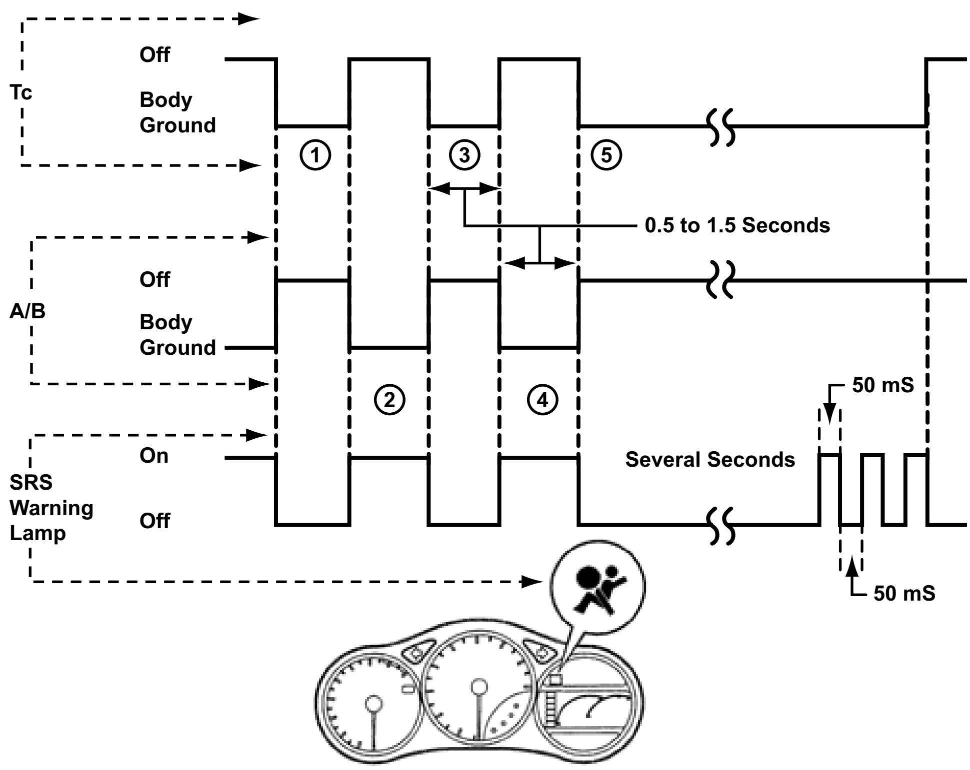


Figure 16-13 *SRS (airbag) code clearing*

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 till in place.

Chapter 17 Generic OBD-II

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)

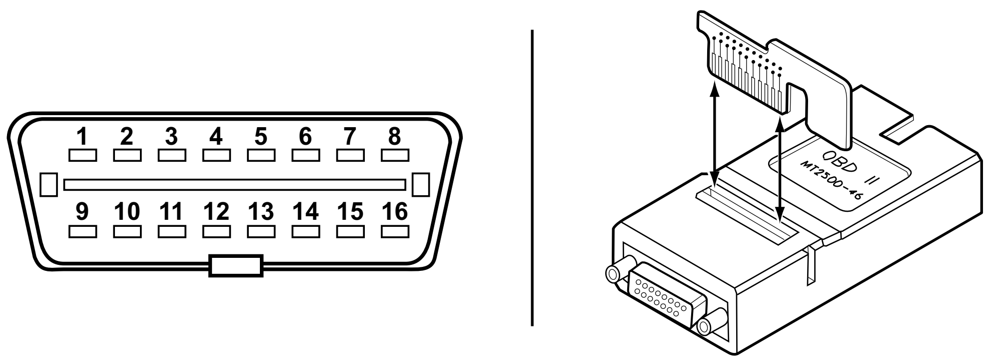


Figure 17-1 *16-pin OBD-II data link connector (DLC), test adapter, and personality key*

Table 17-1 ***16-pin OBD-II connector pinout***

PIN	FUNCTION	PIN	FUNCTION
1	Manufacturer’s discretion	9	Manufacturer’s discretion
2	Bus+ Line, SAE J1850	10	Bus- Line, SAE J1850
3	Manufacturer’s discretion	11	Manufacturer’s discretion
4	Chassis ground	12	Manufacturer’s discretion
5	Signal ground	13	Manufacturer’s discretion
6	2002–earlier: Manufacturer’s discretion 2003–later: ISO 15765-4 CAN	14	2002–earlier: Manufacturer’s discretion 2003–later: ISO 15765-4 CAN
7	K-line, ISO 9141	15	L-line, ISO 9141
8	Manufacturer’s discretion	16	Vehicle battery positive

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.

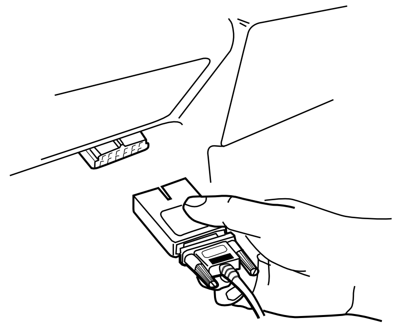


Figure 17-2 *OBD-II diagnostic connector location*

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*

1st DTC Character	System Where a Code Set
P	Powertrain
B	Body
C	Chassis
U	Network

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*

2nd DTC Character	Type of Code
0	SAE-defined (generic) code
1	Manufacturer-defined (enhanced) code
2 & 3	P2 = SAE-defined (generic) code P3000-P3399 = Manufacturer specifications P3400-P3899 = Reserved by SAE for future use
	B2 & C2 = Reserved for manufacturers
	B3 & C3 = Reserved by SAE for future use

The third DTC character indicates the system where the fault occurred (Table 17-4):

Table 17-4 *Third DTC character indications*

3rd DTC Character	System Where Fault Occurred
1	Fuel or air metering problem
2	
3	Ignition malfunction or engine misfire
4	Auxiliary emission control system problem
5	Vehicle or idle speed control system problem
6	Computer or output circuit fault
7	Transmission control problem
8	

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 02S 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.

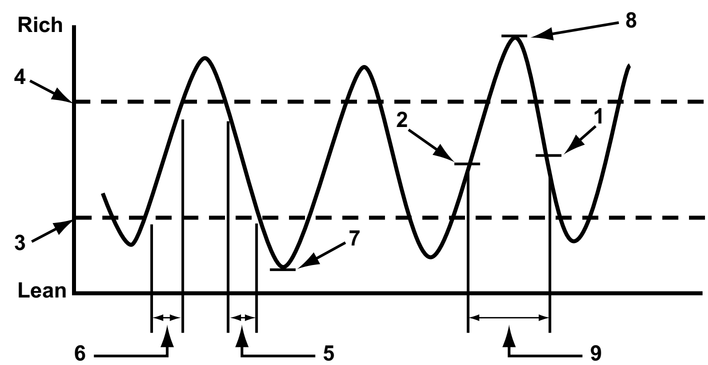
The post-converter check is significantly different. The PCM sees almost no switching when the converter is functioning properly. To test the sensor, the PCM forces a fuel control routine that the converter cannot compensate for, and then monitors the sensor response.

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.



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

Figure 17-3 *O2 sensor monitor tests*

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.

Chapter 18 Data Parameters

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

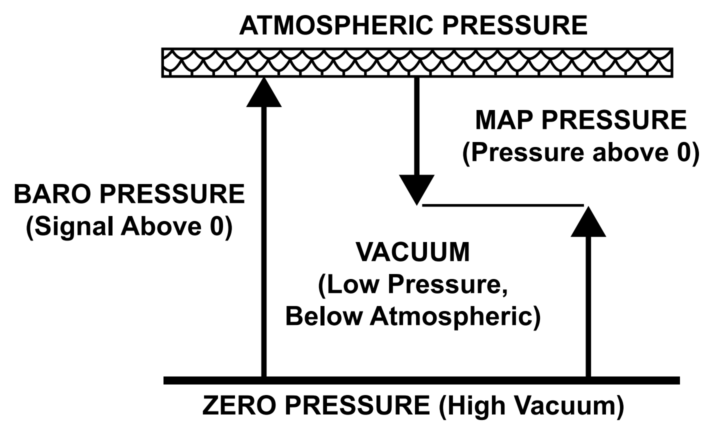


Figure 18-1 *Air pressure relationships*

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

Numerics

A

B

D

E

F

G

H

I

M

N

O

P

Q

R

S

T

U

V

W

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
ABS 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.

- 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.

- 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

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)
RL W/C SENS (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)
RR W/C SENS (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.

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
PASS BELT
Range: ________ **BUCKLED/UNBUCKLED**

Indicates the status of the driver (DRVR) and passenger (PASS) seat belts.

DS_AB(Ohms)
Range: ________ 0 to 22.5 Ω

Indicates the driver's airbag resistance.

DSBELTR(Ohms)
Range: ________ 0 to 22.5 Ω

Indicates the driver's seat belt retractor (pretensioner) circuit resistance.

DTC_CNT
Range: ________ not available

Indicates the number of trouble codes set.

EXTXRSH
Range: ________ 0.0 to 17.0 V

Indicates the external crash sensor test voltage.

IGN_(V)
Range: ________ 0.0 to 17.0 V

Indicates the RCM ignition voltage.

LAMP
SRS LAMP
Range: ________ ON/OFF

Indicates the PCM command status to the Airbag or SRS lamp on the instrument panel.

OCS
Range: ________ actual

Indicates the occupant classification system.

OPS_ST
Range: ________ actual

Indicates the front passage occupant classification system.

P_ABAGR(Ohms)
Range: ________ 0.0 to 22.5 Ω

Indicates the passenger side airbag module resistance.

P_ABAGR2(Ohms)
Range: ________ 0.0 to 22.5 Ω

Indicates the passenger side airbag #2 resistance.

P_Airbag(Ohms)
Range: ________ 0.0 to 22.5 Ω

Indicates the passenger side airbag module resistance.

P_AirBAG2(Ohms)
Range: ________ 0.0 to 22.5 Ω

Indicates the passenger's side airbag resistance.

P_PReTNR(Ohms)
Range: ________ 0.0 to 22.5 Ω

Indicates the passenger retractor (pretensioner) circuit resistance.

PABAGR(Ohms)
Range: ________ 0.0 to 22.5 Ω

Indicates the passenger side airbag module resistance.

PASS IMPACT ID
Range: ______________________________ 10 to 99

Indicates a two digit ID number and typically reads 43.

PBSW_C(A)
Range: ______________________________ actual

Indicates the passenger buckle switch current measurement.

PS_AB(Ohms)
Range: ______________________________ 0.0 to 22.5 Ω

Indicates the passenger side impact air bag resistance.

PS_BUKL
Range: ______________________________ IN/OUT

Indicates the passenger buckle switch status.

PS_PTENS(Ohms)
Range: ______________________________ 0.0 to 22.5 Ω

Indicates the passenger's seat belt retractor (pretensioner) resistance.

PSBELTR(Ohms)
Range: ______________________________ 0.0 to 22.5 Ω

Indicates the passenger's seat belt pretensioner resistance.

SEAT_TRAC
TRAK_SW
Range: ______________________________ FORWARD/REVERSE

Indicates the seat track position.

TIME ON (HOURS)
Range: ______________________________ 0 to 21.25 hours

Indicates the length of time in hours since the PCM set the first airbag DTC.

VBATT (V)
Range: ______________________________ 0.0 to 25.0 V

Indicates the voltage being supplied to the airbag electronic control module (ECM).

Air Conditioning (A/C) Parameters

This section defines data parameters thata 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.

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 inacurate 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 to16.0 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.

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.

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.

Com Tire Pressure
Range: ____________________ OK/STOP

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
Range: ____________________ ON/OFF

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
Range: ____________________ actual

Indicates the number of continuous codes.

COURTESY LAMP SW
Courtesy Sw
Range: ____________________ ON/OFF

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
Range: ____________________ OK/STOP

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
Range: ____________________ ON/OFF

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
Range: ____________________ MEM/NOT MEM

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.

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 day time 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.

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.

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).

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.

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 ignition 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.

LF_PW (A)
Range: ____ actual

Indicates the left front power window amperage draw.

LF_AJAR
Range: ____ OPEN/CLSD

Indicates the left front door ajar status.

LF_ID
Range: ____ actual

Indicates the left front tire transmitter identifier.

LF_LRN
Range: ____ ACTIVE/INACTIVE

Indicates the left front learn status.

LF_MES
Range: ____ ACTIVE/INACTIVE

Indicates the left front measure status.

LF_NORM
Range: ____ ACTIVE/INACTIVE

Indicates the left front normal status.

LF_PSI
Range: ____ actual

Indicates the left front tire pressure.

LF_REC
Range: ____ YES/NO

Indicates the left front transmit received after learn.

LFAWAKE
Range: ____ YES/NO

Indicates the left front awake status.

LFDR_SW
Range: ____ CLSD/AJAR

Indicates the left front door switch.

LFIDPRG
Range: ____ YES/NO

Indicates the left front sensor programmed.

LFLOBAT
Range: ____ LOW/OK

Indicates the left front low battery.

LFPW_PEAK (A)
Range: ____ actual

Indicates the left front power window peak amp draw.

LFPW_SW
Range: ____ OFF, DOWN, UP, ONE TOUCH

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.

LR_MES
Range: ACTIVE/INACTIVE

Indicates the left rear measure status.

LR_NORM
Range: ACTIVE/INACTIVE

Indicates the left rear normal status.

LR_REC
Range: YES/NO

Indicates the left rear transmit received after learn.

LRAWAKE
Range: YES/NO

Indicates the left rear awake status.

LRIDPRG
Range: YES/NO

Indicates the left rear sensor programmed.

LRLOBAT
Range: LOW/OK

Indicates the left rear low battery.

LRO_PSI
Range: actual

Indicates the left rear outer tire pressure.

Lugg Courtesy Sw
Range: ON/OFF

Indicates the position of the luggage courtesy lamp switch. Reads ON when the luggage compartment courtesy lamp switch is turned on and OFF at all other times.

Mirror Fold Sw (Retractable Mirror)
Range: ON/OFF

Indicates the status of the retractable mirror switch. Reads ON when the switch is set to retract the mirror, reads OFF at all other times.

Mirror Pos Sw (Right)
Mirror Pos Sw (Left)
Mirror Pos Sw (Up)
Mirror Pos Sw (Down)
Range: ON/OFF

Indicates whether or not the power mirror position switch is in the indicated position (right, left, up, or down). Reads ON when the switch is in the indicated position, OFF at all other times.

Mirror Return Sw (Retractable Mirror)
Range: ON/OFF

Indicates the status of the retractable mirror switch. Reads ON when the switch is set to extend the mirror, reads OFF at all other times.

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
Park Brake Sw
Parking Brake Sw
PKBS Sw
Range: ____ ON/OFF

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).

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
Rear Wiper On
Rear Wiper Stop
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.

REMOTES
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.

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_LRN
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
P/W Up/Wireless
Range: ______ ON/OFF

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
Range: ______ ON/OFF

Indicates the status of the seatr 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
Seat Mem 2 Sw
Range: ______ ON/OFF

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 Set Sw
Range: ______ ON/OFF

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
Range: ______ –40%/–20%/NORM/+20%/+40%

Displays the sensitivity setting.

Shift position N
Range: ______ ON/OFF

Indicates whether or not the transmission is in neutral range, reads ON when in neutral and OFF at all other times.

Shift position P
Range: ______ ON/OFF

Indicates whether or not the transmission is in park range, reads ON when in park and OFF at all other times.

Shift position R
Range: ______ ON/OFF

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
Range: ______ ON/OFF

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
Range: ______ ON/OFF

Displays the speed mode status. Reads ON when speed mode is available, and OFF when speed mode is not available.

SPR_ID
Range: ______ actual

Indicates the spare tire transmitter identifier.

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 in 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.

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.

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*

Data	ECM Compensation	Engine Condition
0.00 V	Go leaner 10–20%	Rich
1.25 V	Go leaner 4–10%	Normal
2.50 V	Lean/rich ±3%	Normal
3.75 V	Go richer 4–10%	Normal
5.00 V	Go richer 10–20%	Lean

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.

ABSOTPB(%)
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.

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
POWER 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
ACCEL LRN VAL #2
Range: ____________ 0 to 124.512

Indicates the ETCS accelerator pedal sensor fully closed learned position value.

ACCEL LRN VAL#1
ACCEL LRN VAL#2
Range: ____________ Min.: 0 V, Max.: 124.512 V

Indicates the accelerator fully closed learning value Number 1 and Number 2.

ACCEL POS1(%)
Range: ____________ Min.: 0 %, Max.: 100 %

Indicates the Absolute Accelerator Pedal Position (APP) Number 1.

- 10 to 25 %: Accelerator pedal released
- 60 to 90 %: Accelerator pedal fully depressed

ACCEL POS2(%)
Range: ____________ Min.: 0 %, Max.: 100 %

Indicates the Absolute Accelerator Pedal Position (APP) Number 2.

- 20 to 45 %: Accelerator pedal released
- 80 to 100 %: Accelerator pedal fully depressed

ACCEL POS1(V)
Range: Min.: 0 V, Max.: 4.98 V

Indicates the Absolute Accelerator Pedal Position (APP) sensor Number 1 voltage.

- 0.5 to 1.1 V: Accelerator pedal released
- 2.6 to 4.5 V: Accelerator pedal fully depressed

ACCEL POS2(V)
Range: Min.: 0 V, Max.: 4.98 V

Indicates the Absolute Accelerator Pedal Position (APP) sensor Number 2 voltage.

- 1.2 to 2.0 V: Accelerator pedal released
- 3.4 to 5.0 V: Accelerator pedal fully depressed

ACCEL SSR #1 AD(V)
Range: Min.: 0 V, Max.: 4.98 V

Indicates the accelerator fully closed value Number 1 (AD).

ACCPPA(%)
Range: 0 to 100%

Indicates the status of tolerator pedal position A.

ACCPPB(%)
Range: 0 to 100%

Indicates the status of tolerator pedal position B.

ACCS
Range: ON/OFF

Indicates the status of the air conditioning compressor cycling switch.

ACCS=A/C
Range: ON/OFF

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.

ACM BATTERY VOLTAGE
Range: 0.0 to 14.5 V

Indicates the battery input voltage supplied to the ACM control module.

ACMRLY
Range: ON/OFF

Indicates the state of the AC main relay.

ACP
Range: OPEN/CLOSED

Indicates the air conditioning pressure switch.

ACSW
Range: ON/OFF

Indicates the air conditioning switch.

ACT VLV TMNG(°)
Range: not available

Indicates the actual valve timing.

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.

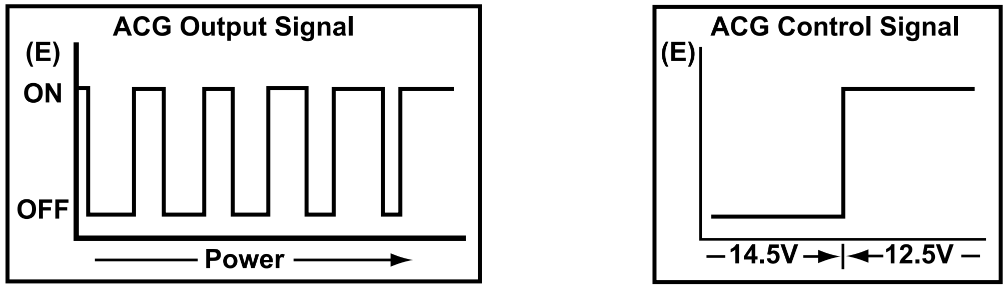


Figure 18-2 *ACG output signal and ACG control signal*

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.

AIR PMP PRS (kPa)
Range: ______ 0 kPa to 320 kPa

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.

AIT PMP PLS PRS(kPa)
Range: ______0 kPa to 639.9 kPa

Indicates the AIR PUMP pulsation pressure. This is cumulative pressure calculated by the ECM.

AIR PUMP
Range: ______ not available

Indicates secondary air injection pump amperage. The reading is based on the electric current sensor signal.

AIR PUMP
Range: ______ ON/OFF

Indicates the status of the AIR pump relay control circuit, it reads:

- ON when the PCM grounds the AIR pump relay control circuit
- OFF when the PCM disables the ground circuit

AIR PUMP RELAY
Range: ______ ON/OFF

Indicates the state of the AIR pump relay, it reads ON when the pump motor is on.

AIR PUMP SIGNAL
Range: ______ LOW/HIGH

Indicates the output voltage of the AIR pump motor, it reads LOW when the pump is on.

AIR SWITCH SOL
Range: ______PORT/CONV

Indicates the ECM command to the air injection switching solenoid, it reads:

- PORT when the solenoid has been commanded to move the valve to direct air to the exhaust ports or manifold.
- CONV when the solenoid has been commanded to move the valve to direct air downstream to the catalytic converter.

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 (m^3/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 18-2 *APP sensor voltage*

Parameter	Accelerator Pedal At 0% (Pedal At Rest)	Accelerator Pedal At 100% (Pedal Fully Depressed)
APP1(V)	Less than 1.1 V	More than 2.0 V
APP2(V)	More than 3.9 V	Less than 3.0 V
APP3(V)	More than 3.2 V	Less than 3.5 V

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 18-3 AT Lockup A or B

Solenoid A	Solenoid B	Lockup Control
ON	OFF	Low Range
ON	Cycling ON/OFF	Middle Range
ON	ON	High Range

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”.

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(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)
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.

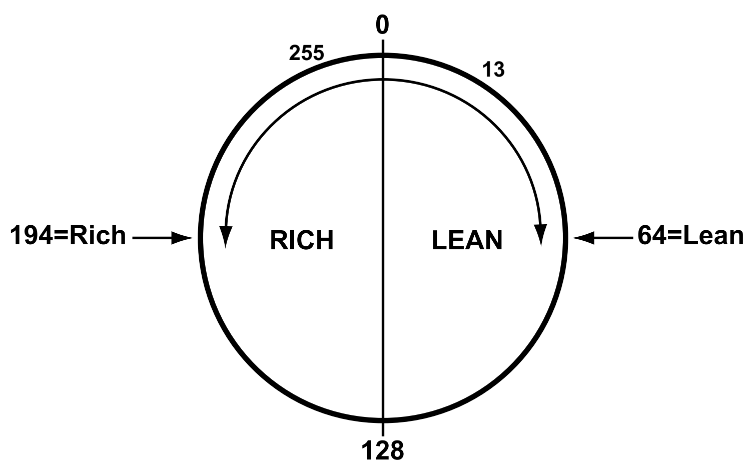


Figure 18-3 *Rich/lean correction from base midpoint (0)*

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 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
O2 LR B1S1(ms)
O2 LR B2S1(ms)
O2 RL B1S1(ms)
O2 RL B2S1(ms)
Range: ______ 0 to 1000 ms

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.

- 2000(H): ENGINE PROBLEM: Engine problem.
- 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.

CALC CLSD THRT
IDLE SW
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 TMP B1S1
CAT TEMP B1S2
CAT TMP B1S2
CAT TEMP B2S21
CAT TMP B2S1
CAT TEMP B2S2
CAT TMP 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.

CATEMP11
Range: ____ –40 to 11,756.3°F or –40 to 6,513.5°C

Indicates the catalyst temperature for bank 1, sensor 1.

CATEMP21
Range: ____ –40 to 11,756.3°F or –40 to 6,513.5°C

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.

CoastClSol (mA)
Range: ____ 0 to 1000 mA

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.

COLD STARTUP
Range: ____ YES/NO

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.

COLP
Range: ____ ON/OFF

Indicates the refrigerant pressure switch (middle pressure) status.

COMMEGR(%)
Range: ____ 0 to 100%

Indicates the commanded EGR status.

COMMEVAP(%)
Range: ____ 0 to 100%

Indicates the commanded evaporative purge.

COMMTAC(%)
Range: ____ 0 to 100%

Indicates the commanded throttle actuator control.

COMPONENT MONITOR
Range: ____ NOT AVAILABLE/AVAILABLE

Indicates the comprehensive component monitor.

COND FAN
Range: ____ ON/OFF

Indicates the FAN signal.

COND FAN LO
Range: ____ ON/OFF

Indicates the FAN 1 control signal.

COOL FAN(%)
Range: ____ 0 to 100%

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:

- A low reading indicates a low fan speed.
- A high reading indicates a high fan speed.
- 0% indicates the fan is off.

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.

CYL #1 (%)
CYL #2 (%)
CYL #3 (%)
CYL #4 (%)
CYL #5 (%)
CYL #6 (%)
CYL #7 (%)
CYL #8 (%)
CYL x MISFIRES
Range: ______ 0 to 100%

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.

CYL #1 (%)
CYL #2 (%)
CYL #3 (%)
CYL #4 (%)
CYL #5 (%)
CYL #6 (%)
CYL #7 (%)
CYL #8 (%)
Range: ______ Min.: 0, Max.: 255

Indicates misfire ratio of cylinder 1 to 8. This item displays only when idling.

CYL 1 DEACT SOL COMMAND
Range: ______ ON/OFF

Indicates the current status of cylinder 1. Reads OFF if the cylinder is being commanded to deactivate. By default, the cylinder is normally activated.

CYL 4 DEACT SOL COMMAND
Range: ______ ON/OFF

Indicates the current status of cylinder 4. Reads OFF if the cylinder is being commanded to deactivate. By default, the cylinder is normally activated.

CYL 6 DEACT SOL COMMAND
Range: ______ ON/OFF

Indicates the current status of cylinder 6. Reads OFF if the cylinder is being commanded to deactivate. By default, the cylinder is normally activated.

CYL 7 DEACT SOL COMMAND
Range: ______ ON/OFF

Indicates the current status of cylinder 7. Reads OFF if the cylinder is being commanded to deactivate. By default, the cylinder is normally activated.

CYL ALL MISS RATE
Range: ______ Min.: 0, Max.: 255

Indicates all cylinders misfire rate: 0 to 35.

CylHdTemp (V)
CHTS(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:

- YES or ON during deceleration
- NO or OFF during all other conditions

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:

Table 18-4 *Typical sensor outputs for DPFE parameter*

0.55 Volt Offset			1.0 Volt Offset		
inHg	**kPa**	**Volts**	**inHg**	**kPa**	**Volts**
8.83	29.81	4.66	8.56	28.9	4.95
6.62	22.36	3.64	4.3	14.4	2.97
4.41	14.90	2.61	0	0	1.0
2.21	7.46	1.58			
0	0	0.55			

DPFEGR
Range: ____________________ not available

Indicates the delta feedback pressure exhaust gas recirculation.

DRIVE CounT
DRIVECNT
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.

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.

EGRFShort
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

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 bypassed 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

FUEL SYS MON
Range: ______ NOT AVAILABLE/AVAILABLE

Indicates the fuel system monitor.

FUEL TANK CAP(L)
Range: ______ 0 to 34 gallons or 0 to 128 liters

Indicates the capacity of the fuel tank in liters or in gallons.

FUEL TEMP (°)
Range: ______ –30 to 224°C or –22 to 435°F

Indicates the ECM calculated fuel temperature within the intake manifold fuel rail. The ECM uses this parameter to fine-tune engine management.

FUEL VOLATI
Range: ______ LO/HI

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.

FUEL(PSI)
Range: ______35 to 120 psi

Indicates the fuel pressure.

FUEL_GAUGE
Range: ______ ON/OFF

Indicates the fuel gauge indicator control.

FUEL_LEVEL(%)
Range: ______ 0 to 100%

Indicates the fuel level in percentage.

FUEL_mon_ready
Range: ______ YES/NO

Indicates the fuel monitor has successfully completed.

FuelLvlInp(%)
Range: ______ 0 to 100%

Indicates the fuel level in percentage.

FuelLvlInp(V)
Range: ______ 0.0 to 5.0 V

Indicates the fuel level in voltage.

FuelPumpA
Range: ______ ON/OFF

Indicates the actual state of the PCM commanded fuel pump output.

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).

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.

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 milliamperes.

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.

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.

IAC_FAULT
IACFault
Range: ____ YES/NO

Indicates whether the PCM detects a fault in the idle air control (IAC) system, reads YES if a fault is present.

IACV(%)
Range: ____ 0 to 100%

Indicates the idle air control percentage.

IACV(mS)
Range: ____ not available

Indicates the idle air control in milliseconds.

IAR SOL
Range: ____ ON/OFF

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.

IASV
Range: ____ ON/OFF

Indicates the intake air shutter valve.

IAT
Range: ____ –40 to 399°F or –40 to 199°C

Indicates the intake air temperature.

IAT (V)
IAT 1
IAT 2
IAT SENSOR 1
IAT SENSOR 2
INTAKE AIR TEMPERATURE SENSOR(2)
Range: ____ 0.0 to 5.0 V

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.

IAT_FAULT
Range: ____ YES/NO

Indicates the inlet air temperature status.

IATDC
Range: ____ –40 to 399°F or –40 to 199°C

Indicates the intake air temperature 2.

IATDC(V)
Range: ____ 0.0 to 5.0 V

Indicates the intake air temperature 2 in voltage.

IATLC(V)
Range: ____ 0.0 to 5.0 V

Indicates the Lysholm compressor intake air temperature signal voltage.

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
IGNITION
Range: ____________________ **see below**

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
Range: ____________________ **YES/NO**

Indicates whether a Vehicle Theft Deterrent (VTD) code is stored in memory.

IGNITION
Range: ____________________ **Min.: 0, Max.: 800**

Indicates ignition counter: 0 to 800.

IGNITION 1 (V)
Range: ____________________ **0.0 to 25.5 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
Range: ____________________ **ON/OFF**

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)
Range: ____________________ **0.0 to 5.0 V**

Indicates the signal voltage on the IGRTNE circuit.

IGRTNI (V)
Range: ____________________ **0.0 to 5.0 V**

Indicates the signal voltage on the IGRTNI circuit.

ILLUMINAT(%)
Range: ____________________ **0 to 100%**

Indicates the dimming control command as a percentage.

IMA (V)
Range: ____________________ **0.08 to 4.92 V**

Indicates the status of the idle mixture adjuster volts. This is a variable resistor that controls the idle mixture.

IMA OUTPUT (kw)
Range: ____________________ **not available**

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 Intergraded 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)

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.

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.

IVS
Range: ______ **YES/NO**

Indicates the idle validation switch (IVS) state, which verifies (reads YES) that the accelerator pedal (AP) is in the idle position on diesel powertrain control systems. The IVS provides a check on the AP sensor. The MIL lights if the IVS signal does not match the AP sensor signal. A faulty IVS or AP sensor allows the engine to run at low idle speed only.

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 indicates 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.

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.

M_ENG
Range: __________ actual

Indicates the engine RPM at the time of a misfire.

M_IAT
Range: __________ actual

Indicates the intake air temperature (IAT) at the time of a misfire.

M_LOAD
Range: __________ actual

Indicates the engine load at the time of a misfire.

M_PNP
Range: __________ PARK NEUTRAL

Indicates the park/neutral position (PNP) at the time of a misfire.

M_RUN
Range: __________ actual

Indicates the engine running time at the time of a misfire.

M_SOAK
Range: __________ actual

Indicates the engine-off soak time in minutes prior to a misfire.

M_TP
Range: __________ actual

Indicates the throttle position at the time of a misfire.

M_TRIP
Range: __________ actual

Indicates the number of trips since the time of a misfire.

M_VSS
Range: __________ actual

Indicates the vehicle speed at the time of a misfire.

MAF (gm/Sec)
MAF (g/s)
Range: __________ 0 to 665 g/s

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.

- 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

MAF (Hz)
Range: __________ 0 to 31,999 Hz

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.

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.

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 18-5 *MAP voltage to pressure relationship*

Voltage	High						Low
MAP (kPa)	70	60	50	40	30	20	10
MAP (“Hg)	21	18	15	12	9	6	3
MAP (mmHG)	533	457	381	305	229	152	76

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.

O2 (mV)
O2 #1 (mV)
O2 #2 (mV)
O2 B1-S1 (mV)
O2 B1-S2 (mV)
O2 B2-S1 (mV)
O2 B2-S2 (mV)
FRONT O2 (mV)
REAR O2 (mV)
Range: ______ 0 to 1800 mV
O2 B1-S1 (V)
O2 B1-S2 (V)
O2 B2-S1 (V)
O2 B2-S2 (V)
O2S B1-S1 (V)
O2S B1-S2 (V)
O2S B2-S1 (V)
O2S B2-S2 (V)
Range: ______ 0 to 1.200 V
F UPSTM O2S (V)
F DNSTM O2S (V)
R UPSTM O2S (V)
R DNSTM O2S (V)
Range: ______ 0 to 4.98 V

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.

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
OXYGEN 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/INCOMPLI

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 O2Sfuel 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*

S/C Vacuum Solenoid	S/C Vent Solenoid	Throttle Position
ON	OFF	Accelerate
ON or OFF	ON	Decelerate
OFF	OFF	Steady

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
SCCS(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(%)
Range: 0 to 100%

Indicates the EGR valve stepping motor position.

SEGRP DES(%)
Range: 0 to 100%

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
SHIFT/CLUTCH SWT
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: ON/OFF

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)
TANK PRESS (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
TANK PRS (kPa)(inHg)(mmHg)
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.

TARGIDL (RPM)
Range: ______ variable

Indicates the target idle, which is the idle speed the ECM is attempting to maintain.

TAT TERMINAL
Range: ______ ON/OFF

Indicates the DLC tat terminal.

TC/TE1
Range: ______ ON/OFF

Indicates the connection status of the TC/TE1 terminals of the DLC-3 (OBD-II) connector.

TC-SDL
Range: ______ ON/OFF or YES/NO

Indicates the status of the transaction control serial data link.

TCC (%)
Range: ______ 0 to 100%

Indicates the duty cycle of the pulse-width-modulated (PWM) signal output to the torque converter clutch (TCC) solenoid. Reads 0% with the TCC solenoid closed (TCC not applied). Reads 100% with the TCC solenoid fully open (TCC applied).

TCC COMMAND
Range: ______ ON/OFF

Indicates the torque converter clutch (modulated) status.

TCC SOL(%)
Range: ______ 0 to 100%

Indicates the torque converter clutch control solenoid.

TCC/CC BRAKE SW
Range: ______ OPEN/CLSD

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.

TCCFault
Range: ______ YES/NO

Indicates the presence of a PCM detected fault in the torque converter clutch circuit. Reads YES only when a fault is present.

TCCMACT (RPM)
Range: ______ 0 to vehicle max.

Indicates a PCM calculated value of torque converter slippage. The value is derived by subtracting the turbine speed from the engine RPM. The reading should be less than 50 RPM when the TCC is applied (TCC parameter reads 95% or greater).

TCILFault
Range: ______ YES/NO

Indicates whether a fault has occurred in the Transmission Control Indicator Lamp circuit.

TCINH
Range: ______ LOW/HIGH

Indicates the status of the traction control inhibitor signal.

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.

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 18-7 *TR_V voltage*

Gear	Voltage*	Gear	Voltage*
Park	0.0 V	Overdrive	1.5 V
Reverse	1.5 V	Manual 2	0.0 V
Neutral	1.5 V	Manual 1	0.0 V
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 CounT
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.

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 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 to 199°C or –40 to 389°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 to 199°C or –40 to 389°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 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 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 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: __________________________________ 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.

EQ RAT11
EQ RAT12
EQ RAT13
EQ RAT14
EQ RAT21
EQ RAT22
EQ RAT23
EQ RAT24
EQ RAT31
EQ RAT32
EQ RAT41
EQ RAT42
Range: ____ 0 to 1.999

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.

EVAP PCT(%)
Range: ____ 0 to 100%

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).

EVAP_VP(Pa)
Range: ____ –8192 to 8192 Pa
EVAP_VP(H2O)
Range: ____ –32.887 to 32.884 inH2O

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.

FLI(%)
Range: ____ 0 to 100%

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.

FRP
Range: ____ 0 to 655350 kPa or 0 to 111 psi

Indicates fuel rail pressure relative to atmospheric pressure. Displayed pressure should be the same as an actual gauge reading taken at the fuel rail.

FUEL PRESS
Range: ____ 0 to 768 kPa or 0 to 111 psi

Indicates the actual pressure in the fuel rail.

FUEL SYS1
FUEL SYS2
Range: ____ NOT USED/OL/CL/OL DRV/OL FLT/CL FLT

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 suppling 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.

IAT(°)
Range: ______ variable °C or °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.

IGN TIMING(°)
Range: ______ variable

Indicates the degrees of ignition timing advance or retard. If timing is retarded, a minus (-) sign appears with the reading.

INTAKE AIR(°)
Range: ______ variable °C or °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.

LOAD(%)
Range: ______ 0 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.

LOAD ABS(%)
Range: ______ 0 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.

LOAD PCT(%)
Range: ______ 0 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
Range: ____ ON/OFF

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
Range: ____________________________________0 to 65535 mi or 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 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)
O2 B1-S2(mV)
O2 B1-S3(mV)
O2 B1-S4(mV)
O2 B2-S1(mV)
O2 B2-S2(mV)
O2 B2-S3(mV)
O2 B2-S4(mV)
Range: ____ 0 to 1800 mV

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)
O2S12(V)
O2S13(V)
O2S14(V)
O2S21(V)
O2S22(V)
O2S23(V)
O2S24(V)
O2S32(V)
O2S41(V)
O2S42(V)
Range: ____0.0 to 1.0

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: ________ –100 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: ________ –64 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: ________ –20 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: ________ 0 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: ________ 0 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.

TP(%)
TP B(%)
TP C(%)
Range: ______ **0 to 100%**

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.

TP R(%)
Range: ______ **0 to 100%**

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.

TRIM B1-S1(%)
TRIM B2-S3(%)
TRIM B1-S4(%)
TRIM B2-S4(%)
TRIM B2-S1(%)
TRIM B1-S2(%)
TRIM B2-S2(%)
TRIM B1-S3(%)
Range: ______ **–100 to +99.2%**

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.

Trim number prefixes B1 and B2 correlate to banks 1 and 2. Bank 1 is the bank that contains the number 1 cylinder. TRIM number suffix S1 indicates a pre-catalyst oxygen sensor input, while suffix S2 indicates a post-catalyst sensor input.

Values typically range from -20% to +20% with 000% as the midpoint. Any number above 0% indicates that the PCM commands a short-term rich mixture correction. A number below 0% indicates the PCM commands a lean mixture. During closed-loop operation, these numbers should closely follow ST TRIM B1 and ST TRIM B2. If N/A displays, the PCM is not supported.

VEH SPEED(MPH)
VEH SPEED(KPH)
Range: ______ **0 to vehicle max.**

Indicates the PCM calculated vehicle speed based on the vehicle speed sensor (VSS) signal.

VPWR(V)
Range: ______ **variable**

Indicates the vehicle power (VPWR) applied to the ECM as voltage. Readings vary and do not always equal battery voltage.

VSS(KPH)
VSS(MPH)
Range: ______ **0 to vehicle max.**

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.

WARM UPS
Range: ______ **0 to 255**

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.

Hybrid HV ECU and Battery System Parameters

+B VOLTS
Range: ______ Min.: 0 V, Max.: 65.535 V

Constant: Auxiliary battery voltage +/–3 V.

#CODES
Range: ______ Min.: 0, Max.: 127

Indicates the number of emission related powertrain DTCs.

A/C CONSMPT PWR (KW)
Range: ______ Min.: 0 kW, Max.: 5 Kw

Indicates the A/C consumption power.

AUX. BATT V
Range: ______ 0 to 25.4 V

Equivalent to auxiliary battery voltage

ACCEL DEG (%)
Range: ______ Min.: 0%, Max.: 100%

Indicates accelerator pedal depressed angle, accelerator pedal depressed: Changes with accelerator pedal pressure.

ACCEL POS1(%)
Range: ______ Min.: 0%, Max.: 100%

Indicates the Number 1 accelerator pedal position sensor. Changes as accelerator pedal moves.

ACCEL POS2(%)
Range: ______ Min.: 0%, Max.: 100%

Indicates the Number 2 accelerator pedal position sensor. Changes as accelerator pedal moves.

AMBIENT TEMP
Range: ______ Min.: -40°C, Max.: 215°C

Indicates the ambient air temperature with Power switch ON (IG): Same as ambient air temperature.

BATT INSIDE AIR
Range: ______ –327.68 C to 327.67 C

Indicates the temperature of ambient intake air to battery pack. Undisturbed for 1 day: Same as ambient air temperature.

BATTERY BLOCK MAX(V)
Range: ______ 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)
Range: ______ 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
Range: ______ 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
Range: ____ Min.:–40°C, Max.: 140°C

Indicates the intake air temperature. Constant: Same as ambient air temperature.

INTERNAL RESISTANCE(OHMS) R01-R14
Range: ____ 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
Range: ____ 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)
Range: ____ Min.:–16,383 rpm, Max.: 16,383 rpm

Indicates MG1 revolutions, in RPM.

MG1 TORQ (N-m)
Range: ____ 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: ____ ????-OBD2

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

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). 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: INACTVE/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 senor. 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 Parmeters

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.

4WDHIGLMP_4X4M
Range: ______ OFF,OFF-FAIL,ON,ON–B+

Indicates the high indicator lamp.

4WD HIGH LAMP
Range: ______ ON/OFF

Indicates the transfer case shift control module command status to the 4WD 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.

4WDLOWLMP_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.

SHMOTCCLO_4X4M
Range: ____ **OFF, OFF-FAIL, ON, ON–B+**

Indicates the transmission transfer counterclockwise motor output.

SHMOTCLOC_4X4M
Range: ____ **OFF, OFF-FAIL, ON, ON–B+**

Indicates the clockwise shift relay coil status.

SLIP ADPT DC (%)
Range: ____ **0 to 100%**

Indicates the duty cycle of the signal being applied to the automatic transfer case motor.

SOFTWARE ID
Range: ____ **YES/NO**

Indicates whether the current calibration ID number is valid.

SVC 4WD LAMP
Range: ____ **ON/OFF**

Indicates the transfer case shift control module command status to the Service 4WD indicator lamp on the instrument panel.

VBATT
Range: ____ **0 to 16 V**

Indicates battery positive voltage.

VSS_4X4M
Range: ____ **0 to vehicle max**

Indicates vehicle speed.

XFER CASE LCKD
Range: ____ **YES/NO**

Indicates the state of the transfer case. It reads YES when locked to enabled 4WD operation.

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 and2-3 solenoid parameter readings*

1-2 Solenoid	2-3 Solenoid	Gear
ON	ON	1st
OFF	ON	2nd
OFF	OFF	3rd
ON	OFF	4th

1-2 SOL CKT STATUS
2-3 SOL CKT STATUS
3-2 SOL CKT STATUS
TCC DUTY SOL CKT STATUS
TCC ENAB SOL CKT STATUS
Range: ______ **see below**

Indicates the status of the solenoid valve driver feedback voltage signal circuit:

- OPEN/SHORTED displays if the voltage is low when the solenoid is commanded off.
- SHORT TO VOLTS display if the voltage is high when the solenoid is commanded on.
- OK displays if no circuit fault is present.
- INDETERMINATE displays if the control module cannot determine the circuit status or an invalid signal was received.

1ST GEAR
Range: ______ **actual**

Indicates the gear commanded by the module.

2 INDICATOR
Range: ______ **ON/OFF**

Indicates the status of the 2 indicator lamp on the instrument panel. It should only read ON when the 2 position lamp is lighted.

2 POS SWITCH
2ND SELECTED
Range: ______ **ON/OFF**

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.

2-3T_CCS
Range: ______ **ON/OFF**

Indicates the coast clutch solenoid.

2-4 BRK PRS SW
Range: ______ **ON/OFF**

Indicates the 2–4 brake pressure switch.

2-4 BRK SOL(%)
Range: ______ **0 to 100%**

Indicates the 2–4 brake solenoid.

24B(%)
Range: ______ **0 to 100%**

Indicates the 2–4 brake solenoid.

2ND GEAR
Range: ______ **actual**

Indicates the gear commanded by the module.

2nd PRESSURE SWITCH
2nd PRESSURE SWT
Range: ______ **ON/OFF**

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.

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.

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:

- 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.

BOO
BrakeOnOff
Range: ______ ON/OFF

Indicates the brake on and off.

BRAKE SW
Range: ______ ON/OFF

Indicates the brake switch input status.

CALC 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
CCSFault
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**
GEAR
Range: ____ **1, 2 3, or 4**

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 INDICATOR
D4/D5/D INDICATOR
D5 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%**
DCCSV SLIP (RPM)
Range: ____ **0 to 510 rpm**

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 hi (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 radio 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.

GEAR_RA
GEAR RAT
Range: ______ 0 to 100%

Indicates the transmission gear ratio.

GEAR RATIO
GR_RATIO
Range: ______ 0.000 to 8.00:1

Indicates the TCM calculated actual gear ratio of the current commanded gear. The value is the input shaft speed divided by the output speed in R, D4, D3, D2, and D1 range. The value is the turbine speed divided by the output speed in D5 range with the TCC locked.

GEN LIGHT
Range: ______ ON/OFF

Indicates the generator warning light.

GEN OUT(V)
Range: ______ 0 to 18 V

Indicates the generator output voltage.

GEN(%)
Range: ______ 0 to 100%

Indicates the generator field current control duty signal.

HC PRES SW
Range: ______ ON/OFF

Indicates the high clutch pressure switch.

HC(%)
HC_SOL(%)
Range: ______ 0 to 100%

Indicates the high clutch solenoid.

HEADLIGHT SW
Range: ______ ON/OFF

Indicates the headlight switch.

HI CLUTCH(%)
Range: ______ 0 to 100%

Indicates the high clutch solenoid.

HI PS PRESSURE
Range: ______ ON/OFF

Indicates the power steering pressure switch.

HIGH GEAR
Range: ______ YES/NO

Indicates whether the high gear contacts in the transmission are open or closed, it reads YES when the contacts are closed.

HOLD LIGHT
Range: ______ ON/OFF

Indicates the transmission control indicator/hold light.

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.

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.

N SWITCH
Range: ______ ON/OFF

Indicates the park/neutral status.

NC(0) RPM
NC(2) RPM
Range: ______ 0 to vehicle max.

Indicates the direct clutch engagement RPM. These clutches rotate in forward gears, and are held in reverse and overdrive.

NEUT_SW(MTX)
Range: ______ ON/OFF

Indicates the neutral switch circuit.

N-SHIFT SOL
Range: ______ ON/OFF

Indicates the N-Shift solenoid.

O/D OFF INDICATOR
Range: ______ ON/OFF

Indicates the status of the dash-mounted OD lamp, reads ON when the lamp is off.

O/D OFF_HOLD SW
OD OFF SW
Range: ______ ON/OFF

Indicates the overdrive cancel switch/hold switch.

O/D SW
O/D SWITCH
OVERDRIVE SW
Range: ______ ON/OFF
OD ENABLED
Range: ______ YES/NO

Indicates the position of the overdrive control switch:

- YES or ON when the switch is on, overdrive allowed.
- NO or OFF when the switch is off, overdrive prevented.

O/D SOLENOID
Range: ______ ON/OFF

Indicates the status of the overdrive solenoid, reads ON when the solenoid is energized.

OD CUT #2
Range: ______ ON/OFF

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.

OD INDICATOR
Range: ______ ON/OFF

Indicates the status of the dash-mounted OD lamp, reads ON when the lamp is on.

OD OFF LIGHT
Range: ______ ON/OFF

Indicates the transmission control indicator light.

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)

Range: ____________________________________ 00 to 30/FF

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*

	1st Gear	2nd Gear	3rd Gear	4th Gear
Shift Solenoid A	ON	OFF	OFF	ON
Shift Solenoid B	ON	ON	OFF	OFF

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**
TCC ENABLED
Range: ______ **YES/NO**

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 id 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.

TCC(%)
Range: 0 to 100%

Indicates the pulse-width-modulated (PWM) signal to the torque converter clutch (TCC).

TCC_FAULT
Range: YES/NO

Indicates a torque converter clutch fault.

TCC_MES(A)
Range: 0.0 to 5.0 A

Indicates the measured current for the TCC pressure control.

TCCA(V)
Range: 0.0 to 5.0 V

Indicates the torque converter clutch actual.

TCCC(%)
Range: 0 to 100%

Indicates the torque converter clutch control solenoid.

TCCFault
Range: YES/NO

Indicates the torque converter clutch fault.

TCCMACT(RPM)
Range: actual

Indicates the torque converter slip actual.

TCIL
Range: ON/OFF

Indicates the transmission control indicator light.

TCIL_FAULT
TCILFault
Range: YES/NO

Indicates the transmission control indicator light fault.

TCS
Range: ON/OFF

Indicates the overdrive cancel switch/hold switch status.

TCS ACTIVE
Range: YES/NO or ACTIVE/INACTIVE

Indicates the status of the traction control system (TCS), it reads:

- YES or ACTIVE when the TCS is operating
- NO or INACTIVE at all other times

TFP SW
Range: PARK, REV, NEUT, 4th, 3rd, 2nd, LOW, INV

Indicates the decoded status of the three A/B/C inputs from the transmission fluid pressure (TFP) manual valve position switch.

The TFP RANGE reading should match the current gear: 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.

Table 18-10 *Transmission fluid pressure manual valve switch logic chart*

Gear Selector Position	TFP SW(A)	TFP SE(B)	TFP SW(C)
Park (P)	HI	LO	HI
Reverse (R)	LO	LO	HI
Neutral (N)	HI	LO	HI
Drive 4 (4TH)	HI	LO	LO
Drive 3 (3RD)	HI	HI	LO
Drive 2 (2ND)	HI	HI	HI
Drive 1 (1ST)	LO	HI	HI
Invalid (INV)	LO	HI	LO
Drive 1 (1ST)	LO	LO	LO
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*

Gear Selector Position	TFP SW(A)	TFP SE(B)	TFP SW(C)	TFP SW(P)
Park (P)	LO	HI	HI	LO
Reverse (R)	LO	LO	HI	HI
Neutral (N)	HI	LO	HI	LO
Drive 4 (4TH)	HI	LO	LO	HI
Drive 3 (3RD)	LO	LO	LO	LO
Drive 2 (2ND)	LO	HI	LO	HI
Drive 1 (1ST)	HI	HI	LO	LO
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*

Gear Selector Position	TR SW A	TR SW B	TR SW C	TR SW P
Park	LOW	HI	HI	LOW
Reverse	LOW	LOW	HI	HI
Neutral	HI	LOW	HI	LOW
Drive 4	HI	LOW	LOW	HI
Drive 3	LOW	LOW	LOW	LOW
Drive 2	LOW	HI	LOW	HI
Drive 1	HI	HI	LOW	LOW
Invalid	All other combinations.			
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)
VPWR(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.

Appendix A

Troubleshooting

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.

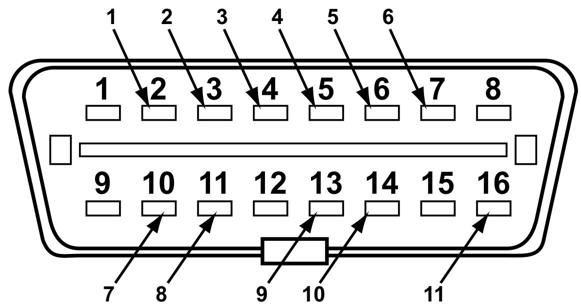
To place the Cressida and Lexus LS400 in a test mode where the ECM is more sensitive to trouble codes, see “Code Sensitivity—OBD-II and some Pre-OBD-II” on page 199.

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.



1— J1850 BUS +
2— CAN medium speed +
3— Case ground
4— Power ground
5— CAN high speed +
6— ISO K-line/KW2000
7— J1850 BUS –
8— CAN medium speed –
9— Module programming signal
10—CAN high speed –
11—Battery B +

Table A-1 *Test 16-pin DLC Terminal Voltages*

Pin	Protocol	Voltage
2	J1850 +	0.0 V
3	Can Medium Speed +	3.0 V
6	CAN High speed +	2.5 V
7	ISO	7.0 V or greater
	KW2000	12.0 V
10	J1850 -	5.0 V
11	Can Medium Speed -	2.0 V
14	Can High Speed -	2.5 V
NOTE: Voltages may vary with BUS terminal activity		

Figure A-1 *Data link connector*

A.4 No Communication for 1987–90 Nissan

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).

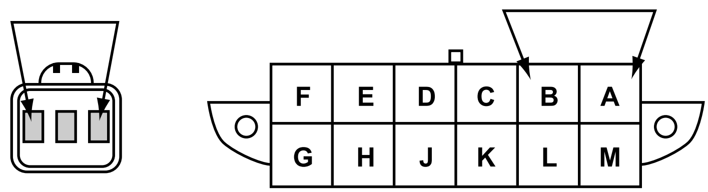


Figure A-2 *Jump these pins to flash codes on the Check Engine lamp*

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.

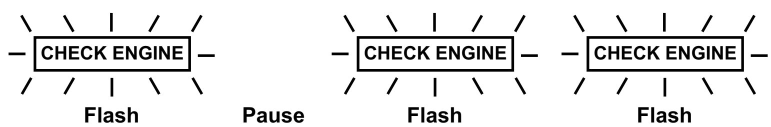


Figure A-3 *Code 12 on Check Engine lamp*

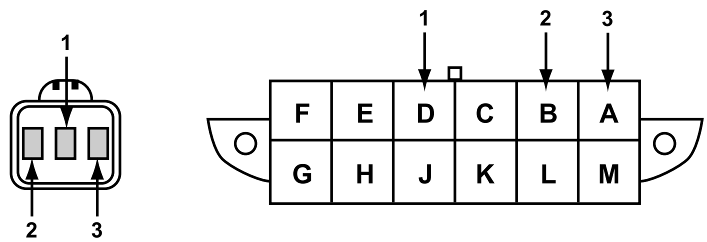
Several different symptoms and problems may occur at this point:

- 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.



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.

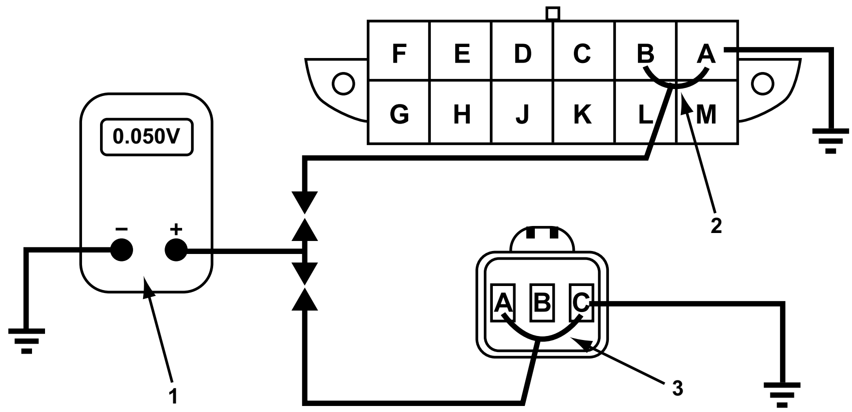
---

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.



1— Voltmeter

2— Jump pin B to pin A

3— Jump pin A to pin C

Figure A-5 *Ground continuity for the ALDL connector*

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

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

EI
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).

ELEC
Electric or Electronic

EMB
Electromagnetic Brake

ENG
Engine

EOT
Engine Oil Temperature

F

FC
Fuel Cut or Fan Control

FT
Fuel Trim

G

GEN
Generator

H

Hz
Hertz (cycles per second)

I

IAC
Idle Air Control. Electrical or mechanical control of throttle bypass air.

IAT
Intake Air Temperature. Also referred to as Manifold Air Temperature (MAT).

IGN
Ignition

inHg
Inches of mercury

INJ
Injector

ISC
Idle Speed Control. Electronic control of minimum throttle position.

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

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

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

VSV
Vacuum Switching Valve

VTD
Vehicle Theft Deterrent

VVT
Variable Valve Timing

W

WOT
Wide Open Throttle

X

XFER
Transfer

Index

Numerics

A

V

W

X