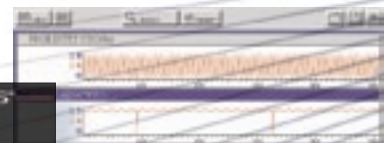
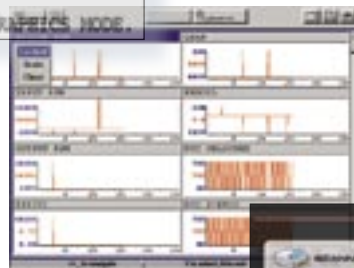


Asian Import Vehicle Communication Software Manual

>LIVE GRAPHICS MODE
MOVIE GRAPHICS MODE
Y SELECTS, N EXITS GRAPHICS MODE.



SELECT 10TH VIN CHARACTER
VIN: *****
VEHICLE:
ENGINE:



US DOMESTIC FROM 2002 Chevrolet

SELECT SYSTEM: SUBS COMPUTER
+ENGINE AIRBAG
TRANSMISSION
-ANTILOCK BRAKES

Example the System to enter the Vehicle Page software screen.
When sequence stops for 1 sec it stops.

Press the "Next" button and wait until the screen displays the next screen.

1C 2C 3C 4C

US DOMESTIC FROM 2002 Chevrolet

SELECT 8th VIN CHARACTER

VIN: --1Y--G-3--

VEHICLE: 2003 CHEVROLET CORVETTE

ENGINE: 5.7L V8 CHEVY SEI

1C 2C 3C 4C

Asian Import Vehicle Communication Software Manual

August 2006

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Form 8-13963A03 Rev. A



Safety Information

For your safety and the safety of others, read, understand and follow all safety messages and instructions in this manual, on the test equipment and in the tool user's manual.

Your diagnostic tool is intended for use by properly trained, skilled professional automotive technicians. The safety messages presented below and throughout this manual are reminders to the operator to exercise extreme care when using a 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 responsibility of the automotive technician to be knowledgeable of the system being tested. It is essential to use proper service methods and test procedures and to perform tests in an appropriate and acceptable manner that does not endanger your safety, the safety of others in the work area, or vehicle or equipment being tested.

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

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

Safety Conventions

Safety messages in this manual contain a signal word with an icon. The signal word indicates the level of the hazard in a situation. Signal words used in this manual are explained below.

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury to the operator or 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. An example is shown below.



Risk of unexpected vehicle movement.

- **Block drive wheels before performing a test with the engine running.**

A moving vehicle can cause injury.

A universal warning triangle is used when an icon for the specific hazard is not available. In these instances, the safety message is preceded by the signal word in bold type. An example is shown below.

Important Safety Instructions

For a complete list of safety messages, refer to the Safety Information chapter in the user's manual for the diagnostic tool associated with this software product.

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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 a sales representative for availability of other modules 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:

Press the **Y** button.

1.1.2 Terminology

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

Select

The term “select” will be used to mean selecting a menu item or other option with the Thumbwheel, Thumb Pad, or arrow keys and pressing the **Y** button to confirm the selection.

Example:

Select **TESTS**:

- Oxygen Sensor Test
- Switch Test
- Base Timing Check

Scroll

The term “scroll” will be used to mean moving the cursor or changing data by turning the Thumbwheel or pressing the Thumb Pad or arrow keys.

Example:

Scroll to see any other codes and the data list.

Scan Tool

The term “scan tool” will be used to refer to any diagnostic tool that can access information from the vehicle data stream. When necessary, the term “Scanner™” will be used to distinguish our equipment from another diagnostic device, such as the manufacturer’s scan tool.

1.1.3 Notes and Important Messages

The following messages appear throughout this manual.

Notes

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

Example:

**NOTE:**

For additional information refer to...

Important

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

Example:

IMPORTANT:

Never install vehicle communication software cartridges in both slots of the Scanner™. This can cause damage to the software cartridges.

The Asian Import Vehicle Communication Software (VCS) allows your scan tool 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, perform tests on OBD-II vehicles, test specific systems and components, check the operation of certain actuators (solenoids, valves, and relays), customize your scan tool function, and record and view data movies. Manufacturer specific sections feature detailed locations of hard to find connectors and information on manual code reading. This manual also includes chapters on data parameters, OBD-II data parameters, and scan tool specific troubleshooting advice.

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

- “Chapter 3: Operations” offers general software operating explanations and procedures.
- Chapters 4–16 offer testing information and procedures for control systems of the following manufacturers:
 - Chapter 4: Acura
 - Chapter 5: Chrysler Imports
 - Chapter 6: Daihatsu
 - Chapter 7: Geo
 - Chapter 8: Honda
 - Chapter 9: Hyundai
 - Chapter 10: Isuzu
 - Chapter 11: Kia
 - Chapter 12: Mazda
 - Chapter 13: Mitsubishi
 - Chapter 14: Nissan/Infiniti
 - Chapter 15: Subaru
 - Chapter 16: Toyota/Lexus/Scion
- “Chapter 17: Generic OBD-II Operations” provides information about testing in the Generic OBD-II Test Mode.
- “Chapter 18: Data Parameters” provides definitions for data parameters.

- “Appendix A: Other Software Available” lists the other software titles available from Snap-on.
- “Appendix B: Troubleshooting” offers advice for troubleshooting scan tool-to-vehicle communication and other issues.
- “Glossary of Terms” lists terms and acronyms used in this manual and in Asian Import manufacturer’s literature.

This section explains how to begin using the scan tool's basic setup and test functions. This information is specific to Asian Import vehicles. For general scan tool functionality, see the user's manual appropriate to your diagnostic tool. Figure 3-1 outlines the general workflow of using the VCS software.

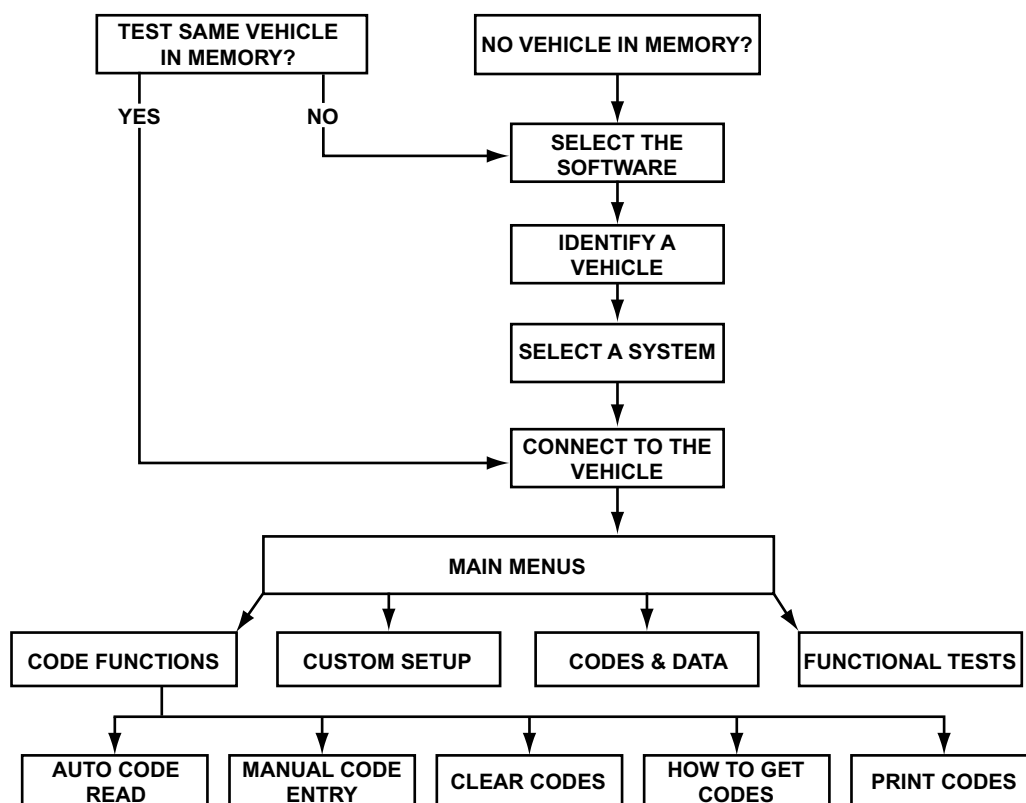


Figure 3-1 Basic Asian Import scan tool test operation



NOTE:

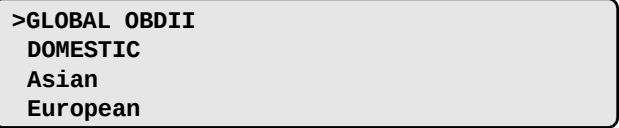
The exact order of test operation steps may vary depending on the test vehicle. Be sure to follow all on-screen instructions.

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.

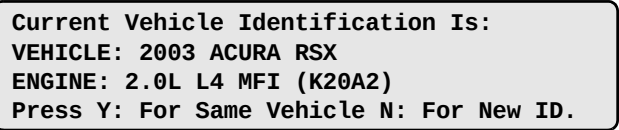
Two types of screens display when you turn on your scan tool:

- The **initial menu** (Figure 3-2) displays if you do not have a vehicle in memory.
- The **Current Vehicle ID screen** (Figure 3-3) displays if you have a vehicle in memory.



>GLOBAL OBDII
DOMESTIC
Asian
European

Figure 3-2 Initial menu



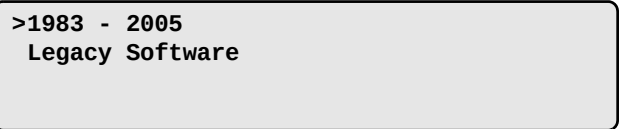
Current Vehicle Identification Is:
VEHICLE: 2003 ACURA RSX
ENGINE: 2.0L L4 MFI (K20A2)
Press Y: For Same Vehicle N: For New ID.

Figure 3-3 Sample Current Vehicle Identification screen



To select the software from the initial menu:

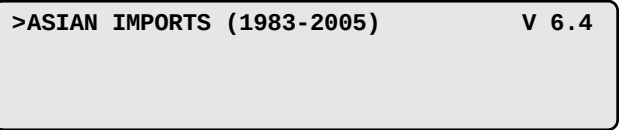
1. Select **ASIAN** (Figure 3-2).
The Year Range menu displays (Figure 3-4).



>1983 - 2005
Legacy Software

Figure 3-4 Year Range menu

2. Select the year range for the test vehicle.
The software loads for a moment and then the Software Confirmation screen displays (Figure 3-5).



>ASIAN IMPORTS (1983-2005) V 6.4

Figure 3-5 Sample Software Confirmation screen

3. Press **Y** to confirm the software.
The Manufacturer Selection menu displays (Figure 3-6).



SELECT MAKE:
>ACURA
CHRYSLER IMPORTS
DAIHATSU

Figure 3-6 Sample Manufacturer Selection menu (2002-2003)

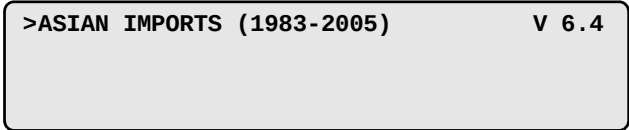


To select the software from the Current Vehicle ID screen:

1. Press **Y** if you want to test the same vehicle, or press **N** if you want to test a different vehicle (Figure 3-5).

If you pressed **Y**, the Connection Instructions screen or System Selection menu displays. See “Selecting the Software” on page 5 or “Connecting to the Vehicle” on page 8 to continue.

If you pressed **N**, the Software Confirmation screen displays (Figure 3-7).



>ASIAN IMPORTS (1983-2005) V 6.4

Figure 3-7 Sample Software Confirmation screen

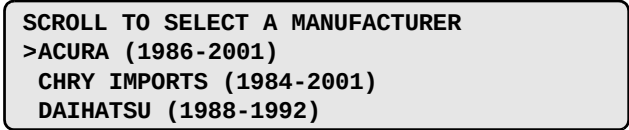
2. Press **Y** to select the software displayed and go to the Manufacturer Selection menu (Figure 3-6). If you want to select different software, skip this step and go on to step 3.
3. Exit back to the initial menu and select the software as previously described.



To exit back to the initial menu from ASIAN IMPORTS (TO 2001) software (Legacy Software):

1. Press **Y**.

The Manufacturer Selection menu displays (Figure 3-8).



SCROLL TO SELECT A MANUFACTURER
>ACURA (1986-2001)
CHRY IMPORTS (1984-2001)
DAIHATSU (1988-1992)

Figure 3-8 Sample Manufacturer Selection menu (to 2001)

2. Scroll to the end of the list and select **EXIT THIS MENU**.
The initial menu displays (Figure 3-2).



To exit back to the initial menu from ASIAN IMPORTS (1983-2005) software:

- Press **N**.

The initial menu displays (Figure 3-2).

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 (Figure 3-8), select the vehicle manufacturer. The first in a series of Vehicle Identification screens displays (Figure 3-9).

SELECT 10TH VIN CHARACTER
VIN: -----3-----
VEHICLE: 2003 ACURA
ENGINE:

Figure 3-9 Sample Vehicle Identification screen

2. Scroll and press **Y** to enter VIN characters, and press **Y** or **N** to answer any questions. When you are finished, a Vehicle ID Confirmation screen displays (Figure 3-10).

VIN: ---N-2---3-----
VEHICLE: 2003 ACURA NSX
ENGINE: 3.2L V6 MFI (C32B1)
PRESS Y TO CONTINUE. N FOR NEW ID.

Figure 3-10 Sample Vehicle ID Confirmation screen

3. Press **Y** if the vehicle ID is correct or press **N** to identify a different vehicle. 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 (Figure 3-11). Menus vary by manufacturer and model. Refer to the manufacturer-specific chapters of this manual for instructions on selecting a system to test.

SELECT SYSTEM:
>ENGINE **ANTI-LOCK BRAKES**
TRANSMISSION

Figure 3-11 Sample System Selection menu

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 (Figure 3-12).

CONNECT OBDII ADAPTER WITH K2A TO 16-PIN
CONNECTOR UNDER GLOVEBOX.
NOTE!! CYCLE KEY OFF TO ON.
PRESS Y TO CONTINUE.

Figure 3-12 Sample Connection Instructions screen

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.

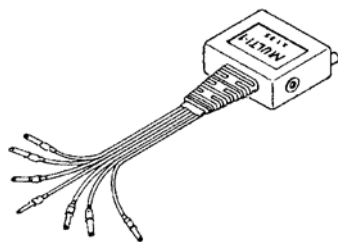


Figure 3-13 MT2500-90 MULTI-1 adapter

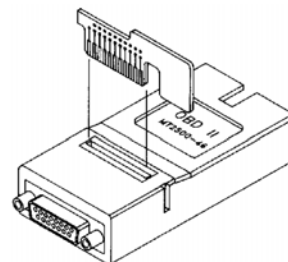


Figure 3-14 MT2500-46 OBD-II adapter with Personality Key™

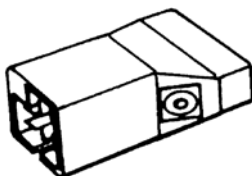


Figure 3-15 MT2500-50 TOYOTA-1 adapter

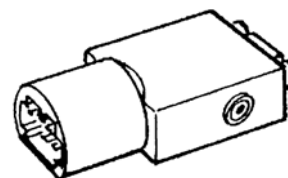


Figure 3-16 MT2500-52 TOYOTA-2 adapter
MT2500-53 MAZDA-1 adapter

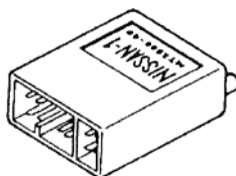


Figure 3-17 MT2500-40 NISSAN-1 adapter (12-pin)

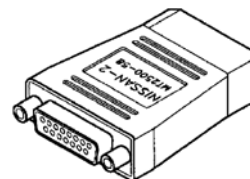


Figure 3-18 MT2500-58 NISSAN-2 adapter (16-pin)

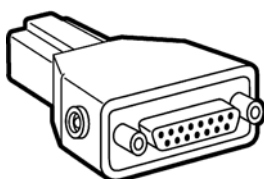


Figure 3-19 MT2500-77 HON-1 adapter

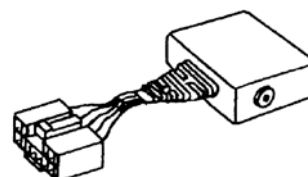


Figure 3-20 MT2500-51 HYUNDAI-2 adapter

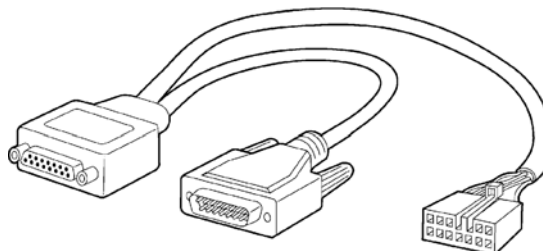


Figure 3-21 MT2500-55 MITSU-1 adapter

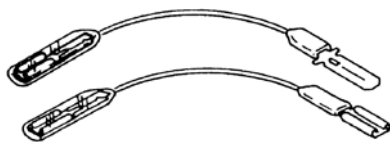


Figure 3-22 MT2500-43 Terminal Converters

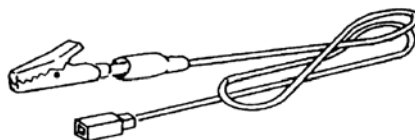


Figure 3-23 MT2500-41 Ground adapter

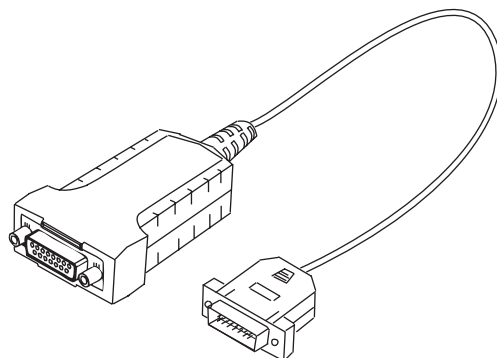


Figure 3-24 CAN1B adapter

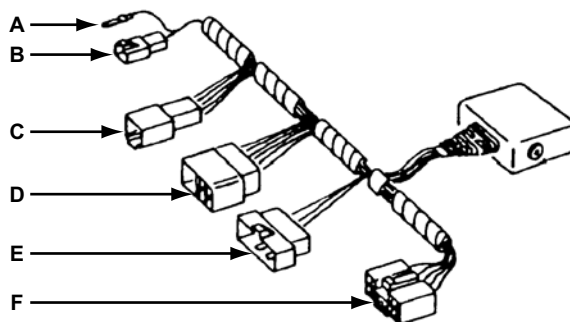


Figure 3-25 MT2500-42 MULTI-2 Asian adapter

- A—Ground
- B—Mazda & Ford (2E)
- C—Isuzu & Geo with GM system (2D)
- D—Subaru (2C)
- E—Mazda & Ford (2B)
- F—Special applications (2A)

**To connect to a vehicle:**

- Follow the on-screen instructions and press **Y** when you are finished. The main menu displays (Figure 3-26).

MAIN MENU	CUSTOM SETUP
>CODES & DATA MENU	MOVIES
FUNCTIONAL TESTS	
ACTUATOR TESTS	

Figure 3-26 Sample main menu

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 & DATA** lets you read input and output signals (switches, sensors, and actuators). See the manufacturer-specific sections of the manual for specific information.
- **CODES & DATA MENU** lets you access a submenu of tests on OBD-II vehicles.
- **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 (Figure 3-27).

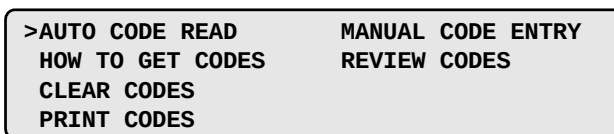


Figure 3-27 Sample Code Functions menu

Depending on the vehicle type, six primary CODE FUNCTIONS selections may be available:

- **AUTO CODE READ** reads all available electronic codes automatically (Figure 3-28).
- **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 (Figure 3-28).
- **REVIEW CODES** lets you review codes stored in scan tool memory, either through automatic code reading or manual code entry.

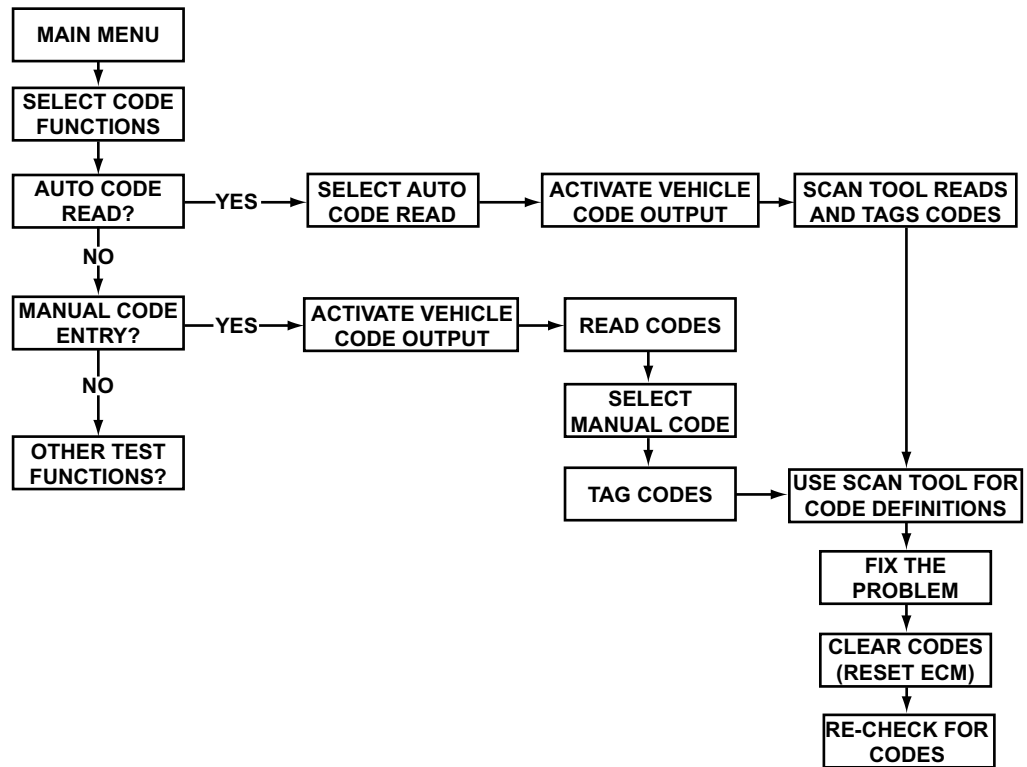


Figure 3-28 Basic Code Functions: Auto Code Read and Manual Code Entry

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. MANUAL CODE ENTRY is used when the AUTO CODE READ selection is not available or when you prefer to enter a code manually.

For vehicles with diagnostic connectors that have automatic code reading, 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 ("How to Get Codes" on page 15).

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 key words to describe the type of code flashing pattern.

Five general code patterns are used:

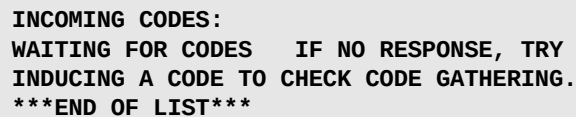
- **Straight Count**—flashes the lamp or LED the number of times equal to the trouble code with a noticeable pause between multiple codes.

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

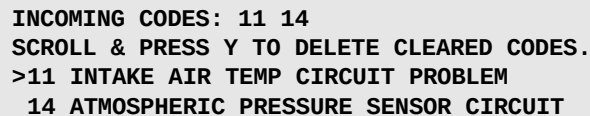
Selecting AUTO CODE READ from the Code Functions menu displays a screen like Figure 3-29.



INCOMING CODES:
WAITING FOR CODES IF NO RESPONSE, TRY
INDUCING A CODE TO CHECK CODE GATHERING.
END OF LIST

Figure 3-29 Incoming Codes screen

If multiple codes are received, the scan tool continues to add to the list. Scroll to view the numbers and titles of all codes. Code numbers appear on the top line in the order in which the ECM transmits them (Figure 3-30).



INCOMING CODES: 11 14
SCROLL & PRESS Y TO DELETE CLEARED CODES.
>11 INTAKE AIR TEMP CIRCUIT PROBLEM
14 ATMOSPHERIC PRESSURE SENSOR CIRCUIT

Figure 3-30 Sample Auto Code Read screen

LEDs flash simultaneously with the codes as they 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.

After you repair a problem or clear codes from the vehicle, the code numbers next to INCOMING CODES are removed. The individual lines with code numbers and titles remain on the AUTO CODE READ screen and in REVIEW CODES until you remove them manually.



To delete cleared codes:

1. Scroll to the line with the code that you want to remove.
2. Press Y to clear the code.

The code number and title are removed from the list. If the code has not been cleared from the ECM, the number remains on the top line.

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 vehicle information for clearing ECM trouble codes (Figure 3-31).

**TO CLEAR CODES, DISCONNECT BATTERY
GROUND CABLE. DEPRESS & HOLD BRAKE
PEDAL FOR AT LEAST 5 SECONDS. RECONNECT
BATTERY & RECHECK FOR CODES. [N TO EXIT]**

Figure 3-31 Clear Codes screen

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 (Figure 3-32).

**CLEAR CODES FROM VEHICLE MEMORY:
ARE YOU SURE? PRESS Y OR N.**

Figure 3-32 Clear Codes Confirmation screen

If you press Y, the scan tool displays the following message (Figure 3-33).

**CLEAR CODES FROM VEHICLE MEMORY:
CLEARING CODES . . . WAIT
PRESS N TO RESUME.**

Figure 3-33 Clearing Codes screen

When all codes are erased, the display changes to the following (Figure 3-34).

**CLEAR CODES FROM VEHICLE MEMORY:
CODES ERASED FROM VEHICLE MEMORY
PRESS N TO RESUME.**

Figure 3-34 Codes Cleared screen



NOTE:

If the vehicle ECM does not receive the code-clearing command, the CLEARING CODES... WAIT 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 (Figure 3-35).

**MANUAL CODES ONLY. FOR CODE LIST,
USE POWER PAC, OR USE MULTI-1 WITH
GROUND EXTENSION & EITHER POWER CABLE.
PRESS Y TO CONTINUE.**

Figure 3-35 Sample Connection Instruction screen for manual codes only

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 (Figure 3-36). The on-screen instructions are supplemented in the manufacturer-specific chapters of this manual.

**FIND ECU BEHIND LEFT KICKPANEL.
TURN ECU SWITCH "ON". SEE MANUAL.
RED LED PULSES TENS DIGIT, GREEN PULSES
ONES. CODE TYPE 07a.**

Figure 3-36 Sample How to Get Codes screen

3.6.7 Reviewing Codes

The REVIEW CODES selection is only available on the Code Functions menu after the scan tool has received codes from a vehicle, either automatically or manually. Selecting REVIEW CODES displays a screen similar to Figure 3-37. Scroll to view all codes.

**CODE SUMMARY: 12 22 23 31 55
*****CODE DEFINITIONS*****
12 AIRFLOW METER CKT OPEN OR SHORTED
22 FUEL PUMP CIRCUIT PROBLEM**

Figure 3-37 Sample Review Codes screen

3.7 Demonstration Programs

The Asian Import VCS contains a program that demonstrates many of the scan tool's test capabilities without actually connecting to a vehicle. A sample vehicle ID and mock test results are provided to familiarize you with scan tool menus and basic operations.

**NOTE:**

The DEMO selection appears at the end of the list of available manufacturers for 2001 and earlier vehicles only.

**To access the demonstration program:**

1. Select the software as described in "Selecting the Software" on page 5.
The Manufacturer Selection menu displays (Figure 3-38).

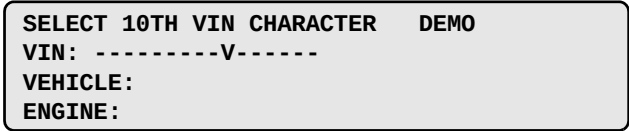


```
SCROLL TO SELECT A MANUFACTURER
>TOYOTA
OBDII GENERIC
DEMO
```

Figure 3-38 Sample Manufacturer Selection menu

2. Select **DEMO**.

A Vehicle Identification screen displays with "DEMO" in the first line, indicating that you are in the demonstration program (Figure 3-39).



```
SELECT 10TH VIN CHARACTER    DEMO
VIN: -----V-----
VEHICLE:
ENGINE:
```

Figure 3-39 Asian demo Vehicle Identification screen

3. Keep pressing Y to choose the defaults until the System Selection menu displays (Figure 3-40).



```
SELECT SYSTEM:
>ENGINE          ANTI-LOCK BRAKES
TRANSMISSION
```

Figure 3-40 System Selection menu

**NOTE:**

If Troubleshooter software is installed, it will be accessible for demonstration purposes. Make sure you select the system that matches the Troubleshooter software. For example, if you have a Transmission Troubleshooter installed, make sure to select TRANSMISSION from the System Selection menu.

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 17
- “ECM Locations 1986 to 1990 with ECM LED”
- “SCS mode” on page 21
- “Code Type” on page 24
- “Manual Code Reading (Engine Codes)” on page 24
- “Multiple Codes” on page 25

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.

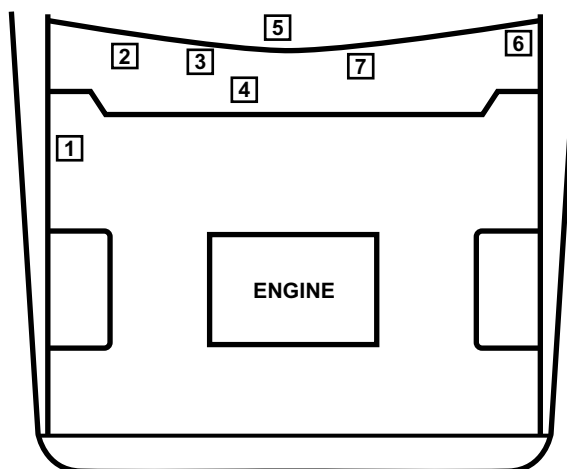


Figure 4-1 Common connector locations

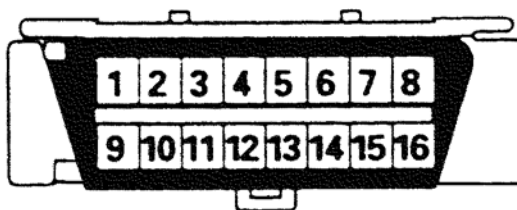


Figure 4-2 OBD-II data link connector (DLC)

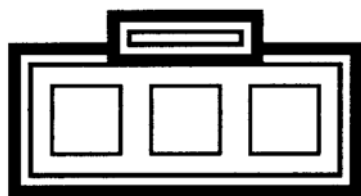


Figure 4-3 3-pin DLC

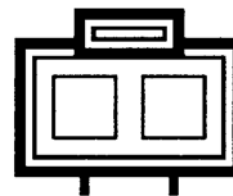


Figure 4-4 2-pin service check signal (SCS) connector

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

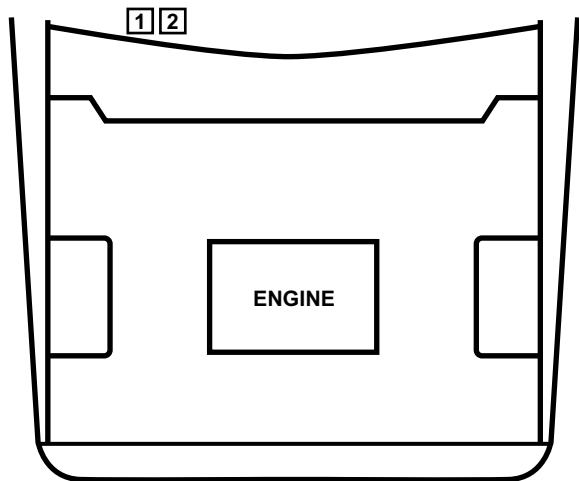


Figure 4-5 LED Locations.

Table 4-2 LED locations

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

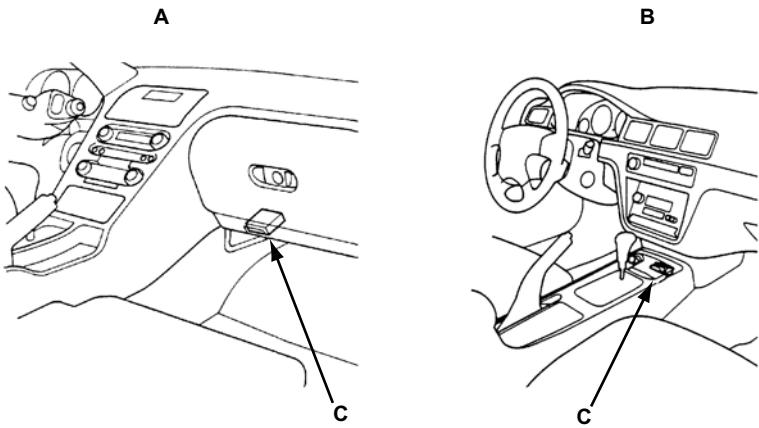


Figure 4-6 Acura data link connector (DLC) locations

- A—1995 2.5, 3.2 TL
- B—1995 NSX
- C—16-pin Data Link Connector (DLC)
Use OBD-II adapter.

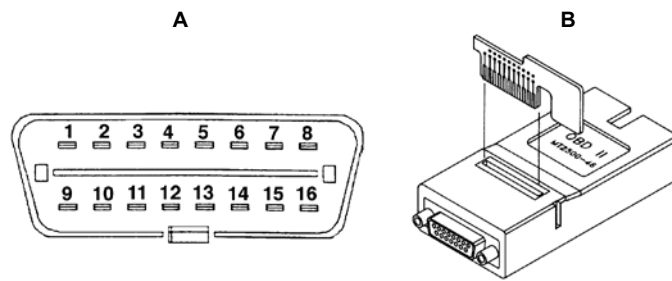


Figure 4-7 Acura DLC and adapter

A—16-pin DLC
B—OBD-II adapter

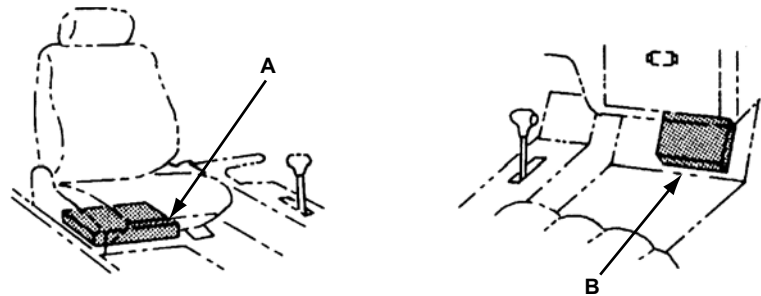


Figure 4-8 Acura control module locations for LED code flashers

A—1986-89 Integra, 1986-90 Legend Sedan
B—1990-91 Integra, 1987-90 Legend Coupe

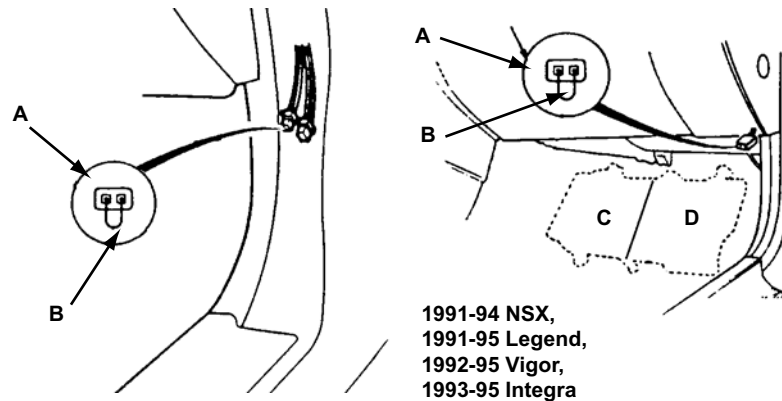


Figure 4-9 Acura check connector locations for Check Engine Lamp code flashers

A—Service check connector
B—Jump wire
C—ECM
D—TCM

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 OBD-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” on page 17.

Models with a separate 2 pin SCS connector:

CODES MENU
HOW TO GET CODES
MANUAL CODE ENTRY
CLEAR CODES

JUMP 2-PIN SERVICE CONNECTOR
UNDER GLOVE BOX. CODE FLASH
ONE TIME PER IGNITION CYCLE ABS LAMP
FLASH CODE. CODE TYPE 04

Figure 4-10 Typical screen menu for the 2 pin SCS. Use jumper or Honda tool O.E. #07PAZ-0010100

Models with the SCS in the 16 pin DLC:

Pressing **Y** grounds the appropriate pin of the DLC, which enables the SCS mode.



NOTE:

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

MAIN MENU (ENGINE)	CUSTOM SETUP
CODES & DATA MENU	TROUBLESHOOTER
SCS MODE	
MOVIES	

Figure 4-11 Typical Engine Main Menu

SCS MENU:
SCS MODE
SCS HELP

Figure 4-12 SCS Menu

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

ABS code reading message (typical, using SCS mode)

SELECT:SCS MODE FOLLOW ON SCREEN INSTRUCTIONS. ABS LAMP FLASHES CODES. SEE MANUAL FOR CODE TYPE INFORMATION. CODE TYPE 04

Figure 4-13 ABS code reading message (typical, using SCS mode)

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.

- | |
|---|
| 1) HOLD BRAKE ON & CYCLE IGNITION ON.
2) WHEN ABS LAMP GOES OFF-RELEASE BRAKE
3) WHEN LAMP COMES ON-HOLD BRAKE AGAIN
4) RELEASE BRK-WHEN LAMP GOES OFF. [MORE] |
|---|

Figure 4-14 ABS clearing using SCS mode

SOME VEHICLES MAY REQUIRE TO BE DRIVEN ABOVE 7-MPH TO COMPLETE CODE CLEARING PROCEDURE.

Figure 4-15 ABS clearing using SCS mode

AIRBAG code reading message (typical, using SCS mode)

SELECT: SCS MODE
FOLLOW ON SCREEN INSTRUCTIONS.
SRS LAMP FLASHES CODES. SEE MANUAL FOR
CODE TYPE INFORMATION. CODE TYPE 06.

Figure 4-16 AIRBAG code reading message (typical, using SCS mode)

AIRBAG code clearing message (typical)

OR CENTER CONSOLE. SEE SMALL REFERENCE
FIND YELLOW MES CONNECTOR IN FUSE BOX
MANUAL FOR DETAILED CLEAR CODES
PROCEDURE.

Figure 4-17 AIRBAG code clearing message (typical, see code clearing section in this manual)



NOTE:

The MES (Message Erase Signal) connector is not the same as the SCS connector.

Two-trip detection bypass

Use SCS mode to bypass OBD '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 OBD-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.

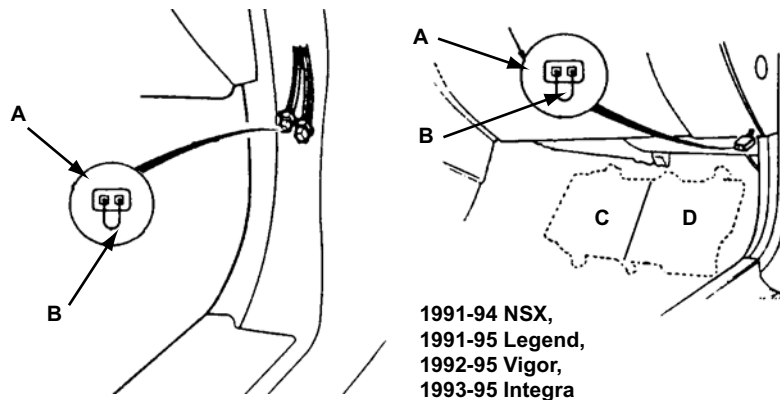


Figure 4-18 Data connector from the wire side (Honda numbering, not the same as SAE)

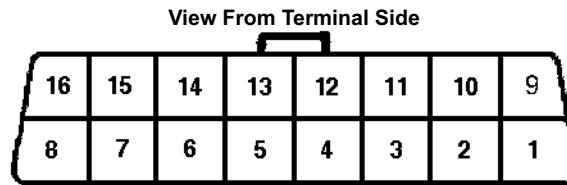


Figure 4-19 Data connector from terminal side (SAE standard pin numbering)

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' (i.e. COPE 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 4-20 and Table 4-3
- Type 03, see Figure 4-21 and Table 4-4



Figure 4-20 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 4-21 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 & DATA selections available from the MAIN MENU.

4.2.1 Code Reading Connector Locations

Figure 4-22 and Figure 4-23 provide diagnostic connector locations and adapter information.

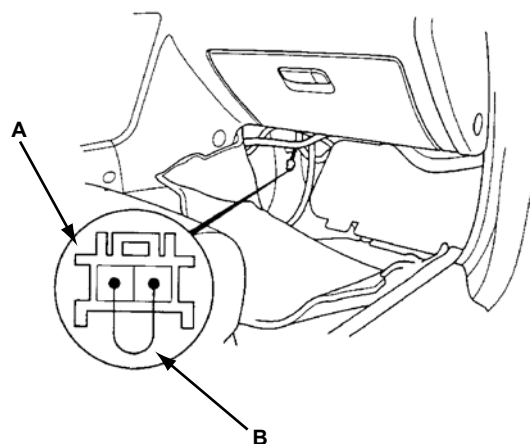


Figure 4-22 1991–95 NSX, 1992–95 Vigor transmission service check connector locations

A—Service check connector

B—Jump wire

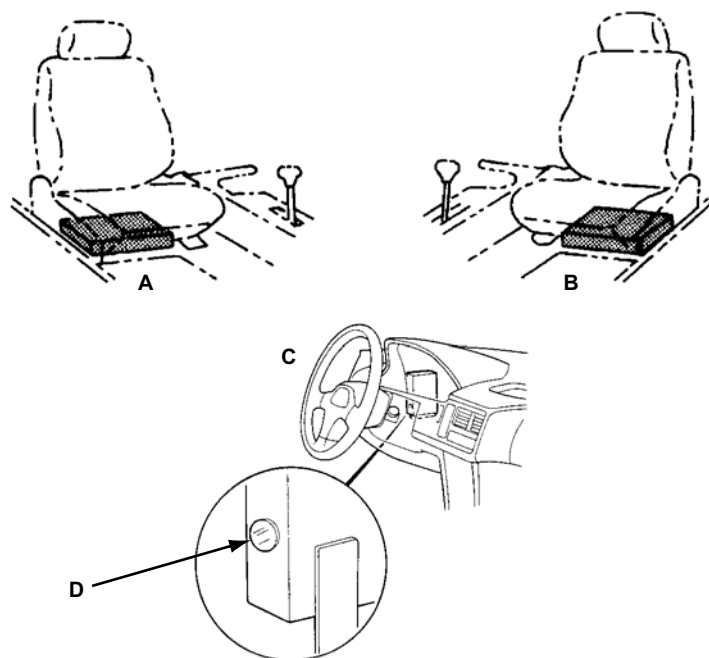


Figure 4-23 Acura transmission service check connector locations

A—1987–90 Legend Coupe

B—1988–90 Legend Sedan

C—1990–95 Integra

D—LED display

Figure 4-24 shows common transmission diagnostic connector locations for Acura vehicles.

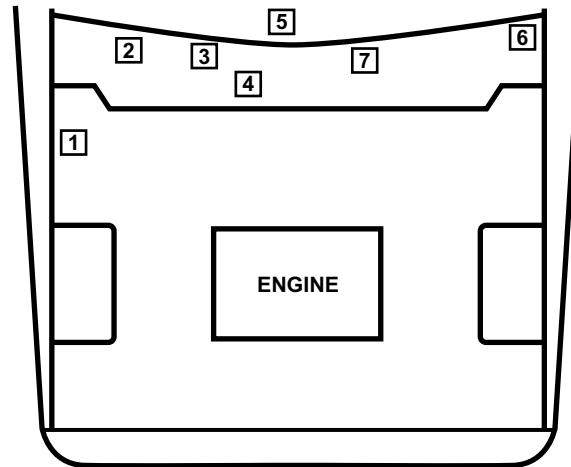


Figure 4-24 Common transmission connector locations for 1995–2003 vehicles

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 4-25 and Table 4-6 on page 28

Type 03, see Figure 4-26 and Table 4-7 on page 28.

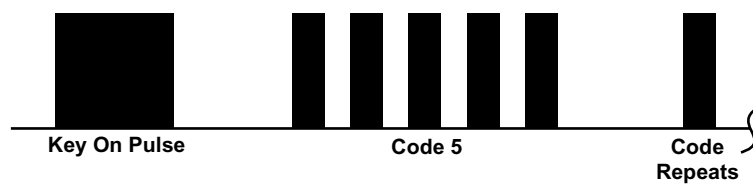


Figure 4-25 Acura transmission Code Type 02

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.	

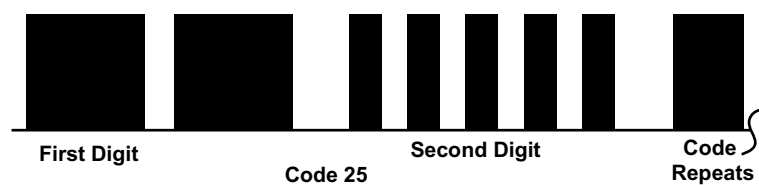


Figure 4-26 Acura transmission Code Type 03

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 29
- “ABS Codes and Data Testing” on page 30
- “Manual Code Reading (ABS Codes) and Clearing Codes” on page 33

4.3.1 Code Reading Connectors and Locations

Diagnostic connector locations and test adapter information for Acura ABS are shown in Figure 4-27, Figure 4-28 and Figure 4-29.

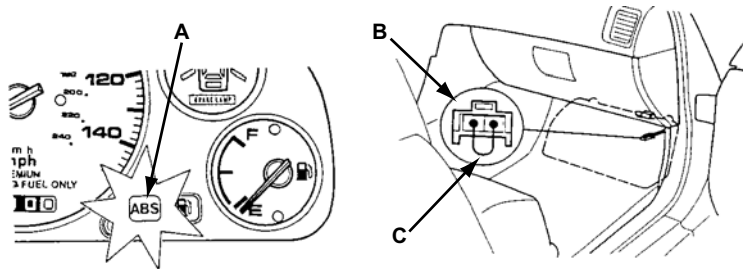


Figure 4-27 1991–95 NSX, 1992–94 Vigor, 1991–94 Legend ABS controller and service check connector locations

- A—ABS indicator lamp
B—Service check connector
C—Jump wire

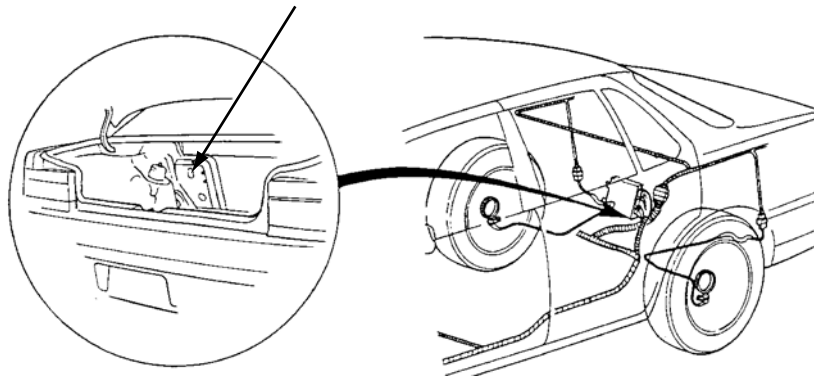


Figure 4-28 1986–90 Legend ABS controller and service check LED location

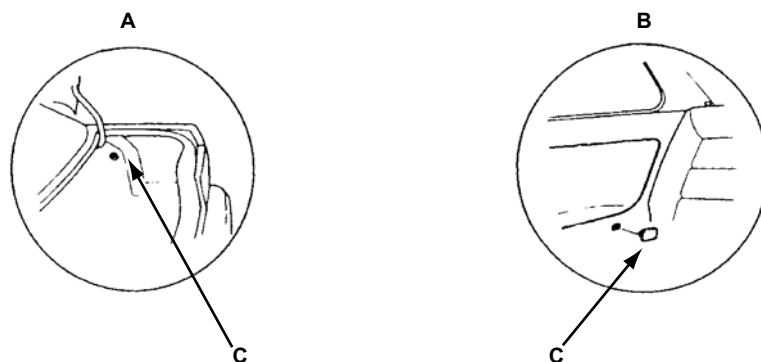


Figure 4-29 1990–93 Integra ABS controller and service check connector locations

A—4-door

B—3-door

C—Access cover

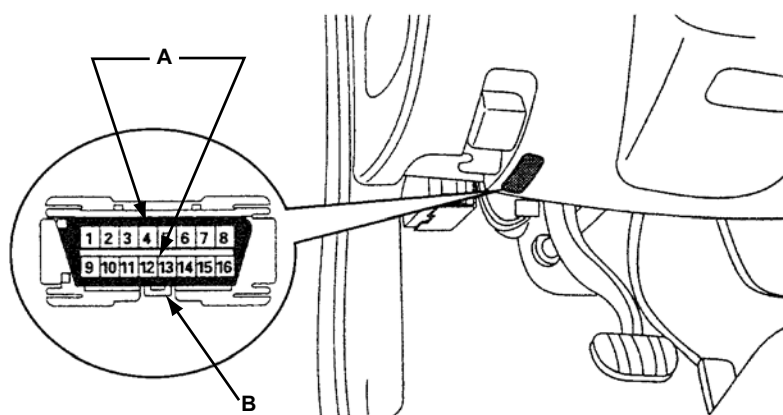


Figure 4-30 1996–97 SLX ABS controller and service check connector locations

A—Jump pin 4 to pin 12

B—DLC

4.3.2 ABS Codes and Data Testing

- “ABS MAIN MENU” on page 30
- “CODES & DATA MENU” on page 31
- “DATA (NO CODES)” on page 31
- “CODE ONLY” on page 32
- “CLEAR CODE” on page 32

ABS MAIN MENU

After selecting ABS from the System Selection menu, the MAIN MENU (ABS) is displayed (Figure 4-31). Selections vary by model and year.

```

MAIN MENU
>CODES & DATA MENU
CUSTOM SETUP
MOVIES                                TROUBLESHOOTER

```

Figure 4-31 Typical ABS main menu

The following main menu selections are discussed:

- “CODES & DATA MENU” on page 31
- MOVIES, CUSTOM SETUP, and TROUBLESHOOTER are discussed in detail in the user’s manual for your diagnostic tool.

CODES & DATA MENU

When CODES & DATA MENU is selected, the following is displayed (Figure 4-32):

```

CODES & DATA MENU
>DATA (NO CODES)      REVIEW CODES
CODE ONLY              PRINT CODES
CLEAR CODE

```

Figure 4-32 Typical ABS CODES & DATA MENU

- **DATA (NO CODES)** - This selection begins communication with the ABS module and displays data parameters.
- **CODE ONLY** - When selected, ABS trouble codes are gathered and displayed.
- **CLEAR CODES** - This selection clears ABS memory codes from the ABS ECM memory.
- **REVIEW CODES** - This selection allows you to view codes. (This menu item appears only after code gathering.)
- **PRINT CODES** - This selection 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.

```

**ABS DATA**
LF WHEEL (MPH) 0 RF WHEEL (MPH) 0
LR WHEEL (MPH) 0 RR WHEEL (MPH) 0
BRAKE SW OFF ABS PUMP MOTOR OFF

```

Figure 4-33 Typical ABS DATA display

CODE 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. Press **Y** to continue.
A screen will appear while the scan tool communicates with the vehicle (Figure 4-34).

**INITIALIZING COMMUNICATION
ONE MOMMENT PLEASE...**

Figure 4-34 Typical ABS code reading screen message

**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 screen appears (Figure 4-35)

**CODE LIST
12-3 WHEEL SPEED SENSOR CIRCUIT OPEN
END OF LIST**

Figure 4-35 Typical ABS codes message

CLEAR CODE

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. Press **Y** to continue.
A code clearing confirmation screen displays (Figure 4-36).

**DTC ERASE ROUTINE (KOE0)

ARE YOU SURE? PRESS Y OR N.**

Figure 4-36 Typical ABS code clearing screen message

3. Press **Y** to clear ABS codes or **N** to cancel the operation.

4. The DTCs CLEARED screen appears (Figure 4-37)
Press **Y** or **N** to exit.

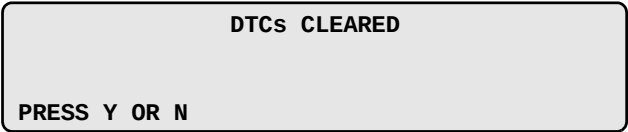


Figure 4-37 Typical ABS codes cleared screen message

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 4-38 and Table 4-8 on page 33
- Type 04, see Figure 4-39 and Table 4-9 on page 34
- Type 5a, see Figure 4-40 and Table 4-10 on page 35
- Type 06, see Figure 4-41 and Table 4-11 on page 35
- Type 12, see Figure 4-42 and Table 4-12 on page 36



Figure 4-38 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.	

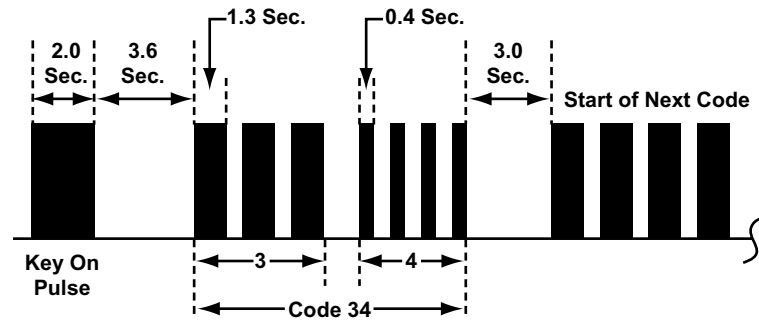


Figure 4-39 Acura ABS Code Type 04

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.

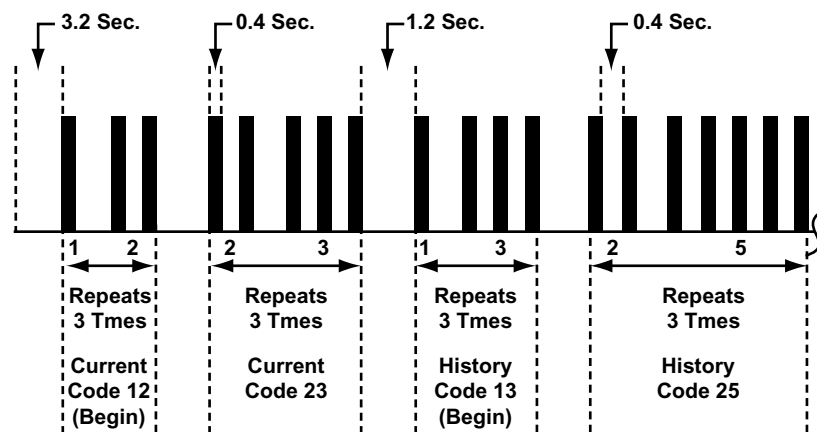


Figure 4-40 Acura ABS Code Type 5a

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.	

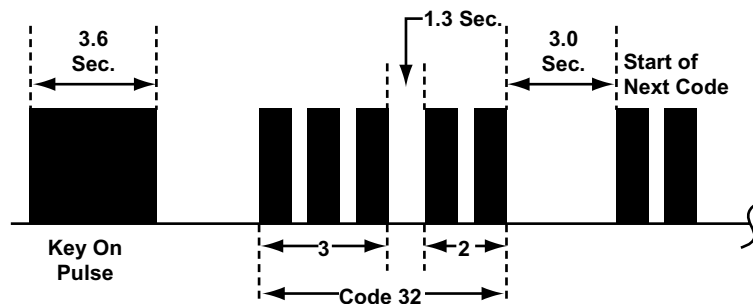


Figure 4-41 Acura ABS Code Type 06

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.

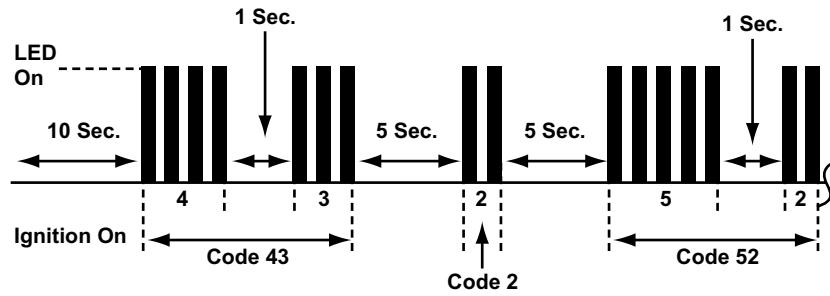


Figure 4-42 Acura ABS Code Type 12

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:

- “Manual Code Reading (SRS)” on page 36
- “Code Clearing (SRS Codes)” on page 38

4.4.1 Manual Code Reading (SRS)

There are 2 types of manual SRS codes:

- Type 06, see Figure 4-43 and Table 4-13 on page 37
- Type 07, see Figure 4-44 and Table 4-14 on page 37

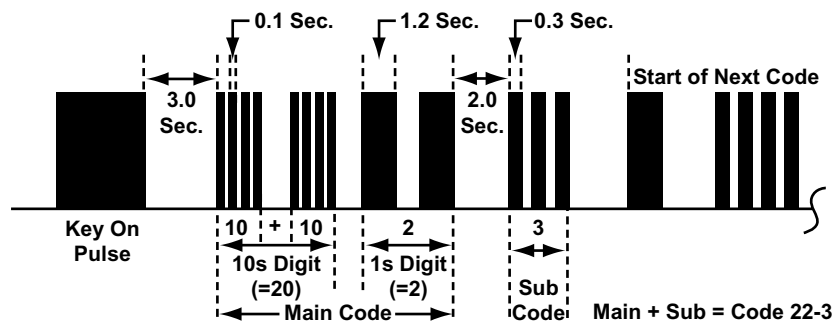
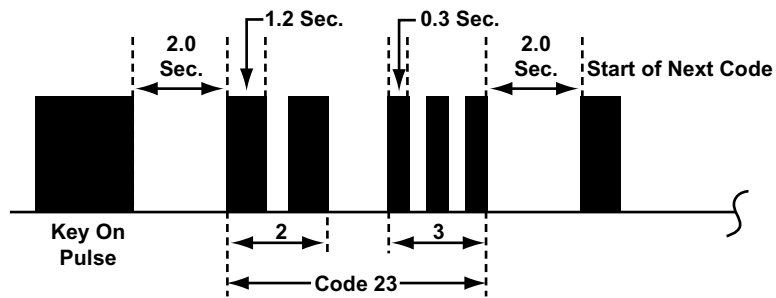


Figure 4-43 Acura SRS Code Type 06

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 4-44** 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.	

4.4.2 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 4-45 on page 38).
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.

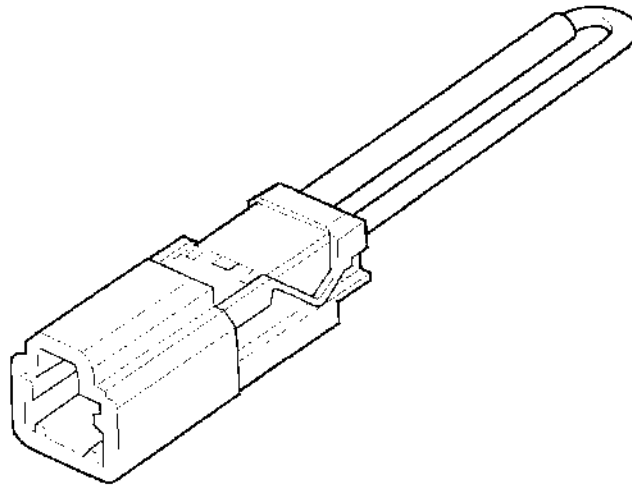


Figure 4-45 SCS Service Connector OEM# 07PAZ-0010100 (or use jumper wire equivalent)

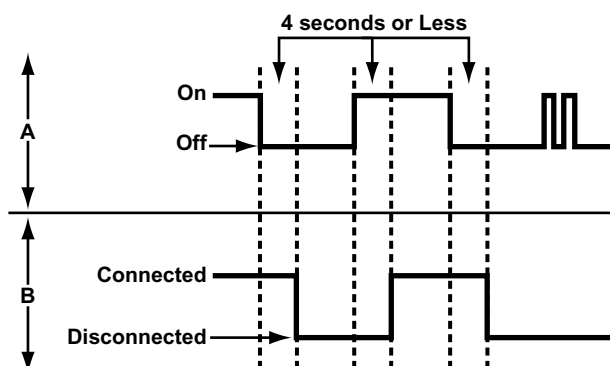


Figure 4-46 SRS code clearing

A—SRS indicator lamp
B—MES connector terminals

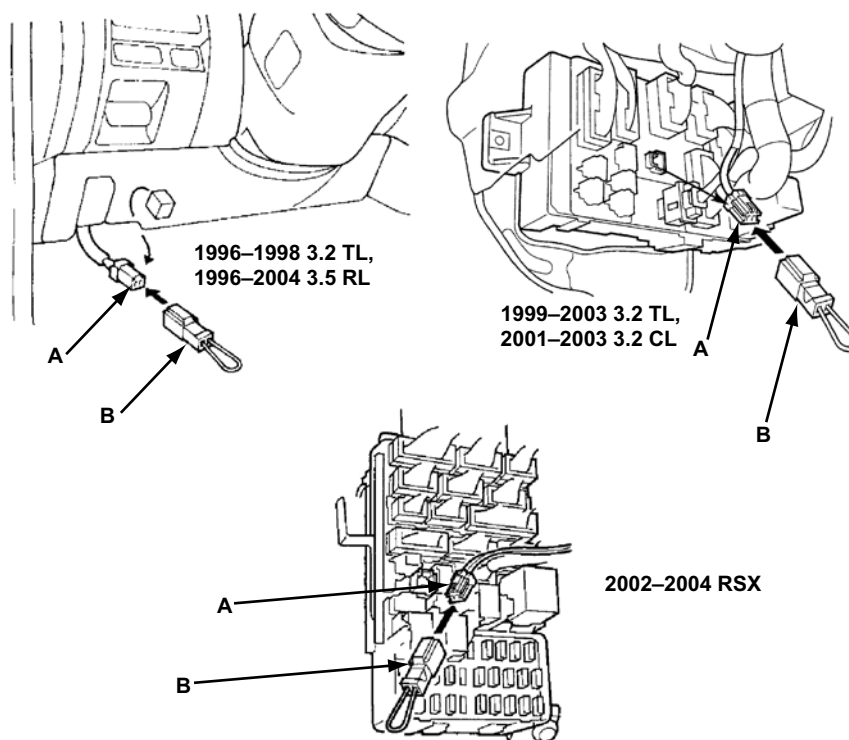


Figure 4-47 Acura OBD-II SRS MES connector (1 of 2)

A—Memory Erase Signal (MES) 2P connector
B—SCS Service connector (Acura 07PAZ-0010100)

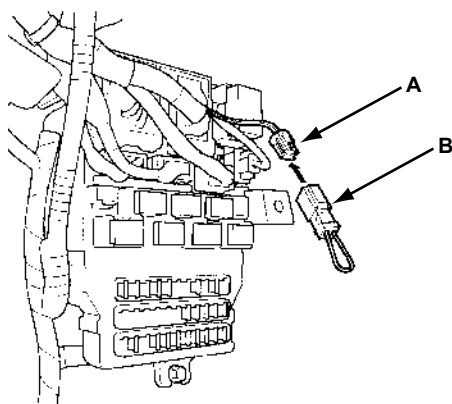


Figure 4-48 2004 TSX/TL SRS code clearing (left side of dash)

A—MES connector

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

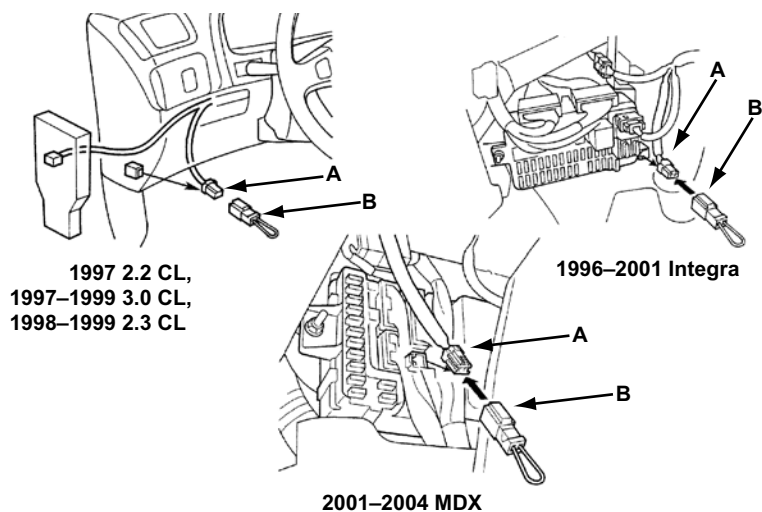


Figure 4-49 Acura OBD-II SRS MES connector location (2 of 2)

A—MES 2P connector

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

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 Systems

Chrysler Import testing includes:

- “Code Reading Connectors and Locations” on page 41
- “ABS Manual Code Reading” on page 44
- “Clearing Codes” on page 44
- “Codes & Data (Slow)” on page 45
- “Actuator Tests” on page 45

5.1.1 Code Reading Connectors and Locations

Figure 5-1 below and Table 5-1 on page 42 provide Chrysler Import diagnostic connector location information.

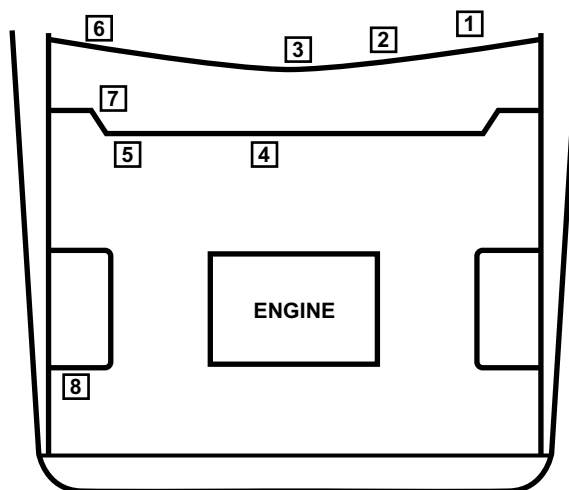


Figure 5-1 Common connector locations

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

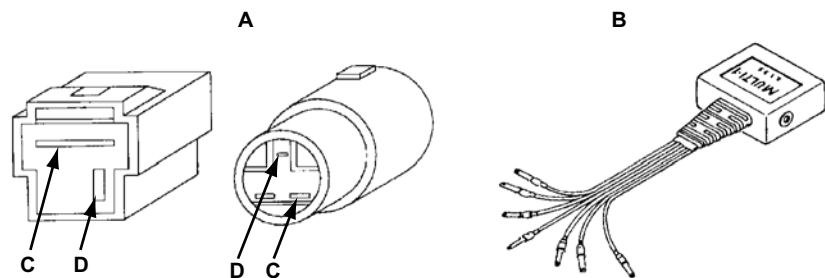


Figure 5-2 Connectors and adapter for most vehicles before 1987

- A—Connectors
 B—MULTI-1 adapter
 C—Black
 D—Green (preferred) or Yellow

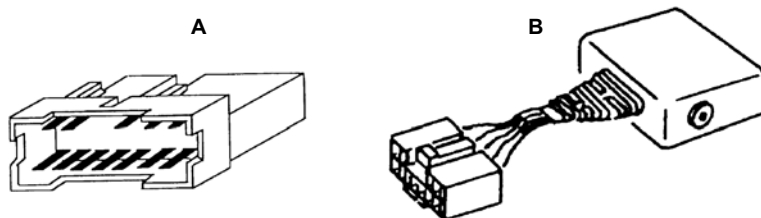


Figure 5-3 Connector and adapter for most OBD-I vehicles

A—Connector
B—HYUN-2 adapter

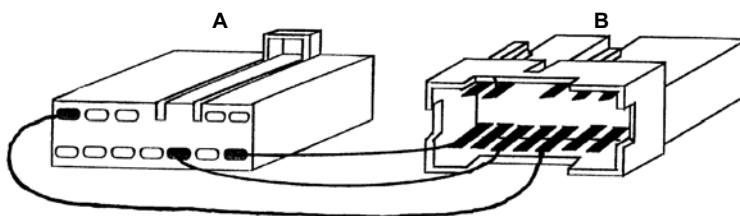


Figure 5-4 Connector and adapter for SRS system on most 1994 and earlier vehicles

A—HYUN-2 adapter
B—Connector

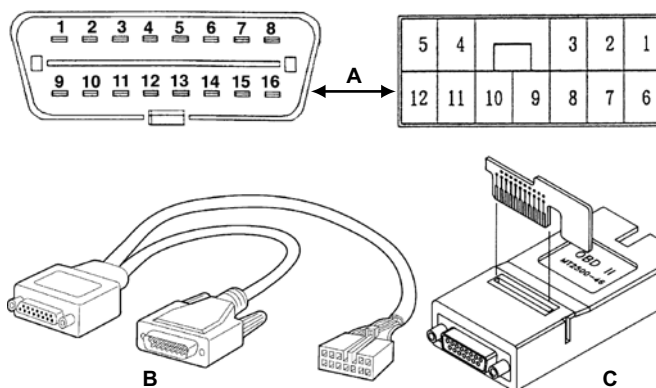


Figure 5-5 Connectors and adapters for most OBD-II vehicles

A—Connectors
B—MITSU-1 adapter
C—OBD-II adapter



NOTE:

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

IMPORTANT:

Do not use the battery pack when connecting to Chrysler Import vehicles. Use the Lighter Power Cable or Battery Power Cable.

5.1.2 ABS Manual Code Reading

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

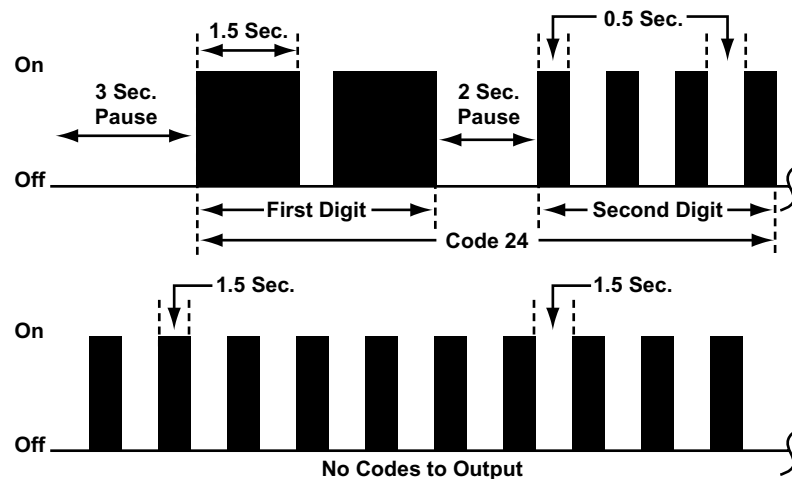


Figure 5-6 Chrysler Imports antilock brake Code Type 11

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 scan tool Exit menu (Figure 5-7).

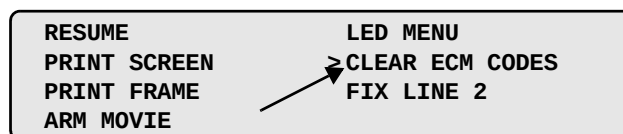


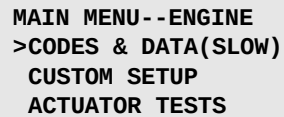
Figure 5-7 CLEAR ECM CODES selection

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 code clearing.

5.1.4 Codes & 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 & DATA(SLOW) (Figure 5-8).



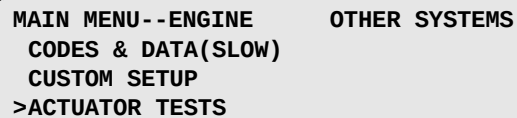
A rectangular box with a black border containing the following text:

```
MAIN MENU - - ENGINE
>CODES & DATA(SLOW)
CUSTOM SETUP
ACTUATOR TESTS
```

Figure 5-8 Sample MAIN MENU with CODES & DATA(SLOW)

5.1.5 Actuator Tests

The ACTUATOR TESTS selection is available from the MAIN MENU (Figure 5-9) 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)” on page 47.



A rectangular box with a black border containing the following text:

```
MAIN MENU - - ENGINE      OTHER SYSTEMS
CODES & DATA(SLOW)
CUSTOM SETUP
>ACTUATOR TESTS
```

Figure 5-9 Sample MAIN MENU with ACTUATOR TESTS

Selecting ACTUATOR TESTS for these vehicles displays a list of available tests. The list of actuator tests appears similar to Figure 5-10. The available tests vary by year and model.

SCROLL TO SELECT A TEST:
5° BTDC TIMING (ENGINE RUNNING ONLY)
>EGR SOLENOID VALVE
FUEL PUMP
INJECTOR #1 (ENGINE RUNNING ONLY)
INJECTOR #2 (ENGINE RUNNING ONLY)
INJECTOR #3 (ENGINE RUNNING ONLY)
INJECTOR #4 (ENGINE RUNNING ONLY)
INJECTOR #5 (ENGINE RUNNING ONLY)
INJECTOR #6 (ENGINE RUNNING ONLY)
VARIABLE INDUCTION CONTROL SERVO
DUAL-MODE MUFFLER
PRESSURE CONTROL SOL VALVE
FUEL PRESSURE SOLENOID
FUEL PUMP RELAY #2
PURGE CONTROL SOLENOID
WASTEGATE SOLENOID

Figure 5-10 Complete list of Chrysler Imports actuator tests

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 (Figure 5-11).

**ACTIVATING EGR SOLENOID VALVE
FOR 5 SECONDS.**

Figure 5-11 Sample actuator test initiated

Approximately 5 seconds later, the engine controller deactivates the actuator (Figure 5-12).

**EGR SOLENOID VALVE
TEST HAS BEEN COMPLETED.
PRESS Y TO REPEAT TEST.
PRESS N FOR ACTUATOR TEST MENU.**

Figure 5-12 Sample actuator test complete



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 screen like Figure 5-13 displays.

**EGR SOLENOID VALVE
TEST HAS BEEN REJECTED.
PRESS Y TO REPEAT TEST.
PRESS NO FOR ACTUATOR TEST MENU.**

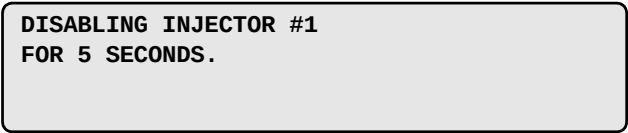
Figure 5-13 Sample key-on, engine-off test

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).

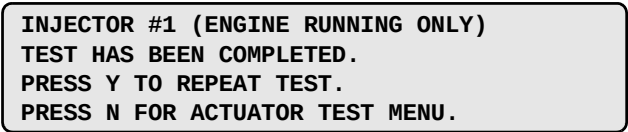
When you select an injector test, the scan tool commands the ECM to disable the selected injector (Figure 5-14).



**DISABLING INJECTOR #1
FOR 5 SECONDS.**

Figure 5-14 Sample injector test initiated

About 5 seconds later, the ECM stops the test and the injector is re-enabled (Figure 5-15).



**INJECTOR #1 (ENGINE RUNNING ONLY)
TEST HAS BEEN COMPLETED.
PRESS Y TO REPEAT TEST.
PRESS N FOR ACTUATOR TEST MENU.**

Figure 5-15 Sample injector test completed

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 and Transmission Systems and ABS

Testing Daihatsu engine systems and ABS includes:

- “Code Reading Connectors and Locations” on page 49
- “Manual Code Reading” on page 50
- “Code Reading Connector Locations (Transmission)” on page 51

6.1.1 Code Reading Connectors and Locations

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



To read engine codes automatically (AUTO CODE READ):

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

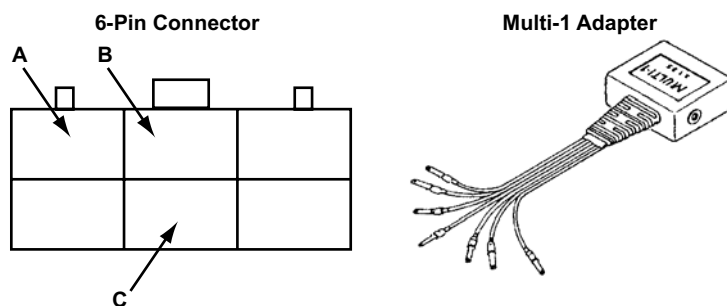


Figure 6-1 Engine connector and MULTI-1 adapter (AUTO CODE READ)

A—White

B—Black

C—Blue



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).

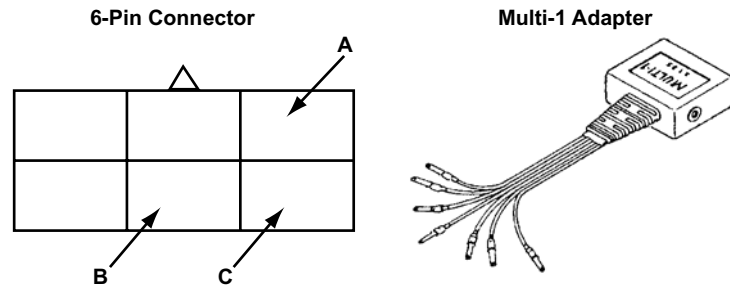


Figure 6-2 Daihatsu Rocky 6-pin diagnostic connector and MULTI-1 adapter

A—White

B—Blue

C—Black

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 51 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 on page 51 for manual code reading information.

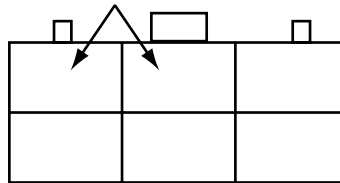


Figure 6-3 Jumper Engine connector. Pins as shown for flash codes (Flash Codes)



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 51 for manual code reading information.

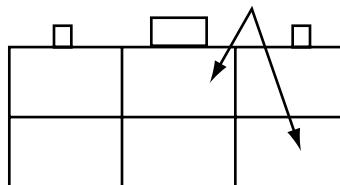


Figure 6-4 Jumper ABS 6-pin connector pins shown for flash codes.

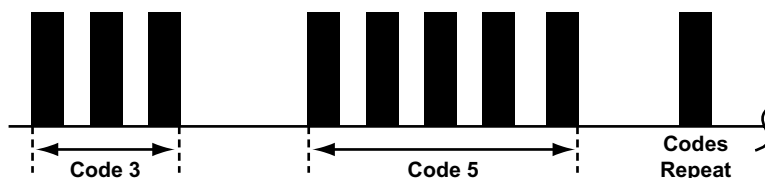


Figure 6-5 Daihatsu engine and antilock brake system code flash pattern

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.

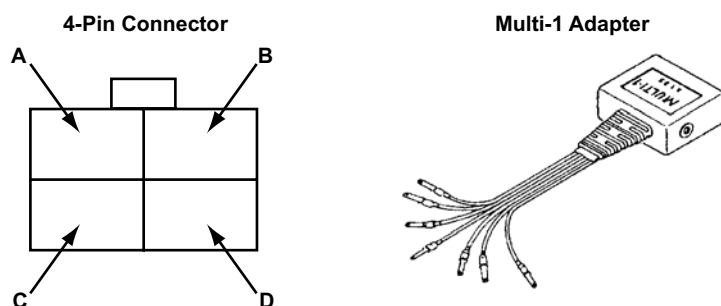


Figure 6-6 1989 transmission 4-pin connector and MULTI-1 adapter

- A—Yellow
- B—White
- C—Green
- D—Black



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.

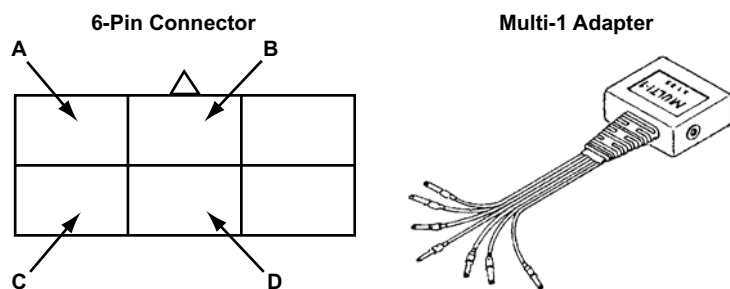


Figure 6-7 1990-1992 6-pin Transmission connector and MULTI-1 adapter

A—Yellow

B—White

C—Green

D—Black with ground extension

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 53
- “Hard Codes and Soft Codes” on page 61
- “Clearing Codes” on page 61
- “Field Service Functional Tests” on page 61
- “Prizm Actuator Tests” on page 62

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).

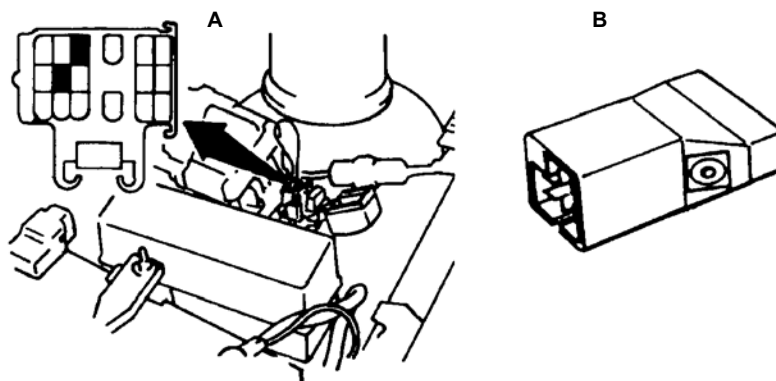


Figure 7-1 1989-95 Prizm connector location

A—Connector

B—TOY-1 adapter



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

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

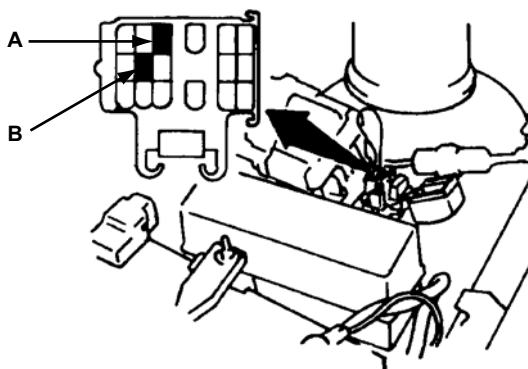


Figure 7-2 Jump pins for flash codes

A—Terminal E1

B—Terminal T, TE, or TE1



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).

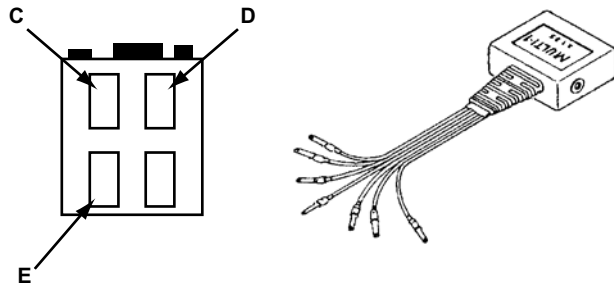


Figure 7-3 1989-92 (except 1992 1.3L) connector and adapter

- A—Connector
- B—MULTI-1 adapter
- C—Green
- D—White
- E—Black



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).

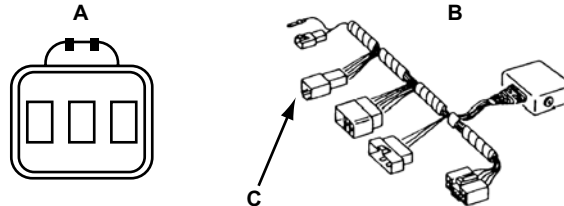


Figure 7-4 1989 Spectrum and 1990-94 Storm connector and adapter

- A—Connector
- B—MULTI-2 adapter
- C—MULTI-2-D



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

- Jump pins as shown in Figure 7-5.

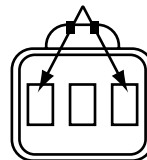


Figure 7-5 Pins to jump for flash codes



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.

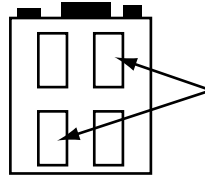


Figure 7-6 1989–95 Tracker connector jump pins



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.

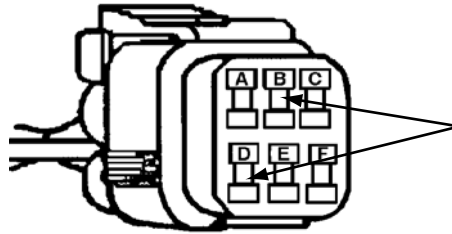


Figure 7-7 1992–1995 Metro connector jump pins



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).

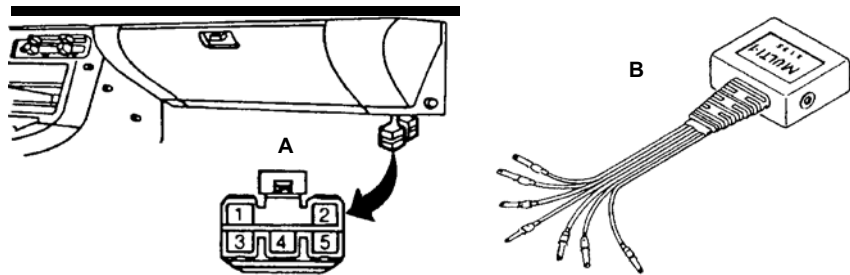


Figure 7-8 1992–94 Storm 1.8L connector and adapter

A—Connector

B—MULTI-1 adapter



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

- Jump pins as shown in Figure 7-9.



Figure 7-9 Pins to jumper for transmission codes

A—Red
B—Black



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.

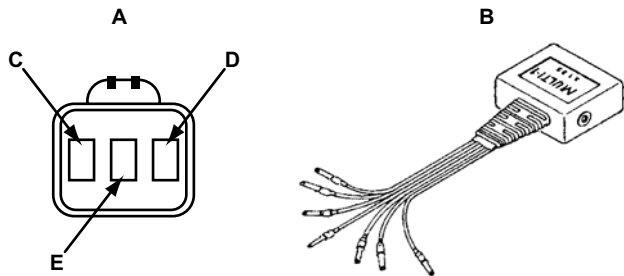


Figure 7-10 1992–95 1.3L and 1995 1.0L Metro connector and adapter

A—Connector
B—MULTI-1 adapter
C—Green
D—White
E—Black



To read 1992–94 1.0L Metro transmission codes:

- Connect the MULTI-1 adapter as shown in Figure 7-11.

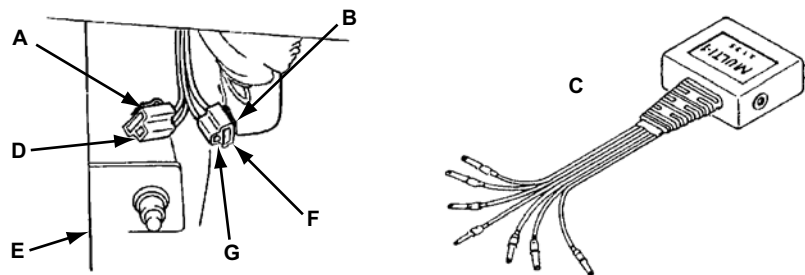


Figure 7-11 1992–94 1.0L Metro transmission connector and adapter

A—Diagnostic connector 701—pink wire and black/white wire
B—Diagnostic connector 705—black wire and pink/black wire
C—MULTI-1 adapter
D—Green

E—Steering column

F—Black

G—White



To read 1992 Prizm with 4AGE and 1993–95 Prizm with 7AFE transmission codes:

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

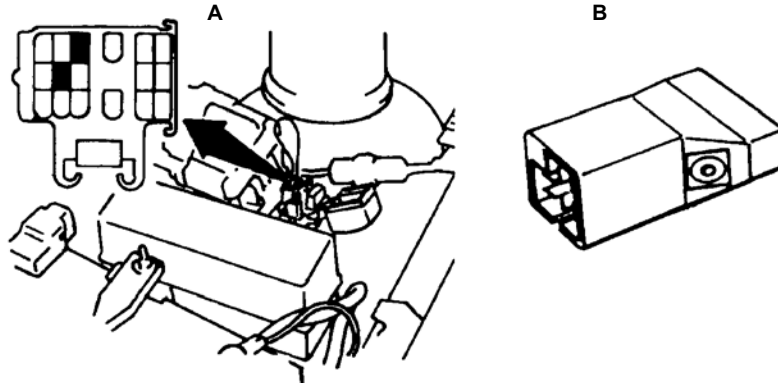


Figure 7-12 1992 Prizm with 4AGE and 1993–95 Prizm with 7AFE transmission

A—Connector

B—TOY-1 adapter



To read 1993–95 Prizm, 1992–95 1.3L Metro, and 1995 1.0L Metro Delco-Moraine VI ABS codes:

- Connect the MULTI-1 adapter to the connector under the left dash (Figure 7-13 on page 58).

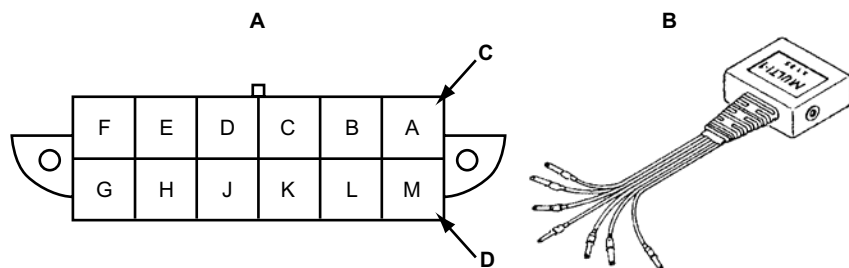


Figure 7-13 1993–95 Prizm, 1992–95 1.3L Metro, and 1995 1.0L Metro ABS connector

A—Connector

B—MULTI-1 adapter

C—Black

D—Green



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.

- Release the parking brake and jump pins 3 and 5 (Figure 7-14) for two seconds, then remove the wire to flash codes.

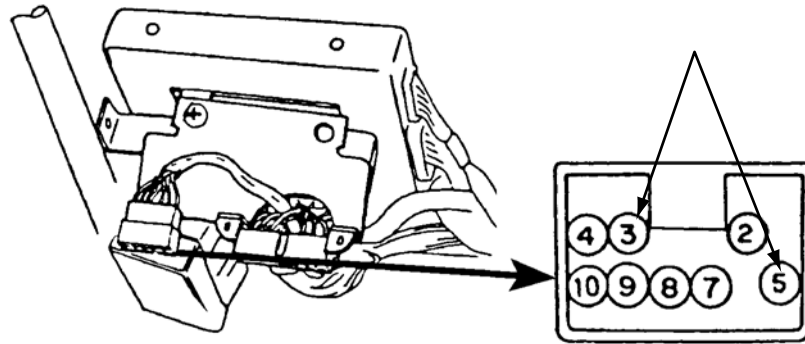


Figure 7-14 1990–95 Tracker RWAL ABS connector jump pins

Manual Code Reading

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

- Type 01 engine codes, see Figure 7-15 and Table 7-1 on page 59
- Type 09 engine codes, see Figure 7-16 and Table 7-2 on page 60
- Type 01 transmission codes, see Figure 7-17 and Table 7-3 on page 60
- Type 09 transmission codes, see Figure 7-18 and Table 7-4 on page 60
- ABS codes, see Figure 7-19

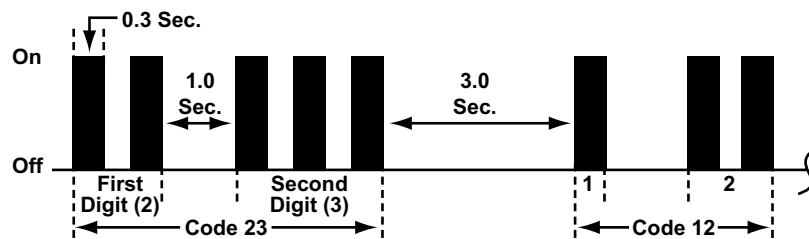


Figure 7-15 Engine Code Type 01

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.	

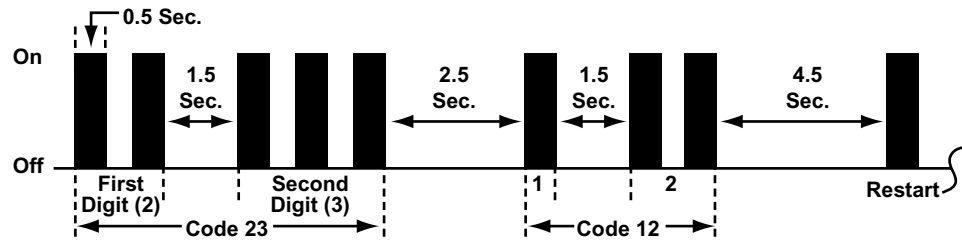


Figure 7-16 Engine Code Type 09

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.

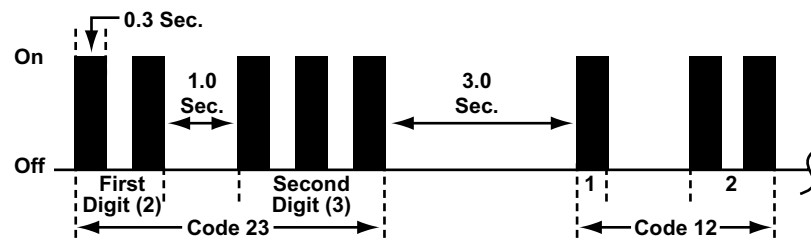


Figure 7-17 Transmission Code Type 01

Table 7-3 Transmission Code Type 01

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

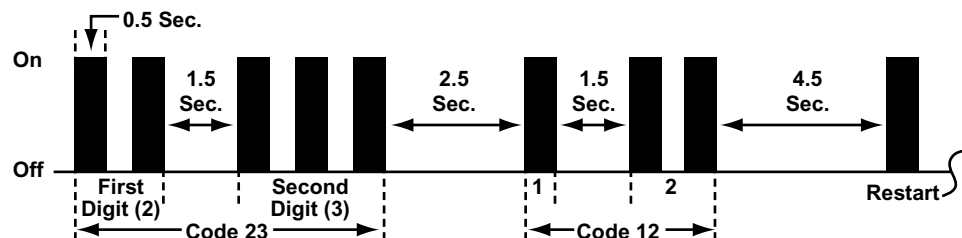


Figure 7-18 Transmission Code Type 09

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 7-19). The code repeats, only one code is stored.

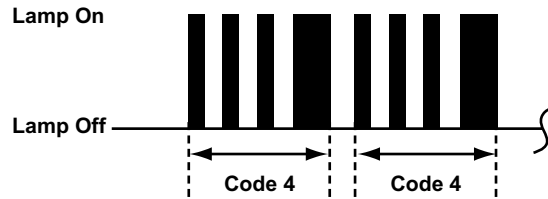


Figure 7-19 ABS diagnostic code pulse

7.1.2 Hard Codes and Soft Codes

Some models separate hard codes from soft (“historical”) codes (Figure 7-20).

```

RPM_1234 O2(mV)___689 MC DWL(°)___38
**  DIAGNOSTIC MODE.  DO NOT DRIVE.  **
13 O2 SENSOR NOT WARM ENOUGH
HC HISTORICAL CODES FOLLOW
  
```

Figure 7-20 Data display with historical codes

7.1.3 Clearing Codes

Some 1987 and later models allow clearing trouble codes from the Exit menu (Figure 7-21).

```

RESUME          LED MENU
PRINT SCREEN    > CLEAR ECM CODES
PRINT FRAME     FIX LINE 2
ARM MOVIE
  
```

Figure 7-21 CLEAR ECM 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 & 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.

Selecting FIELD SERVICE displays a screen like Figure 7-22.

**FIELD SERVICE - ALDL PINS 1 & B SHORTED
WITH KEY ON/ENGINE OFF, CE LAMP FLASHES
TROUBLE CODES, AND SOME ECM OUTPUTS ARE
EXERCISED. PRESS N TO EXIT.**

Figure 7-22 *Sample Field Service*

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, selecting ACTUATOR TESTS displays the following menu (Figure 7-23).

```

INJ VOLUME
>IAC DUTY RATIO
EGR SYSTEM
FUEL PUMP RELAY
FUEL PUMP
A/C CLUTCH RELAY
FUEL CUT PROHIBIT
TE1

```

Figure 7-23 Complete engine actuator test menu

For transmission testing, selecting ACTUATOR TESTS displays the following menu (Figure 7-24).

```

>O/D CUT SOL
LOCK UP
SHIFT

```

Figure 7-24 Transmission actuator tests



To perform an EGR system test:

1. From the ACTUATOR TESTS menu, select **EGR SYSTEM**.
A screen like Figure 7-25 displays.

```

BEFORE RUNNING TEST, ENSURE THAT
KEY IS ON AND ENGINE IS RUNNING

PRESS Y TO ACTIVATE TEST

```

Figure 7-25 Begin EGR SYSTEM test

2. Press **Y**.
A screen like Figure 7-26 displays.

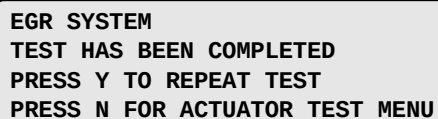
```

EGR SYS___ON          EGR TEMP(°F)___97
ST TRIM B1(%)___12    ST TRIM B2(%)___0
SCROLL UP/DOWN TO TURN ON/OFF
PRESS N TO ABORT THE TEST

```

Figure 7-26 EGR test

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** and this message displays (Figure 7-27).

A rectangular screen with a light gray background and a black border. It contains the following text in all caps: "EGR SYSTEM", "TEST HAS BEEN COMPLETED", "PRESS Y TO REPEAT TEST", and "PRESS N FOR ACTUATOR TEST MENU".

EGR SYSTEM
TEST HAS BEEN COMPLETED
PRESS Y TO REPEAT TEST
PRESS N FOR ACTUATOR TEST MENU

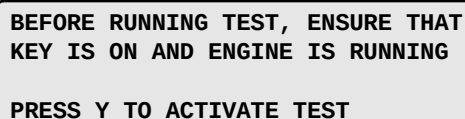
Figure 7-27 EGR test complete message



To perform a Fuel Pump test:

1. From the ACTUATOR TESTS menu, select **FUEL PUMP**.

A screen like Figure 7-28 displays.

A rectangular screen with a light gray background and a black border. It contains the following text in all caps: "BEFORE RUNNING TEST, ENSURE THAT", "KEY IS ON AND ENGINE IS RUNNING", and "PRESS Y TO ACTIVATE TEST".

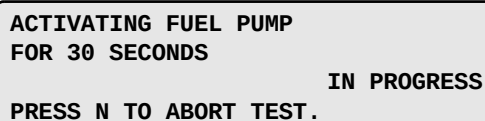
BEFORE RUNNING TEST, ENSURE THAT
KEY IS ON AND ENGINE IS RUNNING

PRESS Y TO ACTIVATE TEST

Figure 7-28 Begin FUEL PUMP test

2. Press **Y**.

A screen like Figure 7-29 displays.

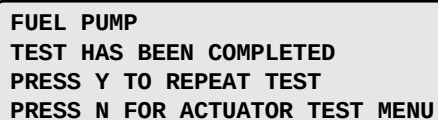
A rectangular screen with a light gray background and a black border. It contains the following text in all caps: "ACTIVATING FUEL PUMP", "FOR 30 SECONDS", "IN PROGRESS" (flashing), and "PRESS N TO ABORT TEST".

ACTIVATING FUEL PUMP
FOR 30 SECONDS

IN PROGRESS
PRESS N TO ABORT TEST.

Figure 7-29 Fuel Pump test

The IN PROGRESS flashes until the end of the 30-second period. After 30 seconds, the pump shuts off and a screen like Figure 7-30 displays.

A rectangular screen with a light gray background and a black border. It contains the following text in all caps: "FUEL PUMP", "TEST HAS BEEN COMPLETED", "PRESS Y TO REPEAT TEST", and "PRESS N FOR ACTUATOR TEST MENU".

FUEL PUMP
TEST HAS BEEN COMPLETED
PRESS Y TO REPEAT TEST
PRESS N FOR ACTUATOR TEST MENU

Figure 7-30 Fuel Pump test complete message

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 65
- “SCS mode” on page 67
- “Code Type” on page 69
- “Manual Code Reading (1986–91) ECM LED ONLY” on page 71
- “Manual Code Reading” on page 76

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 66. Refer to Table 8-1 on page 66 to determine which adapter to use to test a specific vehicle.

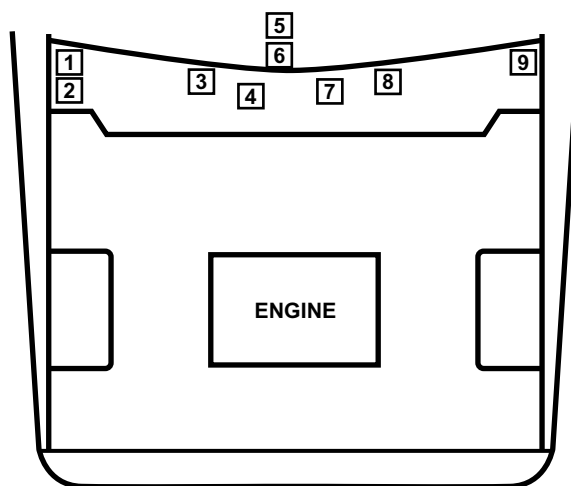


Figure 8-1 Common connector locations

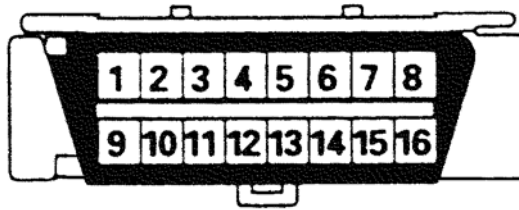


Figure 8-2 OBD-II data link connector (DLC)

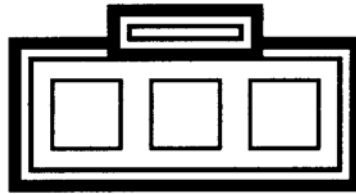


Figure 8-3 3-pin DLC



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 OBD 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.

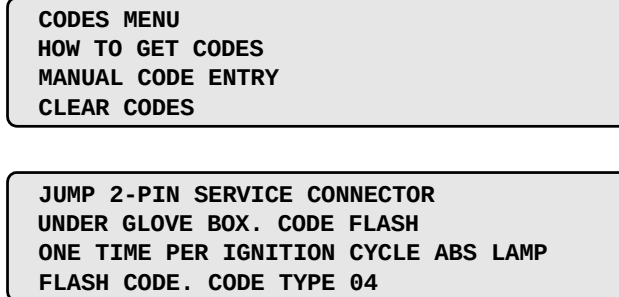


Figure 8-5 Typical screen menu for the 2 pin SCS. Use jumper or Honda tool O.E. #07PAZ-0010100

Models with the SCS in the 16 pin DLC:

Pressing **Y** grounds the appropriate DLC pin, which enables the SCS mode (Figure 8-6).

The SCS help briefly explain the two trip bypass operation (PCM only, see the section on "Two-trip detection bypass").

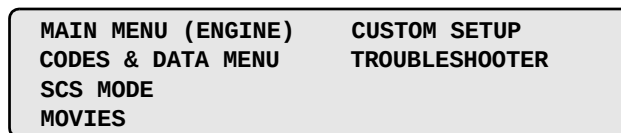


Figure 8-6 Typical Engine Main Menu



Figure 8-7 SCS Menu

ABS code reading message (typical, using SCS mode)

SELECT:SCS MODE
FOLLOW ON SCREEN INSTRUCTIONS.
ABS LAMP FLASHES CODES. SEE MANUAL FOR
CODE TYPE INFORMATION. CODE TYPE 04

Figure 8-8 ABS code reading message (typical, using SCS mode)

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.

- 1) HOLD BRAKE ON & CYCLE IGNITION ON.
- 2) WHEN ABS LAMP GOES OFF-RELEASE BRAKE
- 3) WHEN LAMP COMES ON-HOLD BRAKE AGAIN
- 4) RELEASE BRK-WHEN LAMP GOES OFF. [MORE]

Figure 8-9 ABS clearing using SCS mode

SOME VEHICLES MAY REQUIRE TO BE DRIVEN
ABOVE 7-MPH TO COMPLETE CODE CLEARING
PROCEDURE.

Figure 8-10 ABS clearing using SCS mode

AIRBAG code reading message (typical, using SCS mode)

SELECT: SCS MODE
FOLLOW ON SCREEN INSTRUCTIONS.
SRS LAMP FLASHES CODES. SEE MANUAL FOR
CODE TYPE INFORMATION. CODE TYPE 06.

Figure 8-11 AIRBAG code reading message (typical, using SCS mode)

AIRBAG code clearing message (typical)

FIND YELLOW MES CONNECTOR IN FUSE BOX
OR CENTER CONSOLE. SEE SMALL REFERENCE
MANUAL FOR DETAILED CLEAR CODES
PROCEDURE.

Figure 8-12 AIRBAG code clearing message (typical, see code clearing section in this manual)



NOTE:

The MES (Message Erase Signal) connector is not the same as the SCS connector

Two-trip detection bypass

Use SCS mode to bypass OBD '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 OBD 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.

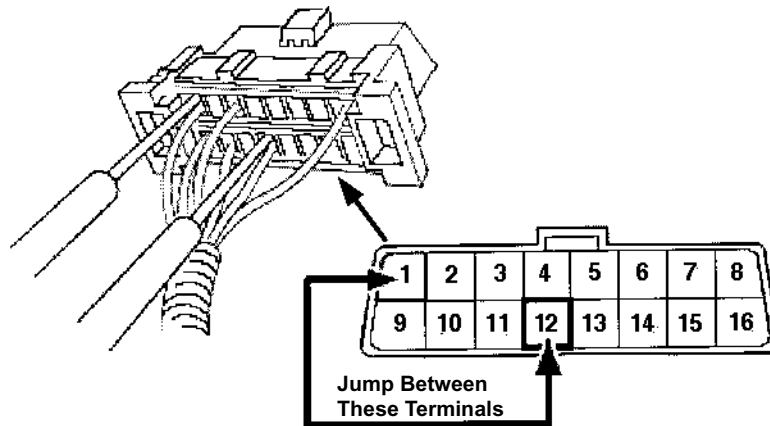


Figure 8-13 Data connector from the wire side (Honda numbering, not the same as SAE)

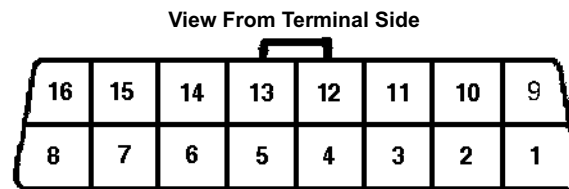


Figure 8-14 Data connector from terminal side (SAE standard pin numbering)

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

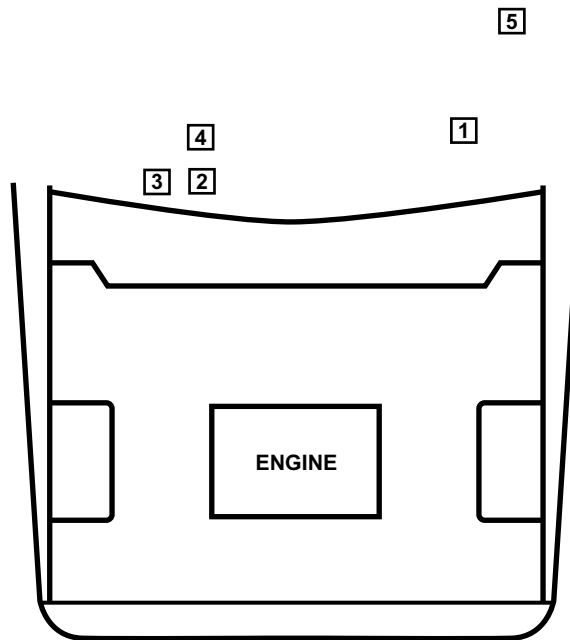


Figure 8-15 Common ECM and LED locations

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

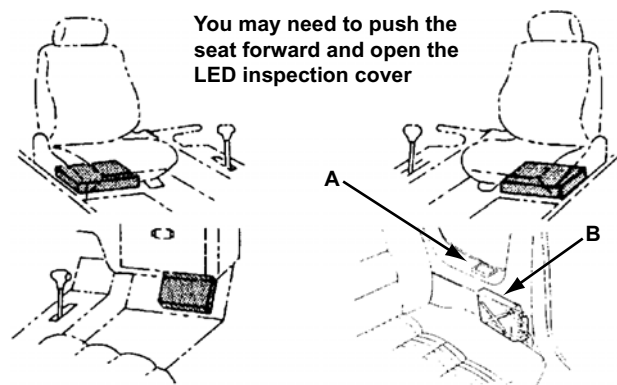


Figure 8-16 Sample ECM locations

A—Remove ashtray to see LED flash

B—ECM

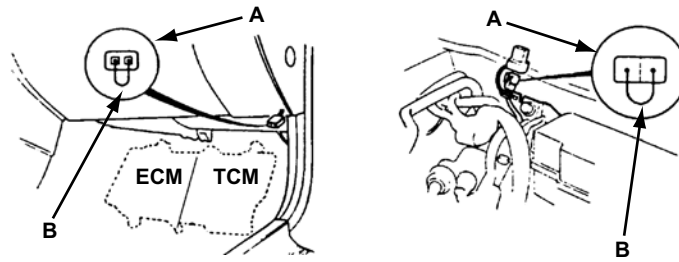


Figure 8-17 1990-later Accord and Prelude Service Check connector locations

A—Service Check connector

B—Jump wire

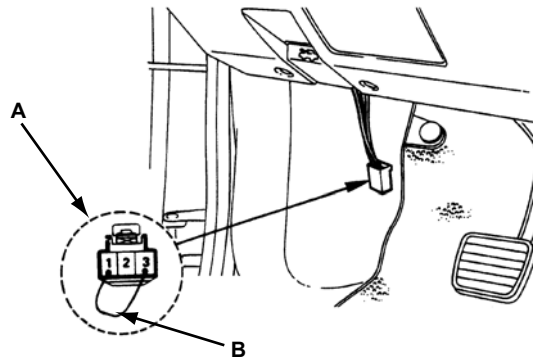


Figure 8-18 1994-95 Passport data link connector locations

A—White DLC

B—Jump wire

8.1.4 Manual Code Reading (1986-91) ECM LED ONLY

There are 3 types of manual engine codes:

- Type 02, see Figure 8-19 and Table 8-3 on page 72
- Type 03, see Figure 8-20 and Table 8-4 on page 72
- Type 04, see Figure 8-21 and Table 8-5 on page 73

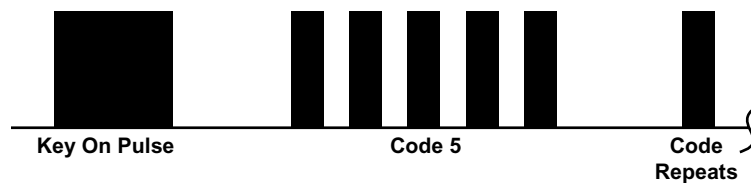


Figure 8-19 Honda engine Code Type 02

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 cars. After repairing the problem, clear codes and drive car; then check for other codes.	

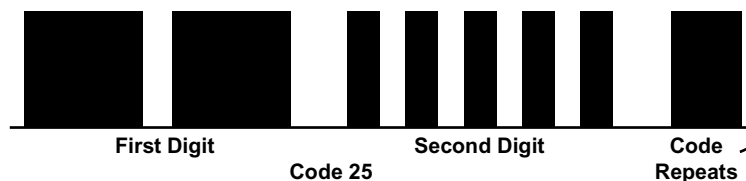


Figure 8-20 Honda engine Code Type 03

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.	

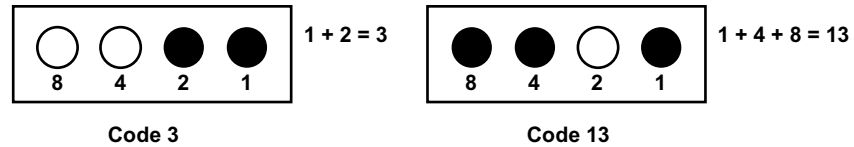


Figure 8-21 Honda engine Code Type 04

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 73
- “Manual Code Reading” on page 76
- “Code Clearing for 1996–2002 Passport with Rear Wheel ABS” on page 79
- “Code Clearing for 1996–2002 Passport with 4-Wheel ABS” on page 80

8.2.1 ABS Codes and Data Testing

- “ABS MAIN MENU” on page 74
- “CODES & DATA MENU” on page 74
- “DATA (NO CODES)” on page 75
- “CODE ONLY” on page 75
- “CLEAR CODE” on page 76

ABS MAIN MENU

After selecting ABS from the System Selection menu, the MAIN MENU (ABS) is displayed (Figure 8-22). Selections vary by model and year.



MAIN MENU
>CODES & DATA MENU
CUSTOM SETUP
MOVIES TROUBLESHOOTER

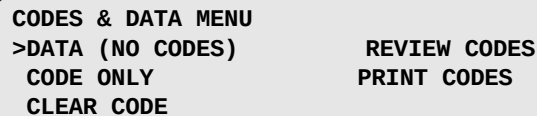
Figure 8-22 Typical ABS main menu

The following main menu selections are discussed:

- “CODES & DATA MENU” on page 74
- MOVIES, CUSTOM SETUP, and TROUBLESHOOTER are discussed in detail in the user’s manual for your diagnostic tool.

CODES & DATA MENU

When CODES & DATA MENU is selected, the following is displayed (Figure 8-23)



CODES & DATA MENU
>DATA (NO CODES) REVIEW CODES
CODE ONLY PRINT CODES
CLEAR CODE

Figure 8-23 Typical ABS CODES & DATA MENU

- **DATA (NO CODES)** - This selection begins communication with the ABS module and displays data parameters.
- **CODE ONLY** - When selected, ABS trouble codes are gathered and displayed.
- **CLEAR CODES** - This selection clears ABS memory codes from the ABS ECM memory.
- **REVIEW CODES** - This selection allows you to view codes. (This menu item appears only after code gathering.)
- **PRINT CODES** - This selection 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.

ABS DATA			
LF WHEEL (MPH)	0	RF WHEEL (MPH)	0
LR WHEEL (MPH)	0	RR WHEEL (MPH)	0
BRAKE SW	OFF	ABS PUMP MOTOR	OFF

Figure 8-24 Typical ABS DATA display

CODE 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. Press **Y** to continue.
A screen will appear while the scan tool communicates with the vehicle (Figure 8-25).

INITIALIZING COMMUNICATION ONE MOMMENT PLEASE...

Figure 8-25 Typical ABS code reading screen message

**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 screen appears (Figure 8-26)

CODE LIST 12-3 WHEEL SPEED SENSOR CIRCUIT OPEN END OF LIST

Figure 8-26 Typical ABS codes message

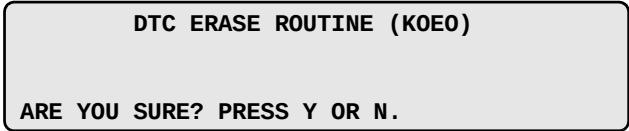
CLEAR CODE

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



To clear codes:

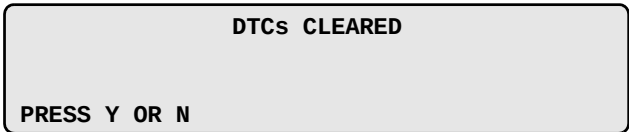
1. Select **CLEAR CODES**.
A “key on” verification screen displays. Make sure the ignition is switched on.
2. Press **Y** to continue.
A code clearing confirmation screen displays (Figure 8-27).



DTC ERASE ROUTINE (KOE0)
ARE YOU SURE? PRESS Y OR N.

Figure 8-27 Typical ABS code clearing screen message

3. Press **Y** to clear ABS codes or **N** to cancel the operation.
4. The DTCs CLEARED screen appears (Figure 8-28)
Press **Y** or **N** to exit.



DTCs CLEARED
PRESS Y OR N

Figure 8-28 Typical ABS codes cleared screen message

8.2.2 Manual Code Reading

There are several types of manual codes for Honda ABS:

- Type 02, see Figure 8-29 and Table 8-6 on page 77
- Type 04, see Figure 8-30 and Table 8-7 on page 77
- Type 04a, see Figure 8-31 and Table 8-8 on page 78
- Type 05a, see Figure 8-32 and Table 8-9 on page 78
- Type 06, see Figure 8-33 and Table 8-10 on page 79

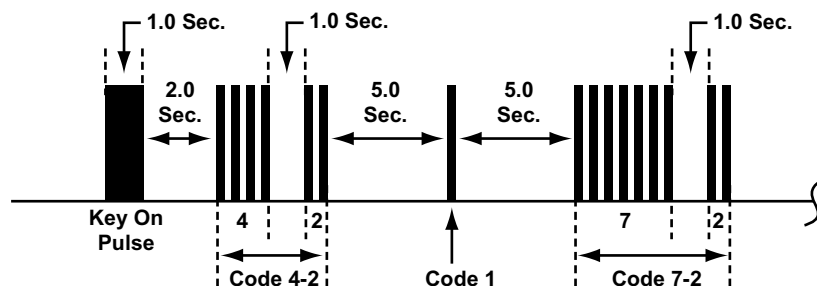


Figure 8-29 Honda ABS Code Type 02

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.

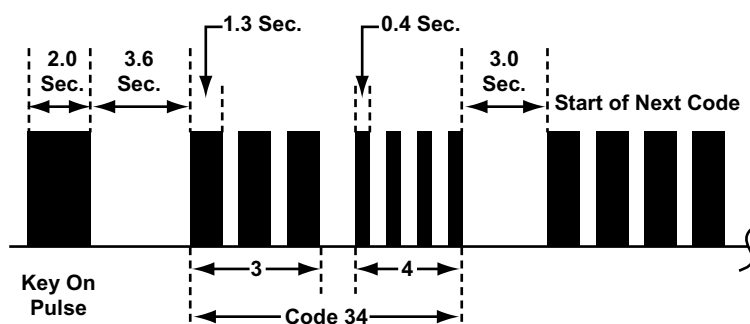


Figure 8-30 Honda ABS Code Type 04

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.

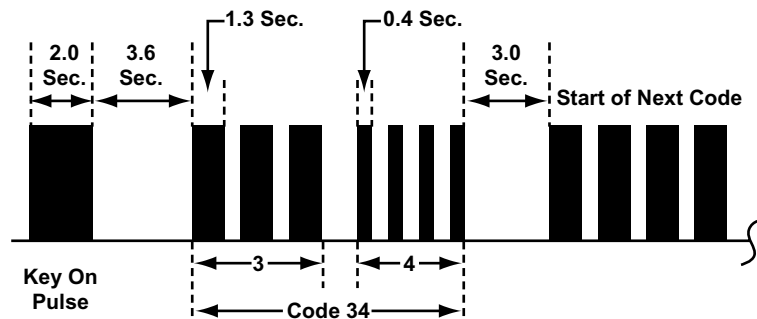


Figure 8-31 Honda ABS Code Type 04a

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.

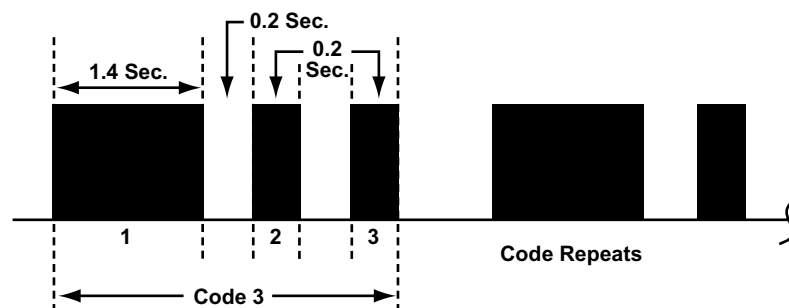


Figure 8-32 Honda ABS Code Type 05a

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.	

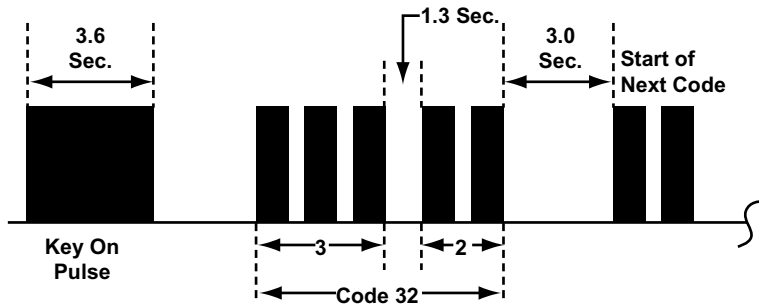


Figure 8-33 Honda ABS Code Type 06

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 8-34.

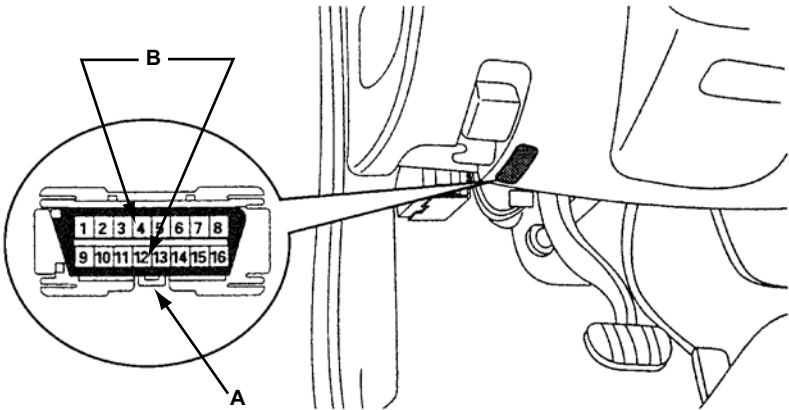


Figure 8-34 1996–2002 Passport with RWAL system

A—Data Link Connector (DLC)

B—Pins 4 and 12

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



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

1. With the ignition off, jump pins 4 and 12 of the 16-pin DLC (Figure 8-35).
2. Switch the ignition on and allow the ABS lamp to flash at least once before proceeding.
3. Depress the brake pedal by hand until you hear the solenoid click, then release the pedal. Repeat eight times within three seconds.

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

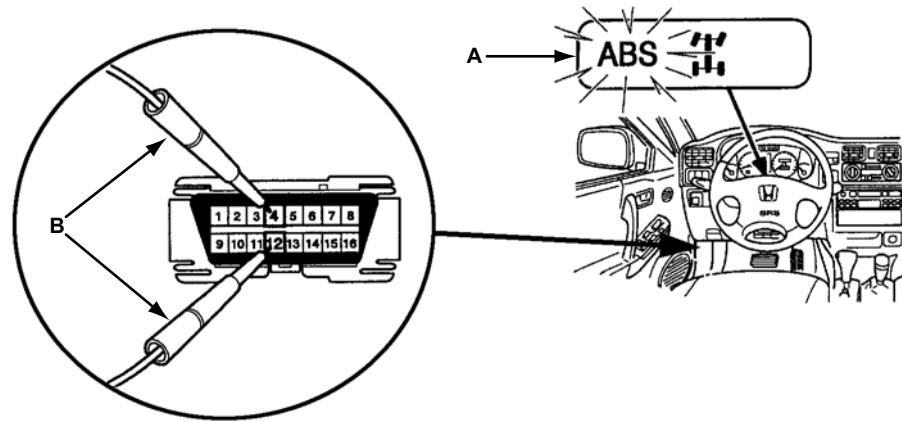


Figure 8-35 1996–2002 Passport with 4WAL system

A—ABS indicator lamp

B—Jump wire

8.3 Testing Supplemental Restraint Systems (SRS)

Testing Honda SRS includes:

- “Manual Code Reading” on page 80
- “Code Clearing” on page 85

8.3.1 Manual Code Reading

There are several types of Honda SRS codes:

- Type 03, see Figure 8-36 and Table 8-11 on page 81
- Type 06, see Figure 8-37 and Table 8-12 on page 82
- Type 06 with a continuous failure, see Figure 8-38 and Table 8-13 on page 82
- Type 06 with an intermittent failure, see Figure 8-39 and Table 8-14 on page 83
- Type 06 with no failure, see Figure 8-40 and Table 8-15 on page 83
- Type 07, see Figure 8-41 and Table 8-16 on page 84

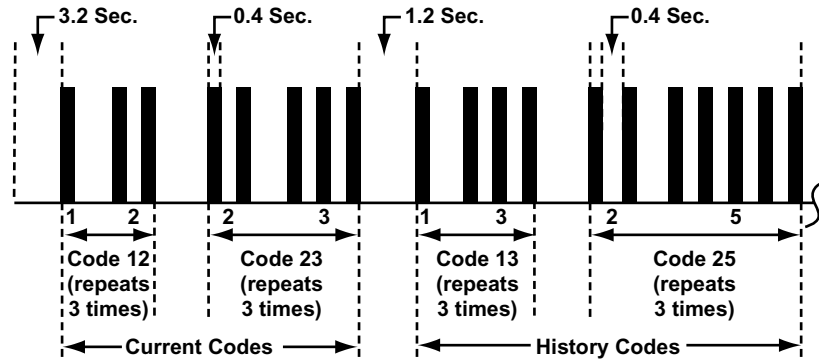


Figure 8-36 Honda SRS Code Type 03

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 8-42). 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 12 flashes first, then code 13, followed by the historical codes. The code cycle repeats as long as the system is in the diagnostic state.	

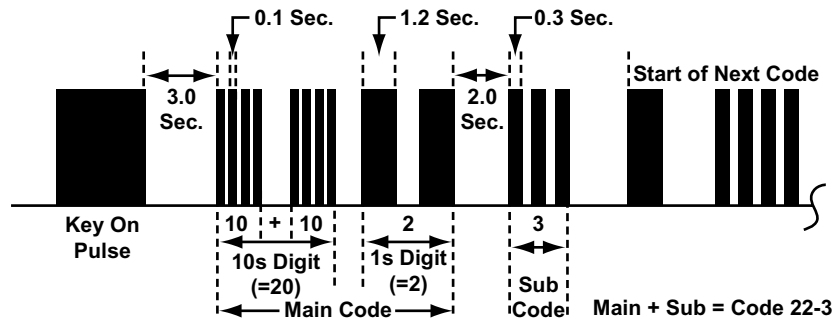


Figure 8-37 *Honda SRS Code Type 06*

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 85.
When done:	Clear codes.
If the SCS connector is shorted and SRS has no stored DTC, the SRS light remains on continuously.	

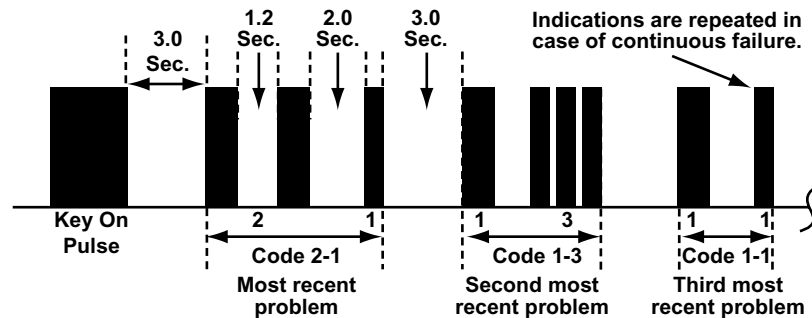


Figure 8-38 Honda SRS Code Type 06 - Continuous Failure, SRS indicator blinks like this

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 85.
When done:	Clear codes.
2001–04 Civic; 2002–04 CR-V, Insight, and S-2000; 2003–04 Element.	

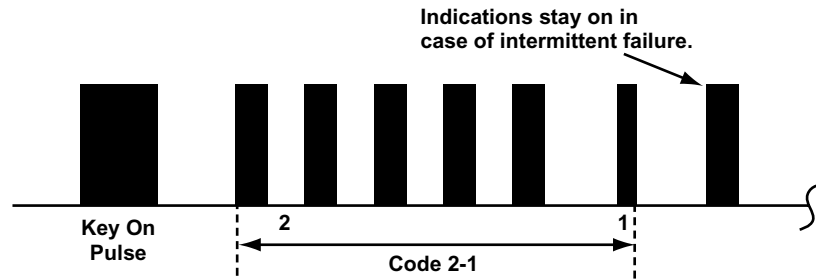


Figure 8-39 Honda ABS Code Type 06 - Intermittent Failure, SRS indicator blinks like this

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 85.
When done:	Clear codes.
2004 Civic, CR-V, Insight, and S-2000	

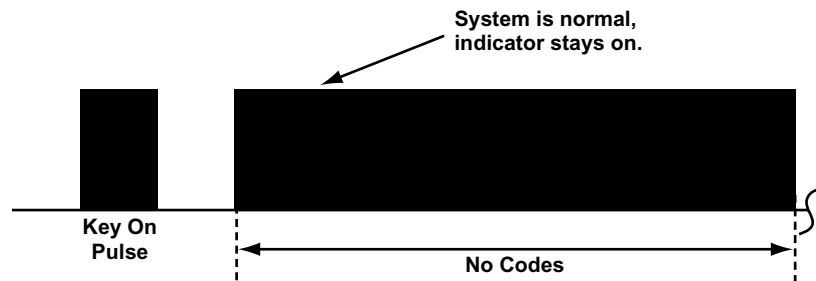


Figure 8-40 Honda SRS Code Type 06 - Normal (no failure), SRS indicator stays on

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 85.
When done:	Clear codes.
2004 Civic, CR-V, Insight, and S-2000	

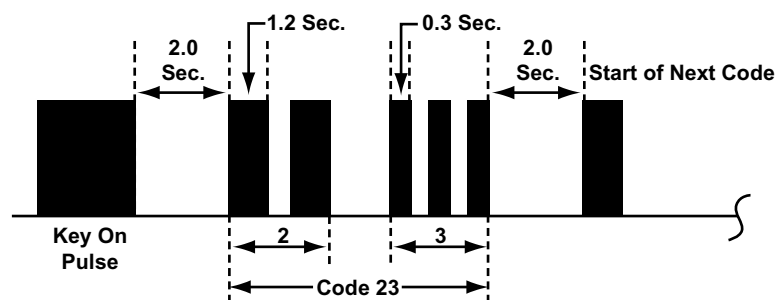


Figure 8-41 Honda SRS Code Type 07

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 85.
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.	

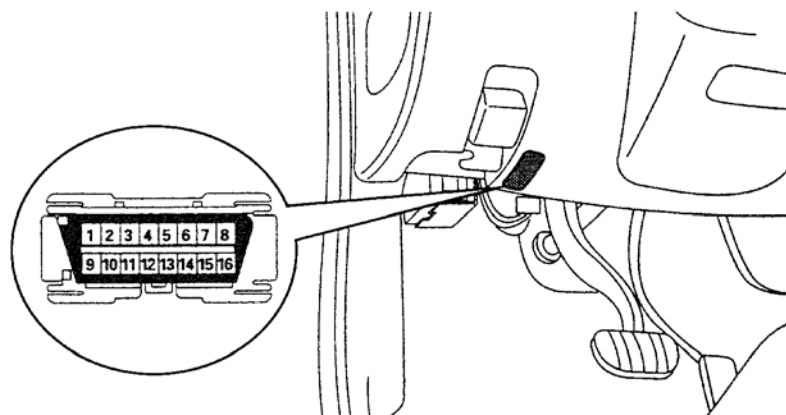


Figure 8-42 1996–2002 Passport SRS Service Check connector location

8.3.2 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.
7. Switch the ignition off and wait ten seconds.

The SRS lamp flashes twice to indicate memory has been erased.

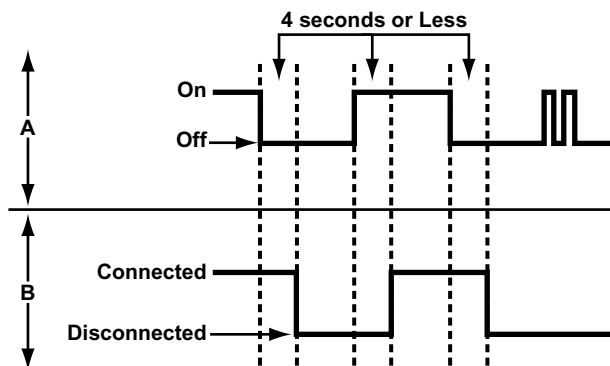


Figure 8-43 SRS code clearing

A—SRS Indicator Lamp

B—MES Connector Terminal

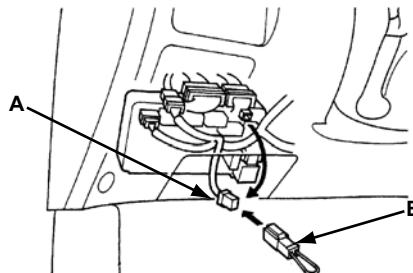


Figure 8-44 1994–2000 Civic, 1992–1997 del Sol SRS code clearing

A—Memory Erase Signal (MES) connector

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

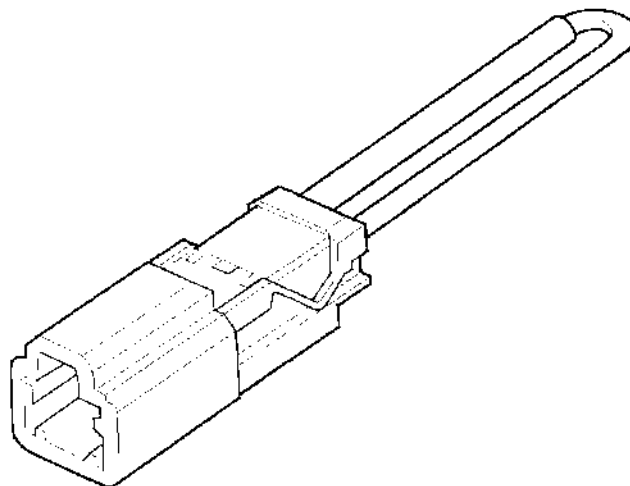


Figure 8-45 SCS Service Connector Honda part number 07PAZ-0010100 (or use jumper wire equivalent)

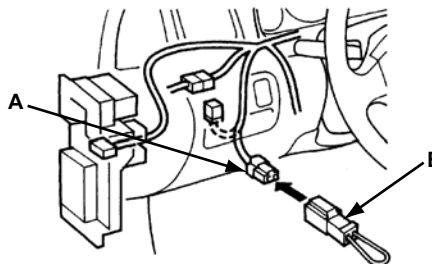


Figure 8-46 1997–2001 Prelude SRS code clearing

A—MES connector

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

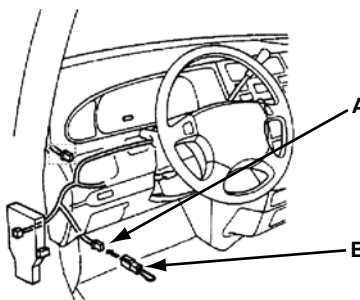


Figure 8-47 1996–98 Odyssey, 1995–97 Accord SRS code clearing

A—MES connector

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

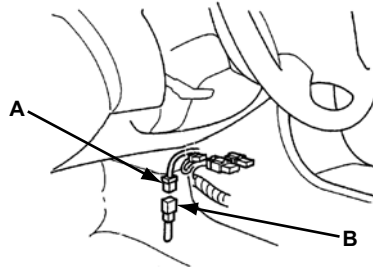


Figure 8-48 1994–96 Prelude SRS code clearing

A—MES connector

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

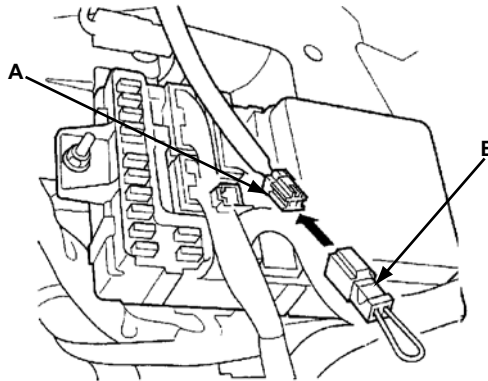


Figure 8-49 1999–2002 Odyssey SRS code clearing (left side of dash)

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

B—MES connector

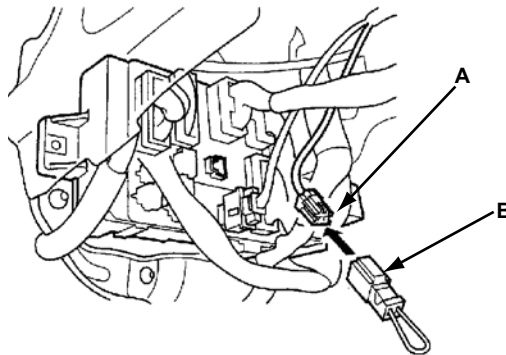


Figure 8-50 1998–2003 Accord, 2000–03 S2000 SRS code clearing (left side of dash)

A—MES connector

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

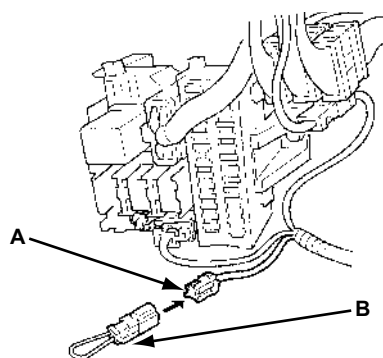


Figure 8-51 2004 S2000 SRS code clearing (left side of dash)

A—MES connector

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

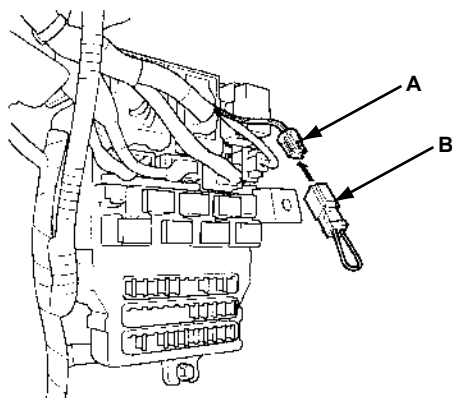


Figure 8-52 2004 Accord SRS code clearing (left side of dash)

A—MES connector

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

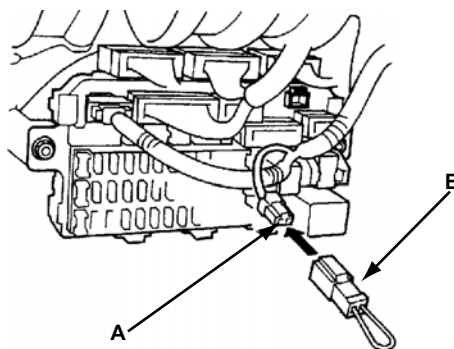


Figure 8-53 1997–2001 CR-V SRS code clearing (left side of dash)

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

B—MES connector

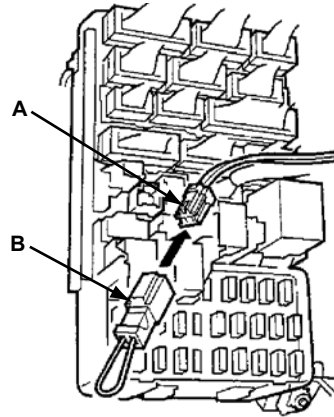


Figure 8-54 2002–04 CR-V SRS code clearing (left side of dash)

A—MES connector

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

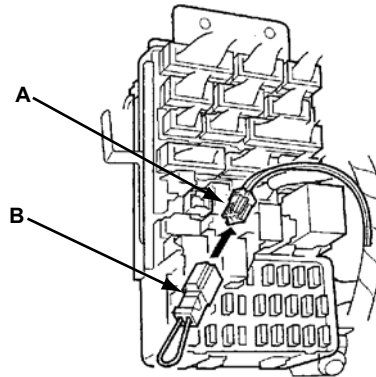


Figure 8-55 2001–04 Civic, 2003–04 Element SRS code clearing

A—MES connector

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

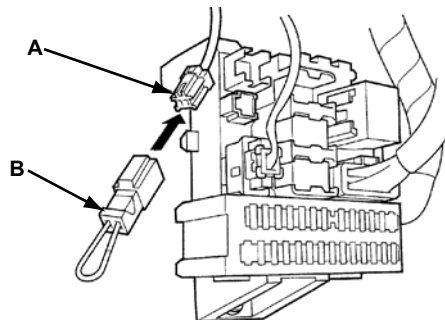


Figure 8-56 2000–04 Insight SRS code clearing (left side of dash)

A—MES connector

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

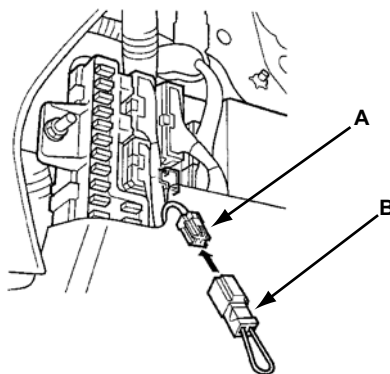


Figure 8-57 2003–04 Pilot SRS code clearing

A—MES connector

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

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 Systems

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

- “Code Reading Connectors and Locations” on page 91
- “Clearing Codes” on page 93
- “Actuator Tests” on page 93

9.1.1 Code Reading Connectors and Locations

Refer to Figure 9-1 below and Table 9-1 on page 92 Hyundai diagnostic connector locations and adapter usage information.

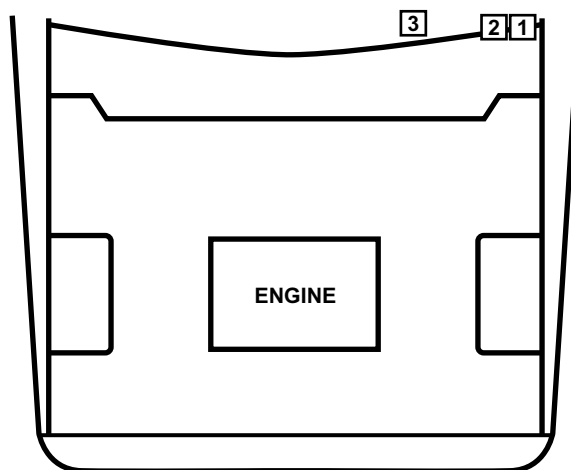


Figure 9-1 Common connector locations

Table 9-1 Common connector locations

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

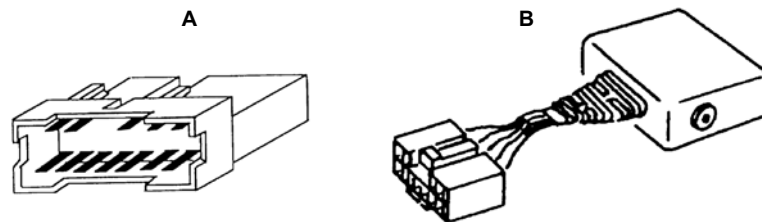


Figure 9-2 Connector and adapter for most OBD-I vehicles

A—Connector

B—HYUN-2 adapter

**To read codes from most 1996 and later vehicles:**

- Use the OBD-II adapter with the specified Personality Key™ device (Figure 9-3 on page 93).

**NOTE:**

Always use the Personality Key™ device specified in the on-screen instructions.

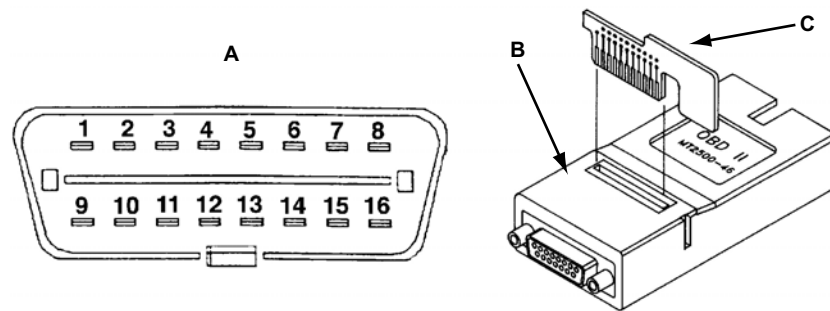


Figure 9-3 OBD-II DLC and adapter

- A—16-pin DLC
- B—Personality Key™ device
- C—OBD-II adapter

9.1.2 Clearing Codes

Most 1988 and later Hyundai models let you clear trouble codes from PCM memory through the scan tool Exit menu selection **CLEAR ECM CODES** (Figure 9-4).

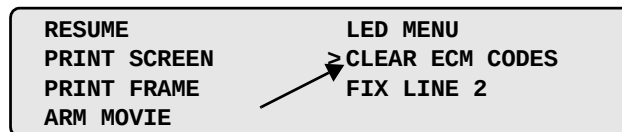


Figure 9-4 **CLEAR ECM CODES** selection

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 & DATA**. If this happens, repeat code clearing.

9.1.3 Actuator Tests

The **ACTUATOR TESTS** selection is available from the **MAIN MENU** (Figure 9-5) 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)” on page 95.

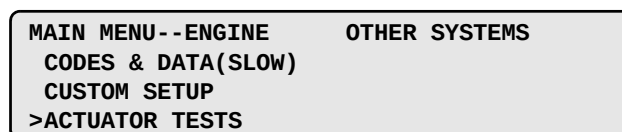


Figure 9-5 Sample **MAIN MENU** with **ACTUATOR TESTS**

Selecting ACTUATOR TESTS for these vehicles displays a list of available tests. The list of actuator tests displays similar to Figure 9-6. The available tests vary by year and model.

SCROLL TO SELECT A TEST:
5° BTDC TIMING (ENGINE RUNNING ONLY)
>EGR SOLENOID VALVE
FUEL PUMP
INJECTOR #1 (ENGINE RUNNING ONLY)
INJECTOR #2 (ENGINE RUNNING ONLY)
INJECTOR #3 (ENGINE RUNNING ONLY)
INJECTOR #4 (ENGINE RUNNING ONLY)
INJECTOR #5 (ENGINE RUNNING ONLY)
INJECTOR #6 (ENGINE RUNNING ONLY)
VARIABLE INDUCTION CONTROL SERVO
DUAL-MODE MUFFLER
PRESSURE CONTROL SOL VALVE
FUEL PRESSURE SOLENOID
FUEL PUMP RELAY #2
PURGE CONTROL SOLENOID
WASTEGATE SOLENOID

Figure 9-6 Complete list of Chrysler Imports actuator tests

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 the selected actuator (Figure 9-7).

ACTIVATING EGR SOLENOID VALVE
FOR 5 SECONDS.

Figure 9-7 Sample actuator test initiated

Approximately 5 seconds later, the ECM deactivates the actuator (Figure 9-8).

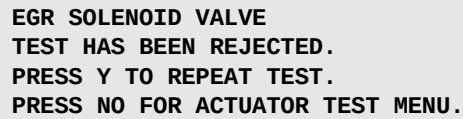
EGR SOLENOID VALVE
TEST HAS BEEN COMPLETED.
PRESS Y TO REPEAT TEST.
PRESS N FOR ACTUATOR TEST MENU.

Figure 9-8 Sample actuator test complete



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 screen like Figure 9-9 displays.



**EGR SOLENOID VALVE
TEST HAS BEEN REJECTED.
PRESS Y TO REPEAT TEST.
PRESS NO FOR ACTUATOR TEST MENU.**

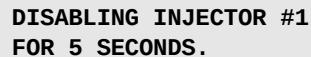
Figure 9-9 Sample key-on, engine-off test

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).

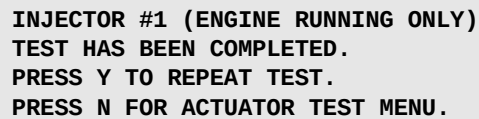
When you select an injector test, the scan tool commands the ECM to disable the selected injector (Figure 9-10).



**DISABLING INJECTOR #1
FOR 5 SECONDS.**

Figure 9-10 Sample injector test initiated

About 5 seconds later, the ECM stops the test and the injector is re-enabled (Figure 9-11).



**INJECTOR #1 (ENGINE RUNNING ONLY)
TEST HAS BEEN COMPLETED.
PRESS Y TO REPEAT TEST.
PRESS N FOR ACTUATOR TEST MENU.**

Figure 9-11 Sample injector test completed

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)

10.1 Testing Engine and Transmission Systems

Isuzu engine and transmission system testing includes:

- “Engine And Transmission Code Reading Connectors and Locations” on page 97
- “Manual Code reading (Engine)” on page 103
- “Hard Codes and Soft Codes” on page 104
- “Clearing Codes” on page 104
- “Road Test (No C&D)” on page 105
- “Field Service Functional Tests” on page 105

10.1.1 Engine And Transmission Code Reading Connectors and Locations

Figure 10-1 and Table 10-1 on page 98 show common engine diagnostic connector locations for Isuzu vehicles. Figure 10-2 and Table 10-2 on page 99 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 99
- “To read codes from 1984–95 Pickup 1988–95 Amigo, and 1991–95 Rodeo:” on page 101
- “To read codes from vehicles with a 12-pin connector:” on page 102
- “To read codes from 1988–89 Impulse:” on page 102
- “To read codes from 1985½–89 I-Mark and 1990 and later Impulse:” on page 103
- “To read codes from 1988–89 Impulse (optional):” on page 103
- “To read codes from 1985½–89 I-Mark and 1990 and later Impulse (optional):” on page 103

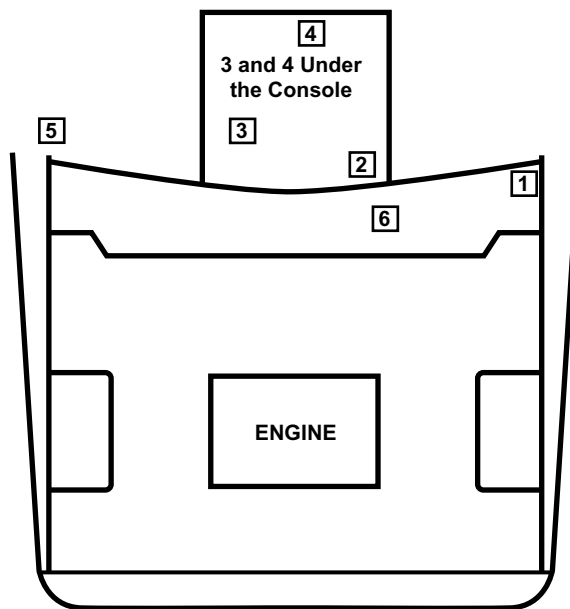


Figure 10-1 Isuzu common engine connector location

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

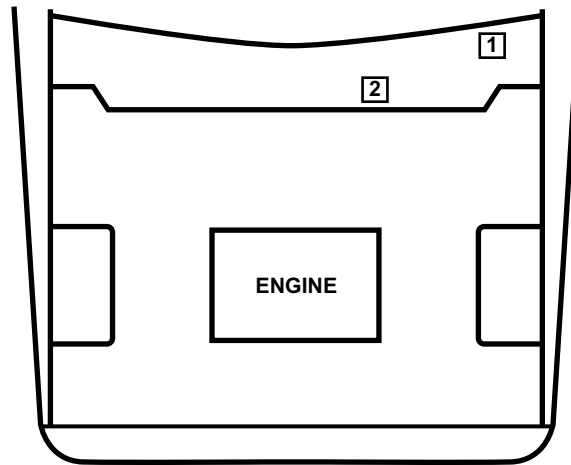


Figure 10-2 Common transmission connector locations

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).

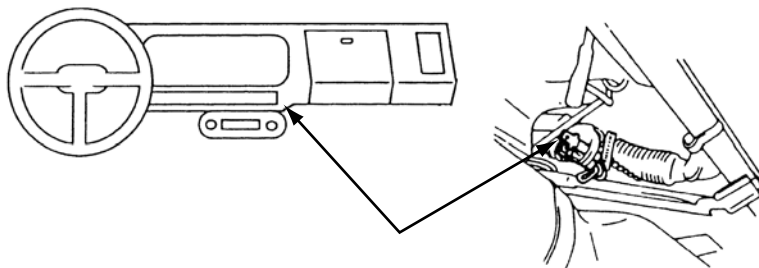


Figure 10-3 1984–1985 Isuzu Trooper diagnostic connector



To read codes from 1986–87 Trooper:

- Connect the MULTI-1 adapter to the ALDL or diagnostic connector (Figure 10-4 on page 100).

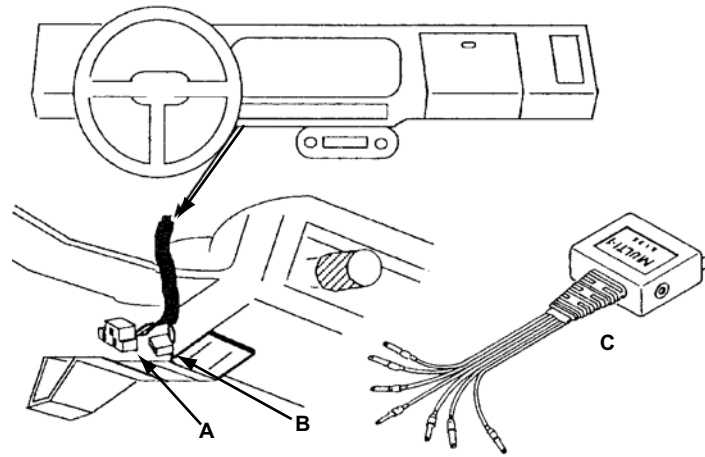


Figure 10-4 1986-87 Trooper connectors and adapter

- A—ALDL connector**
- B—Diagnostic connector**
- C—MULTI-1 adapter**

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

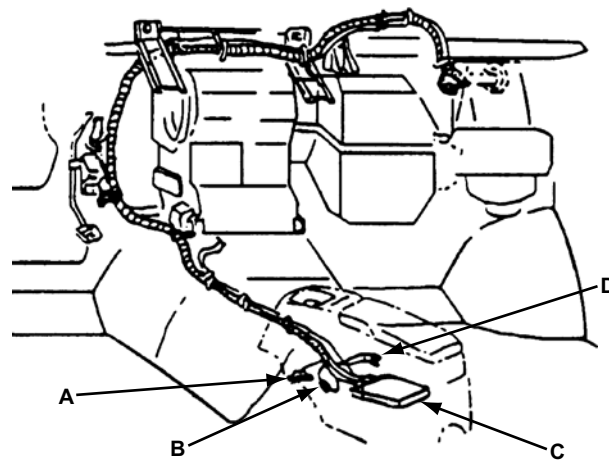


Figure 10-5 1988-91 Trooper connectors

- A—ALDL connector**
- B—Distributor set timing connector**
- C—ECM**
- D—Diagnostic lead terminal**

Diagnostic connector locations for the 1984-95 Pickup, 1988-95 Amigo, and 1991-95 Rodeo are shown in Figure 10-6 on page 101.

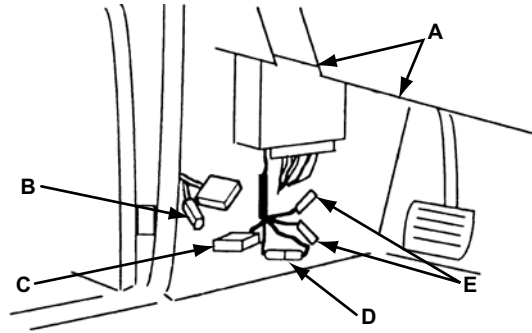


Figure 10-6 1984–95 Pickup, 1988–95 Amigo, and 1991–95 Rodeo connectors

- A—1984–87 Impulse (leads and ALDL not shown)
- B—RWAL 1-pin connector
- C—ALDL (3-pin connector)
- D—Timing set connector
- E—Diagnostic leads (connect together for flash codes)



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).

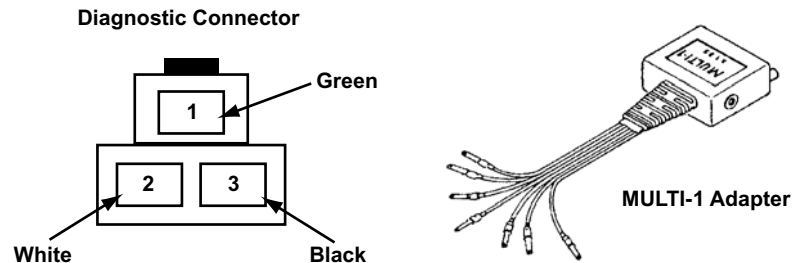


Figure 10-7 1984–95 Pickup 1988–95 Amigo, and 1991–95 Rodeo connector and adapter

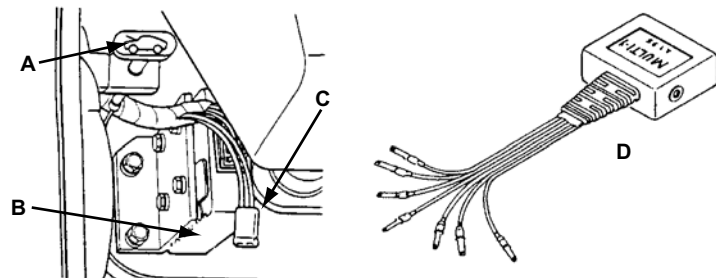


Figure 10-8 1988–91 Trooper with automatic transmission connector location

- A—Hood release
- B—ECM
- C—Diagnostic connector
- D—MULTI-1 adapter



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.

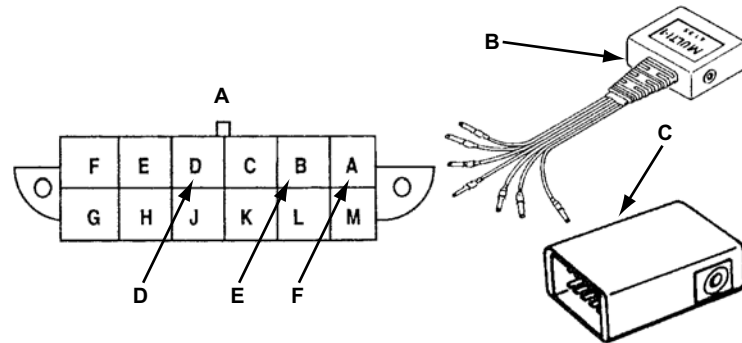


Figure 10-9 12-pin connector and adapters

A—Diagnostic connector

B—MULTI-1 adapter

C—GM-1 adapter

D—Green

E—White

F—Black



To read codes from 1988–89 Impulse:

- Connect the MULTI-1 adapter with the white terminal converters (Figure 10-10).

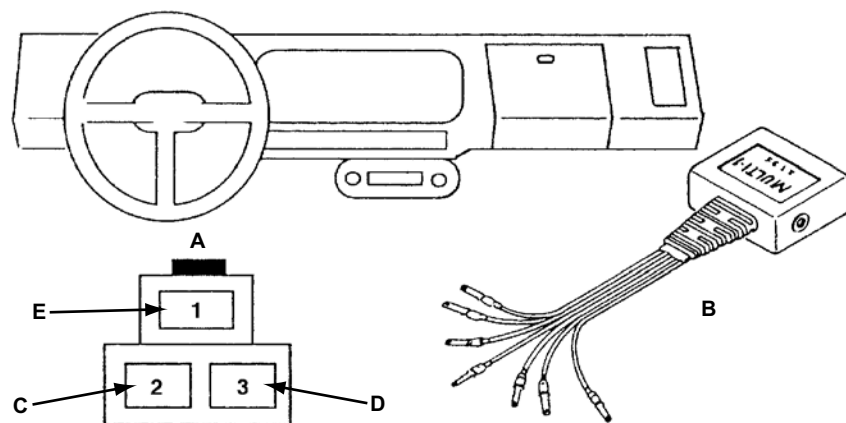


Figure 10-10 1988–89 Impulse connector and adapter

A—Diagnostic connector

B—MULTI-1 adapter

C—White

D—Green

E—Black



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 103).

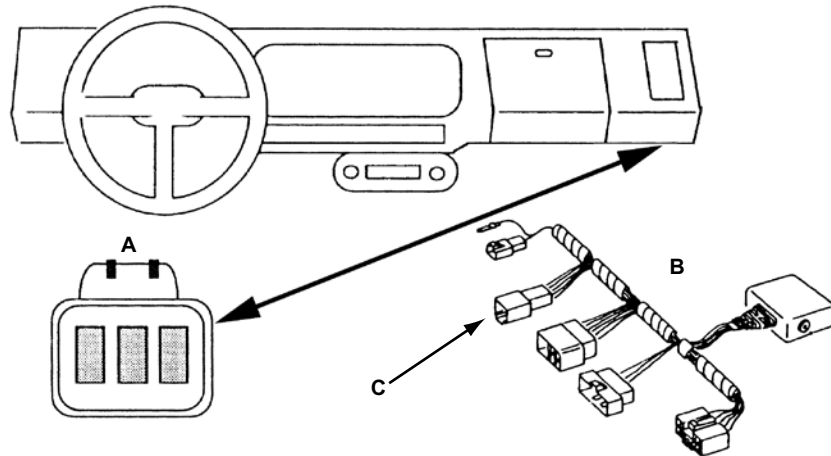


Figure 10-11 1985½–89 I-Mark, 1990 and later Impulse connector and adapter

A—Diagnostic connector

B—MULTI-2 adapter

C—MULTI-2-D

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 104 for Type 05 code information.



To read codes from 1988–89 Impulse (optional):

- Jump pins 2 and 3 as shown in Figure 10-12.

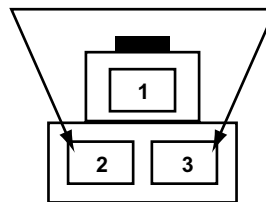


Figure 10-12 1988–89 Impulse jump pins



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

- Jump pins as shown in Figure 10-13.

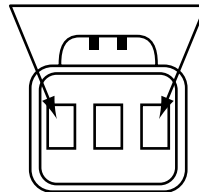


Figure 10-13 1985½–89 I-Mark, 1990 and later Impulse jump wire

Code Type 05

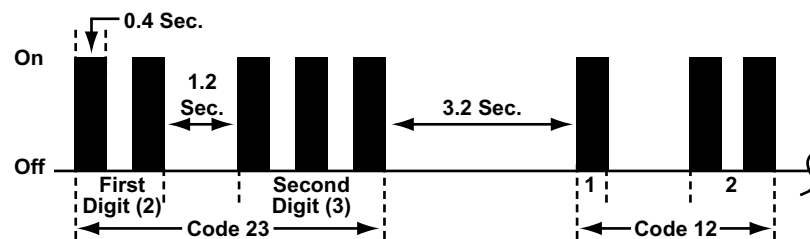


Figure 10-14 Isuzu engine Code Type 05

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 Hard Codes and Soft Codes

Some models separate hard codes from soft ("historical") codes (Figure 10-15).

```

RPM_1234 02(mV)___689 MC DWL(°)___38
**  DIAGNOSTIC MODE.  DO NOT DRIVE.  **
13 02 SENSOR NOT WARM ENOUGH
HC HISTORICAL CODES FOLLOW
  
```

Figure 10-15 Data display with historical codes

10.1.4 Clearing Codes

Some 1987 and later models allow clearing trouble codes from the Exit menu (Figure 10-16).

RESUME	LED MENU
PRINT SCREEN	> CLEAR ECM CODES
PRINT FRAME	FIX LINE 2
ARM MOVIE	

Figure 10-16 CLEAR ECM CODES

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 & DATA. If this happens, repeat code clearing.

10.1.5 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 & 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 (Figure 10-17).

MAIN MENU - ISUZU [PRESS N FOR HELP]	
>CODES & DATA	ROAD TEST (NO C&D)
CUSTOM SETUP	REVIEW MOVIE
FUNCTIONAL TESTS	TROUBLESHOOTER

Figure 10-17 ROAD TEST (NO C&D) selection

10.1.6 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 displays a screen like Figure 10-18.

FIELD SERVICE - ALDL PINS 1 & B SHORTED WITH KEY ON/ENGINE OFF, CE LAMP FLASHES TROUBLE CODES, AND SOME ECM OUTPUTS ARE EXERCISED. PRESS N TO EXIT.

Figure 10-18 Sample Field Service

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 106
- “Manual Code Reading (ABS)” on page 108
- “Clearing ABS Codes” on page 111

10.2.1 ABS Code Reading Connectors and Locations

Refer to Figure 10-19 and Table 10-4 for common Isuzu ABS diagnostic connector locations.

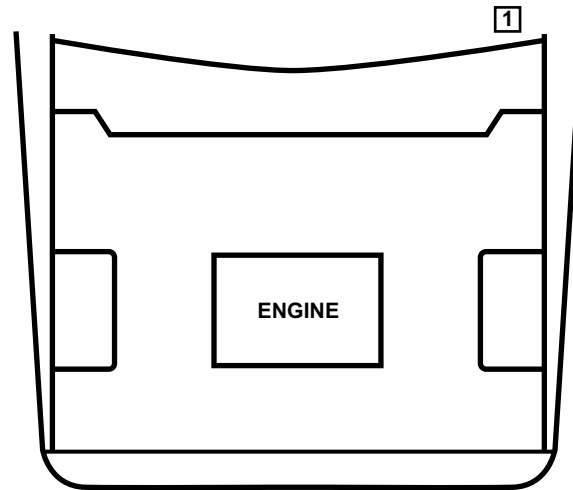


Figure 10-19 Isuzu common ABS connector locations

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 2003–04 Ascender:

- Connect the OBD-II adapter to the 16-pin connector (Figure 10-20).

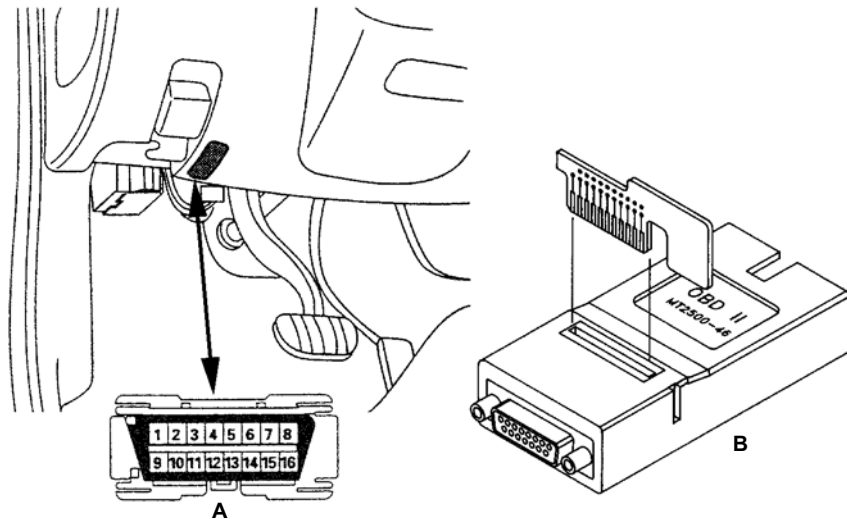


Figure 10-20 2003–04 Ascender ABS connector

A—16-pin DLC

B—OBD-II adapter

10.2.2 Manual Code Reading (ABS)

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

- Rear wheel antilock (RWAL), see Figure 10-22 and Table 10-5 on page 108
- Type 02, see Figure 10-24 and Table 10-6 on page 109
- Type 05a, see Figure 10-26 and Table 10-7 on page 110

RWAL ABS Code Type

The RWAL diagnostic connector location is shown in (Figure 10-21).

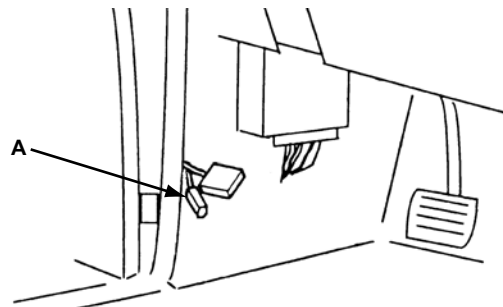


Figure 10-21 1991–95 Rodeo, 1990–95 Pickup, and 1992–94 Amigo 1-pin RWAL diagnostic connector

A— RWAL 1-pin 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.

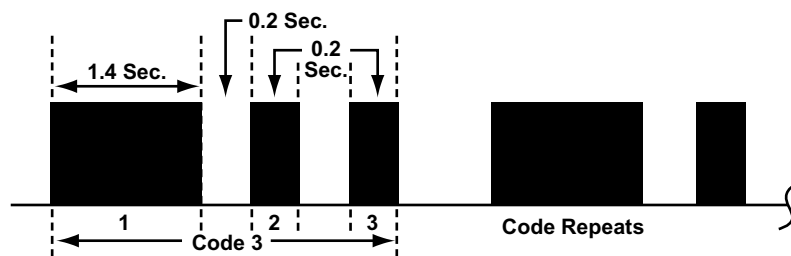


Figure 10-22 Isuzu RWAL ABS Code Type

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 10-21)
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 10-23).

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.

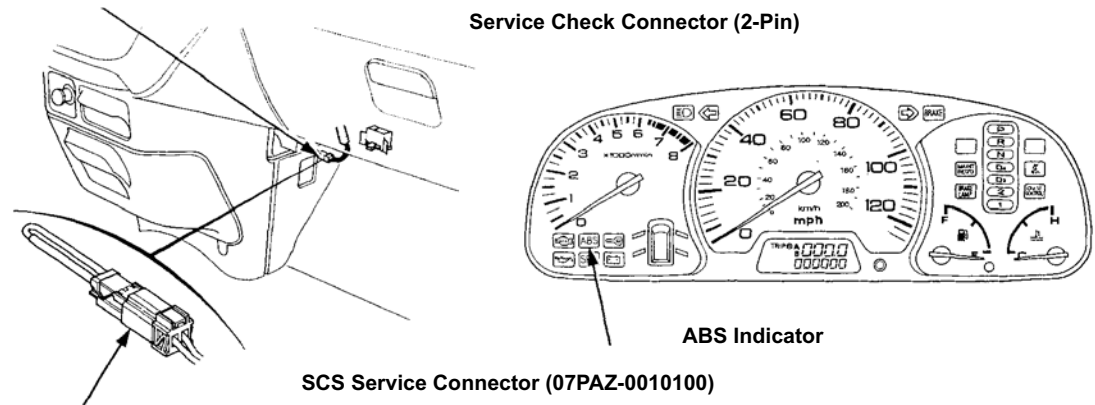


Figure 10-23 1996-1999 Isuzu Oasis ABS service check connector location

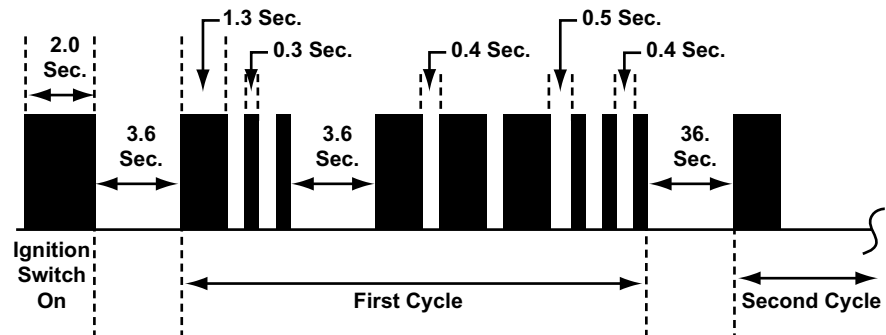


Figure 10-24 Isuzu ABS Code Type 02

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 2002–04 Axiom, 1996–2002 Trooper, 1999–2001 Rodeo and 1999–2001 Vehicross:

- Jump pins 4 and 12 as shown in Figure 10-25.

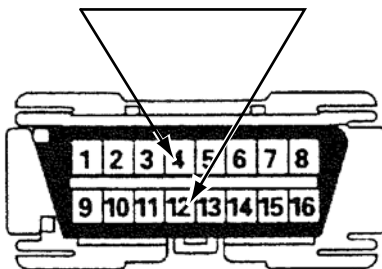


Figure 10-25 16-pin connector jump wire

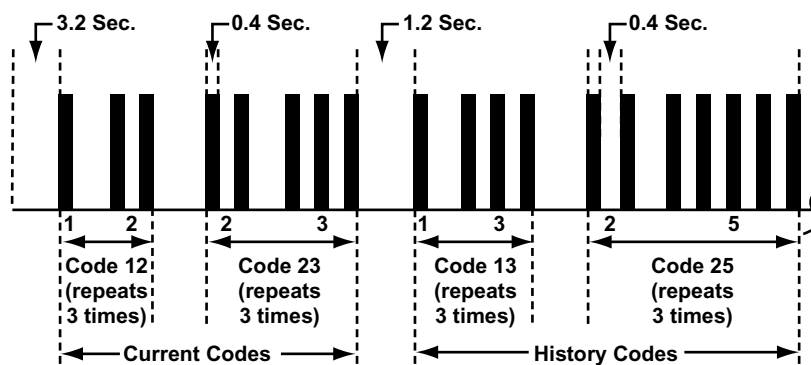


Figure 10-26 Isuzu ABS Code Type 05a

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 10-20). 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 10-23 on page 109 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 10-23 on page 109)
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.

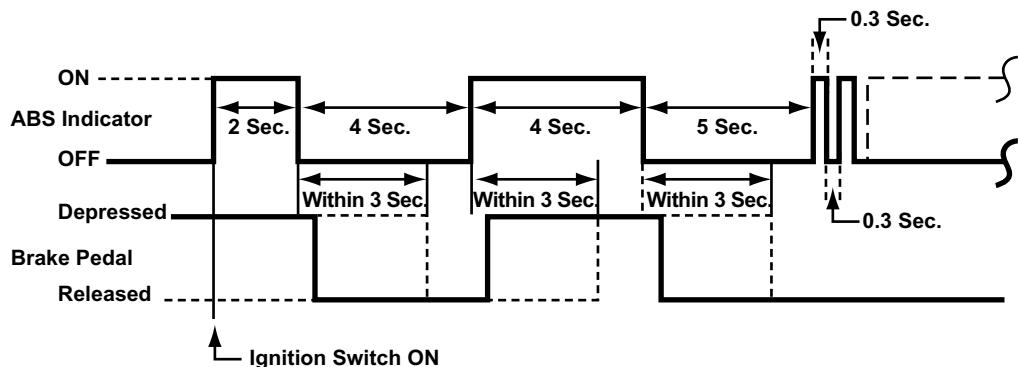


Figure 10-27 1996–99 Isuzu Oasis ABS DTC erasure mode

10.3 Testing Supplemental Restraint Systems (SRS)

Isuzu SRS, or airbag testing includes:

- “Manual Code Reading (SRS)” on page 112
- “Clearing SRS Codes” on page 115

10.3.1 Manual Code Reading (SRS)

Isuzu models use 2 types of SRS codes:

- Type 02a, see Figure 10-29, Figure 10-30 and Figure 10-31 and Table 10-8 on page 113
- Type 03, see Figure 10-32 Figure 10-33, and Figure 10-34 and Table 10-9 on page 115

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.

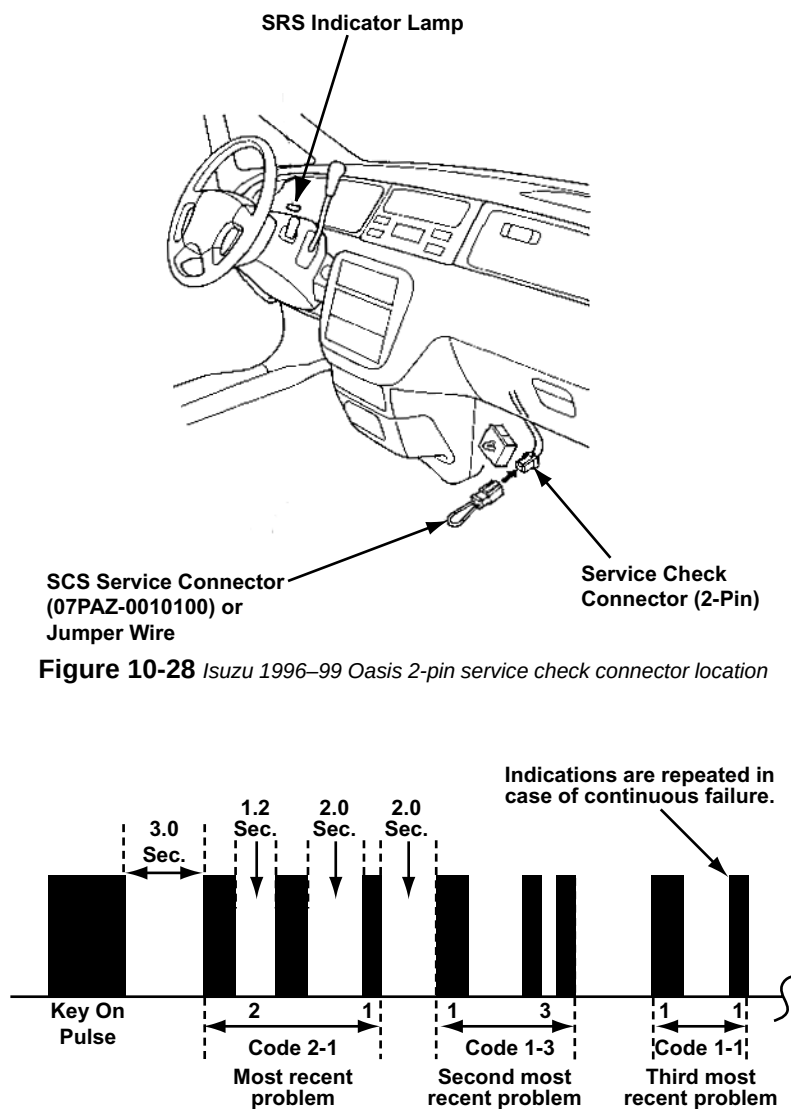


Figure 10-28 Isuzu 1996–99 Oasis 2-pin service check connector location

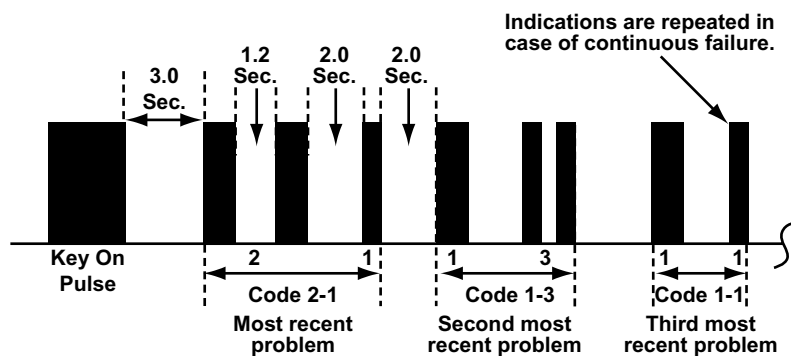


Figure 10-29 Isuzu SRS Code Type 02a: Continuous Failure, SRS indicator flashes like this

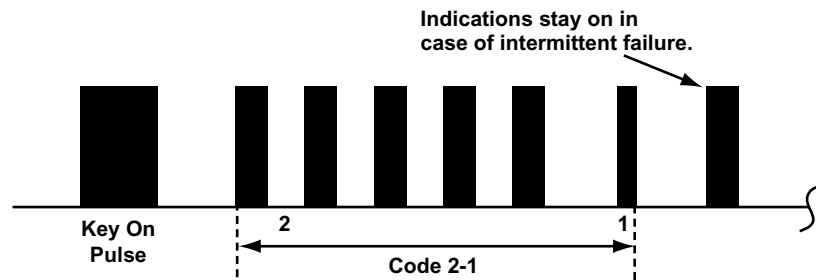


Figure 10-30 Isuzu SRS Code Type 02a: Intermittent Failure, SRS indicator flashes like this

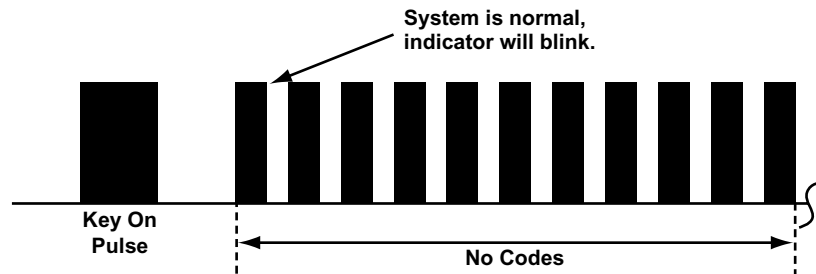


Figure 10-31 Isuzu SRS Code Type 02a: Normal (no failure), SRS indicator flashes like this

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 10-29).
- 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 10-30).
- In case of both continuous and intermittent failures, the DTC of the continuous failure only will be 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 will start to blink (see Figure 10-31).

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.

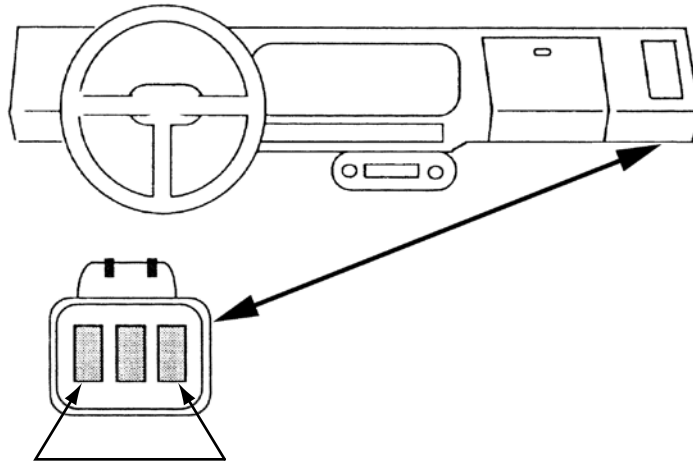


Figure 10-32 Isuzu vehicles with orange SRS diagnostic connector and jumper pins

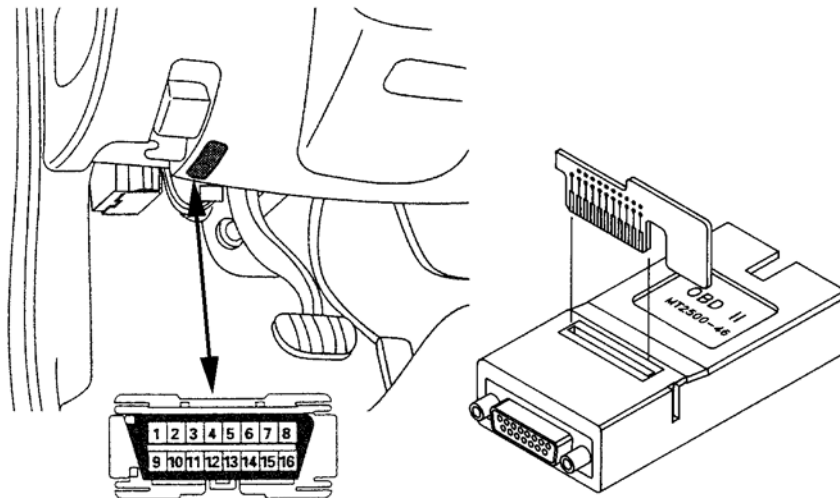


Figure 10-33 1996 and newer Isuzu vehicles with 16-pin OBDII style connector location

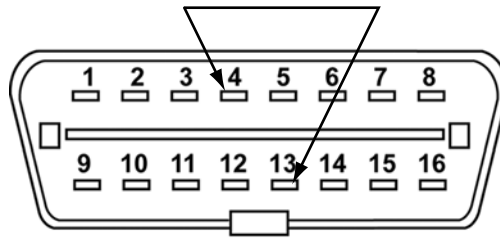


Figure 10-34 1996 and newer Isuzu vehicles with 16-pin OBDII style connector and jumper wire

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 10-32, Figure 10-33)
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

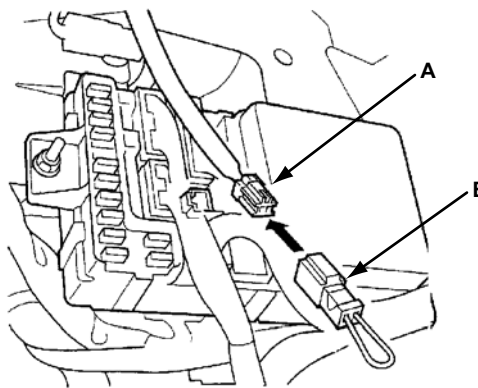


Figure 10-35 1996–99 Oasis SRS code clearing (left side of dash)

A—MES (Memory Erase Signal) connector

B—SCS service connector

**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 and stays on 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. 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 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 and Body Control Module (BCM)

Figure 10-36 shows the diagnostic connector location for testing the transfer case and BCM.

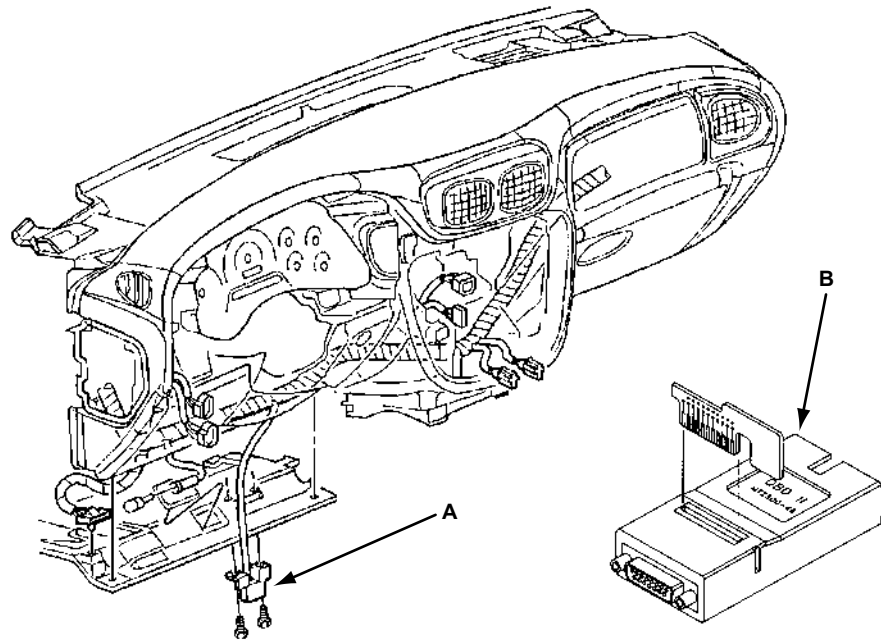


Figure 10-36 2003–04 Isuzu Ascender 16pin DLC Connector for all systems

A—16-pin DLC

B—OBD-II adapter

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, and ABS testing includes:

- “Code Reading” on page 119
- “Manual ABS Code Reading” on page 122

11.1.1 Code Reading



To read engine codes with a 20-pin connector:

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

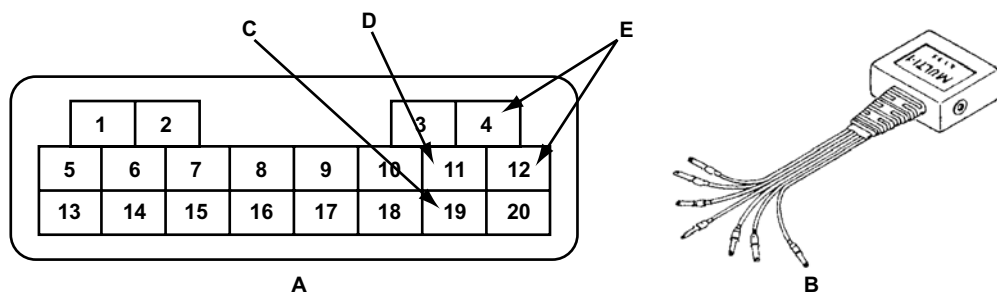


Figure 11-1 20-pin DLC and MULTI-1 adapter—engine codes

A—20-pin connector

B—MULTI-1 adapter

C—Red

D—Blue

E—Black

**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).

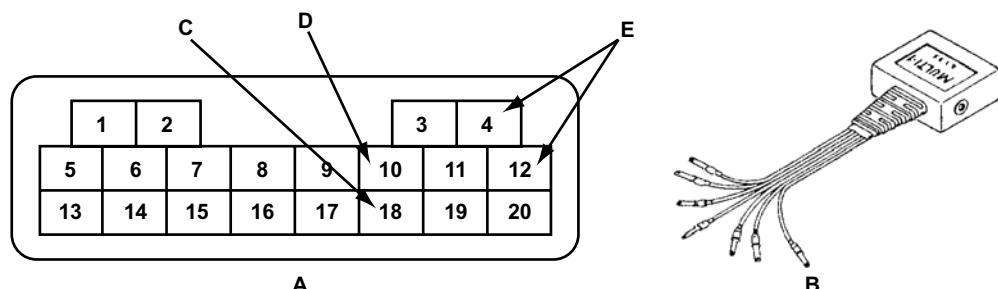


Figure 11-2 20-pin DLC and MULTI-1 adapter—transmission codes

A—20-pin connector

B—MULTI-1 adapter

C—Red

D—Blue

E—Black

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

- Use the OBD-II adapter with the specified Personality Key™ device (Figure 11-3).

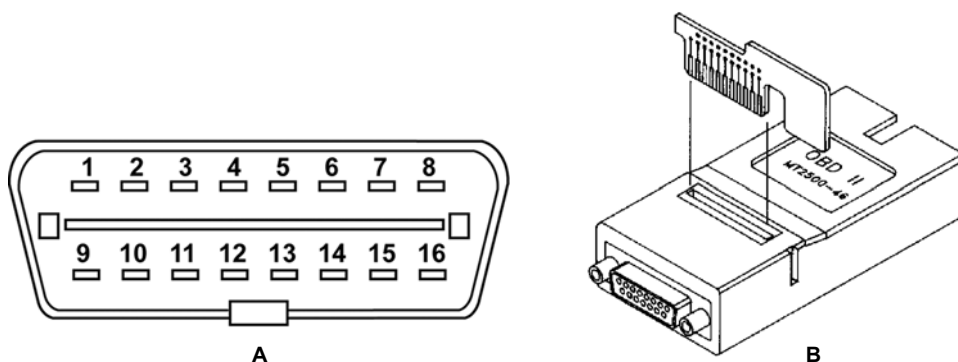


Figure 11-3 16-pin DLC and OBD-II adapter

A—16-pin DLC

B—OBD-II adapter

**To read 1994–2001 Sportage ABS codes:**

- Ground terminal 1 as shown in Figure 11-4 on page 121.

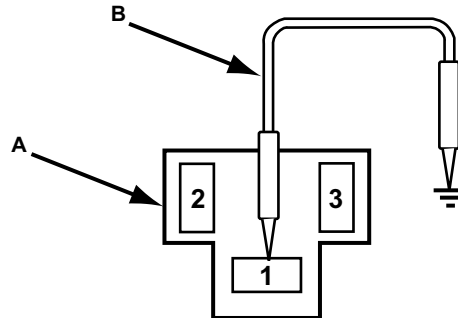


Figure 11-4 1994–2001 Sportage 3-pin ABS check connector

A—3-pin connector
B—Fused jump wire



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.

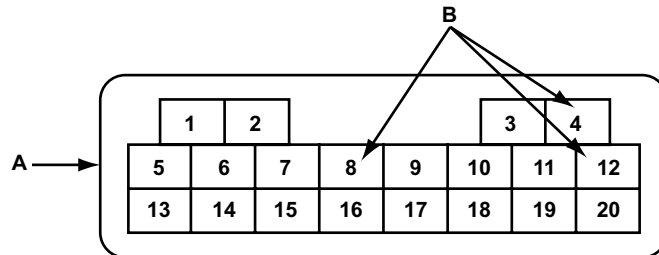


Figure 11-5 20-pin DLC—jump pins for ABS codes

A—20-pin connector
B—Jump wires



To read 2000–01 Spectra and Sephia ABS codes:

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

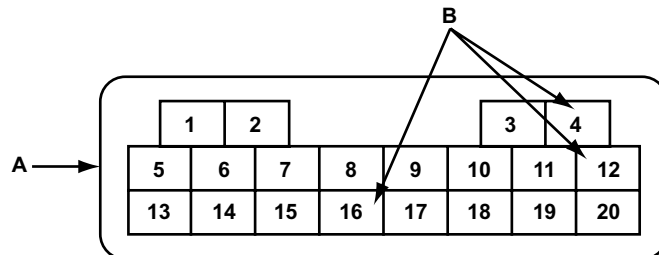


Figure 11-6 20-pin DLC—jump pins for ABS codes

A—20-pin connector
B—Jump wires

11.1.2 Manual ABS Code Reading

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

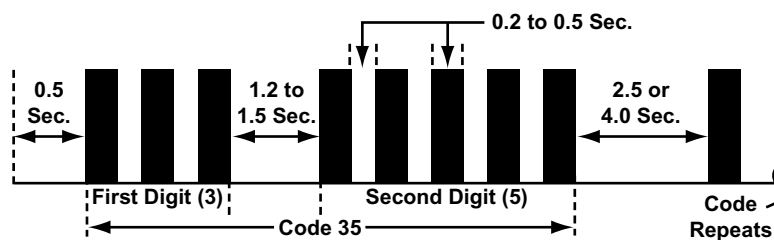


Figure 11-7 *Kia ABS Code Type 13*

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.	

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
- Generic Electronic Module (GEM)
- Instrument Cluster Module (ICM)
- Transfer Case

12.1 Testing Engine and Transmission Systems

Mazda engine and transmission system testing includes:

- “Code Reading”
- “Manual Code Reading”
- “Functional Tests—All 1983–95 models except: 1991–94 Navajo; 1994 B-Series; and 1994–95 626 2.0L ATX”
- “Functional Tests—All models with EEC-IV and EEC-V systems”
- “Transmission Code Retrieval—1987 626”

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).

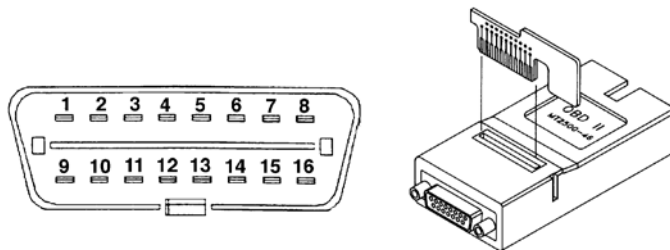


Figure 12-1 16-pin connector and OBD-II adapter with Personality Key™ device


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.

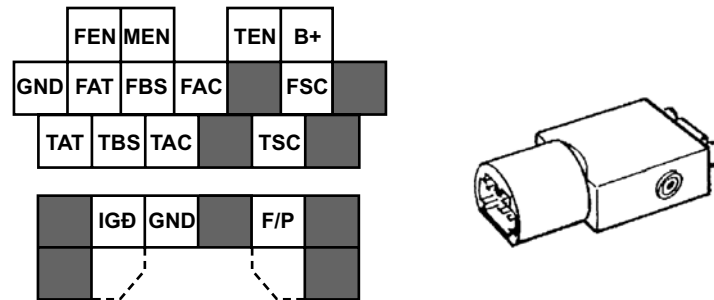


Figure 12-2 17-pin underhood connector and MAZDA-1 adapter


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

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

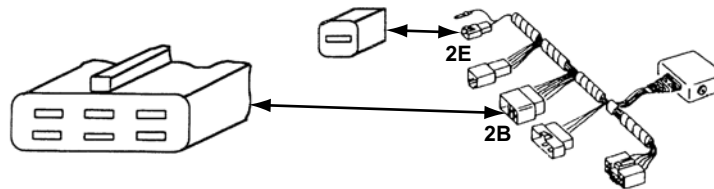


Figure 12-3 6-pin and 1-pin connectors and MULTI-2 adapter

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.

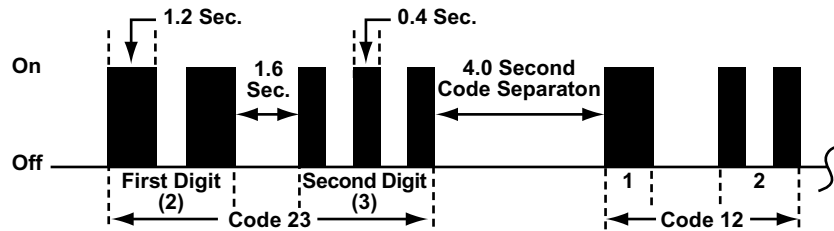


Figure 12-4 Mazda engine, transmission, and ABS flash codes

12.1.3 Functional Tests—All 1983–95 models except: 1991–94 Navajo; 1994 B-Series; and 1994–95 626 2.0L ATX



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 (Figure 12-5):

- **OXYGEN SENSOR TEST**—monitors the feedback signal from the exhaust gas 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.

FUNCTIONAL TEST MENU:
>OXYGEN SENSOR TEST
SWITCH TEST
BASE TIMING CHECK

Figure 12-5 Sample Mazda Functional Tests menu



To perform an oxygen sensor test:

1. From the Functional Tests menu, select **OXYGEN SENSOR TEST**.
A screen like Figure 12-6 displays.

**MAKE SURE ENGINE IS RUNNING AND WARM
 (IN CLOSED LOOP) BEFORE MONITORING THE
 EXHAUST OXYGEN CONTENT.
 PRESS Y TO CONTINUE**

Figure 12-6 OXYGEN SENSOR TEST selected

2. Start and run the engine to warm it to normal operating temperature.
3. Press **Y**.
A screen like Figure 12-7 displays.

HOLD ENGINE AT 2000 RPM TO MONITOR
EXHAUST OXYGEN SENSOR.

.....
EXHAUST _____ LEAN

Figure 12-7 Oxygen Sensor Test

4. As instructed, accelerate the engine to 2000 RPM and hold it there.
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**.

A screen like Figure 12-8 displays.

WITH KEY ON AND ENGINE OFF, TEST EACH
SWITCH. AS ANY SWITCH STATE CHANGES,
DISPLAY ALTERNATES HIGH/LOW & LED 3
GOES ON/OFF. PRESS Y TO CONTINUE.

Figure 12-8 SWITCH TEST selected

2. Press Y.

A screen like Figure 12-9 displays.

TEST ANY SW: NEUTRAL/CLUTCH INHIBITOR,
IDLE, HEADLAMP, BRAKE LAMP, BLOWER A/C,
REAR DEFROSTER, WATER THERMO.
SWITCH STATE _____ HIGH

Figure 12-9 Switch 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 (sheet 1 of 2)

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.

Table 12-1 Individual switch test instructions (sheet 2 of 2)

SWITCH	TEST INSTRUCTIONS
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**.
A screen like Figure 12-10 displays.

**THE VEHICLE CHECK CONNECTOR HAS BEEN
GROUNDED BY THE SCANNER. BASE IGNITION
TIMING CAN NOW BE CHECKED.
PRESS N WHEN DONE.**

Figure 12-10 Base Timing Check



NOTE:

On some models, the transmission test connector is under the instrument panel. Do not connect to the engine test connector.

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 128 and “EEC-V Functional Tests” on page 132 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 (Figure 12-1).

The following EEC-IV functional tests are described:

- “Computed Timing Test” on page 128
- “Wiggle (Engine Off) Test” on page 128
- “Wiggle (Engine Running) Test” on page 129
- “Output State Check” on page 130
- “Idle Speed Adjustment Test” on page 131

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 (Figure 12-2).

**NOTE:**

A “warning” message displays (Figure 12-3) 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, press **Y** 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 (Figure 12-11).

WIGGLE TEST - KEY ON, ENGINE OFF
TURN KEY ON. DO NOT START ENGINE.
WITH KEY ON, PRESS Y TO CONTINUE.
.....

Figure 12-11 Sample engine off wiggle test initiation screen

2. Switch the key on and press **Y**.

After a brief startup message, the test displays (Figure 12-12).

MOVE, WIGGLE, AND TAP THE HARNESS,
SENSORS, AND CONNECTORS. DO NOT TURN
KEY OFF DURING TEST! PRESS N TO EXIT
.....

Figure 12-12 Sample engine off wiggle test screen

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 (Figure 12-13).

WIGGLE TEST - ENGINE RUNNING
START ENGINE AND RUN AT IDLE. DO NOT
ACCELERATE. PRESS Y TO CONTINUE (OR
PRESS Y BEFORE STARTING ENGINE).

Figure 12-13 Sample engine running wiggle test instruction screen

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, press **Y** to enter the test.

The screen momentarily displays a test initiated message (Figure 12-14), then switches to the test screen (Figure 12-15).

TEST INITIATED ... PLEASE WAIT
TEST MAY TAKE 30 SECONDS TO START
IF TEST DOES NOT START, CYCLEKEY & RETRY

Figure 12-14 Sample engine running wiggle test initiated screen

MOVE, WIGGLE, AND TAP THE HARNESS,
SENSORS, AND CONNECTORS. DO NOT TURN
KEY OFF DURING TEST! PRESS N TO EXIT
.....

Figure 12-15 Sample engine running wiggle 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 (Figure 12-16).

OUTPUT STATE TEST
PRESS Y, THEN TURN KEY ON. DO NOT START
THE ENGINE.

Figure 12-16 Sample output state test initiation screen

2. Press **Y**, 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 (Figure 12-17).

TO TOGGLE ACTUATORS ON/OFF, SNAP THE
THROTTLE. CHECK THE ACTUATORS
INDIVIDUALLY WITH A DVOM.
** ACTUATORS OFF **

Figure 12-17 Sample output state 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 (Figure 12-18). 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.

IDLE SPEED ADJUSTMENT
START ENGINE AND RUN AT 2000 RPM
FOR 2 MINUTES, OR UNTIL EGO IS WARM.
PRESS Y WHEN DONE. [0:00]

Figure 12-18 Sample idle speed adjust test initiation screen

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. Press **Y** 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 (Figure 12-19).

**ENGINE RUNNING TEST COMPLETE. READY FOR
IDLE SPEED TEST. IF NO RESPONSE IN 15
SECONDS, IDLE TEST MAY NOT BE AVAILABLE
IN THIS EEC (SEE FORD REFERENCE MANUAL).**

Figure 12-19 Sample idle speed adjust test complete screen

After the PCM response is received, the throttle stop screw adjustment screen displays (Figure 12-20). 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.

**TURN THROTTLE STOP SCREW TO ADJUST RPM.
PRESS N WHEN DONE AND RPM IS IN SPEC.
CURRENT CONDITION IS:
** IDLE RPM 975**

Figure 12-20 Sample idle speed adjust throttle stop screen

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. Press **N** when the idle RPM is correct.

An instruction and verification screen displays (Figure 12-21).

**RUN ENGINE AT 1500 RPM FOR 10 SECONDS.

WHEN DONE, PRESS Y TO RECHECK BASE IDLE,
OR PRESS N TO EXIT. [0:00]**

Figure 12-21 Sample idle speed adjust verification screen

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, press **N** to exit.

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 133
 - “Module Identification Test” on page 133

**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. Press **Y** and the test list displays (Figure 12-22).

A rectangular screen display with a black border. It contains four lines of text: ">NORMALLY ON OUTPUTS OFF", "ALL OUTPUTS ON", "LOW FAN ON ONLY", and "HIGH FAN ON ONLY".

Figure 12-22 Sample EEC-V output state tests

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.

**To conduct a module ID test:**

1. Select **MODULE ID TEST**.
An identification screen displays (Figure 12-23). If a module does not store VIN information, “not available” displays on the third line.

```

SOFTWARE FILE: CCAQAB3.HEX
MODULE PART #: F4WFBD
VIN: XXXXXXXXXXXXXXXX
Copyright Ford Motor Co. 1993

```

Figure 12-23 Sample EEC-V module identification screen

2. Press **Y** to print the screen, or press **N** to exit.

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 12-24.

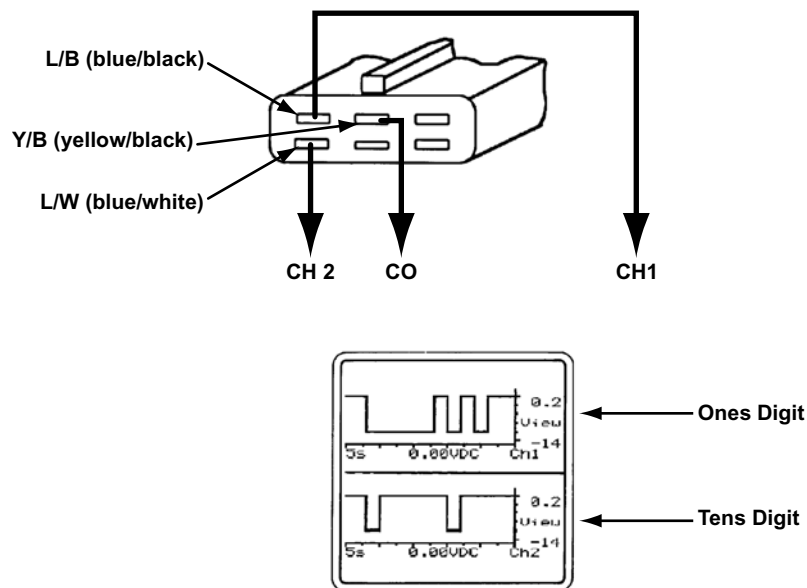


Figure 12-24 Connecting a Dual Trace Graphic Meter to a 1987 626 transmission connection

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 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 L/B (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 12-25 on page 135).

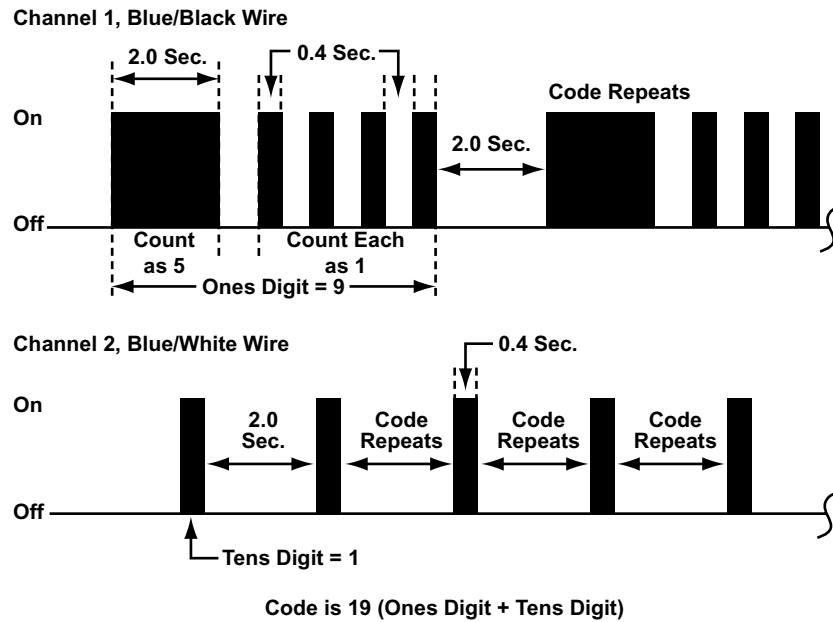


Figure 12-25 1987 626 transmission manual flash codes

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 12-26). For reading codes manually, ground the TBS pin.

IMPORTANT:

Grounding the incorrect pin may result in vehicle damage.

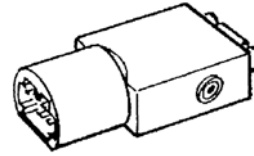
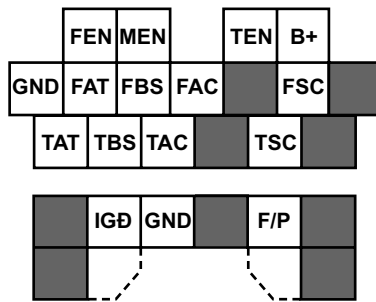


Figure 12-26 17-pin underhood connector and MAZDA-1 adapter



To read 1988–92 626/MX6 ABS codes:

- Connect an analog voltmeter to FBS (G/R) (Figure 12-27).
- Read malfunction code(s) by observing meter needle swings.

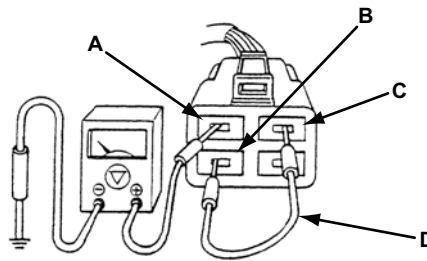


Figure 12-27 Analog voltmeter and terminal on 1988-1992 626/MX6

- A—FBS (Green/Red)
 B—TBS (Green Black)
 C—GND (Black)
 D—Jump wire



To read 1993–94 Navajo 4-Wheel Antilock (4WAL) brakes codes:

1. With the key off, jump the white, light blue, and black wires (Figure 12-28).
2. Turn the key on and remove the jumper within 5 seconds.
3. Count flashes. Code 16 is a system pass.

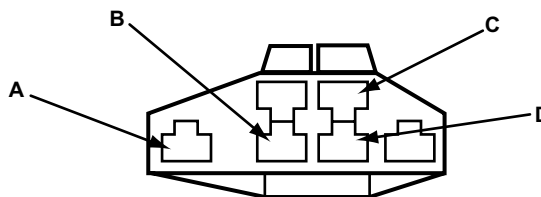


Figure 12-28 1993–94 Navajo with 4WAL

- A—Black/Light Blue
 B—Dark Green
 C—Black
 D—White/Light Blue



To read 1990–93 B-Series and MPV ABS codes:

1. Attach a jumper wire to Terminal C (yellow wire, Figure 12-29).
Ground the jumper wire to the chassis for one second and release it.

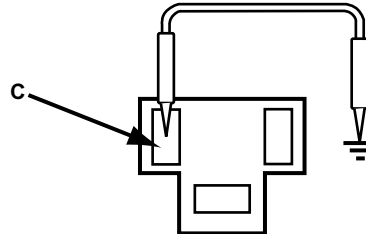


Figure 12-29 Terminal C on 1990–93 B-Series and MPV

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 (Figure 12-30). Selections vary by model and year.

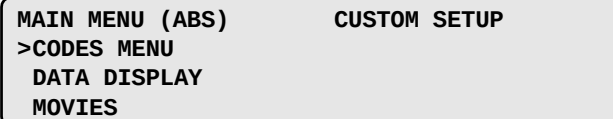


Figure 12-30 Sample Mazda MAIN MENU—ABS

The following main menu selections are discussed:

- “Service Codes” on page 137
- “ABS Data Communication Guidelines” on page 141

Refer to the user’s 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 SERVICE CODE MENU displays (Figure 12-31):

- **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

served 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.

CODE MENU	REVIEW CODES
>KOEO SELF-TEST	PRINT CODES
MEMORY CODES	
CLEAR CODES	

Figure 12-31 Sample Mazda ABS SERVICE CODE MENU

Any time a self-test is selected, a self-test initiated message displays (Figure 12-32). 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.

SELF-TEST INITIATED...WAIT FOR CODES TEST MAY TAKE 60 SECONDS TO START IF TEST DOES NOT START,CYCLE KEY & RETRY

Figure 12-32 Sample KOEO self-test initiated

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 press **Y**.
The self-test initiated screen displays.



NOTE:

Some systems require the ignition to be cycled on after pressing the Y button. Follow on-screen screen instructions.

3. At the end of the test, the service code list displays (Figure 12-33).

ENGINE RUNNING SELF-TESTSTART ENGINE AT RUN AND IDLE. DO NOTACCELERATE. PRESS Y TO CONTINUE (ORPRESS Y BEFORE STARTING ENGINE).

Figure 12-33 Sample ABS service code list

If no codes are detected during the test a “P0000 no faults present” message 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. Press **Y** 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 (Figure 12-34).

A rectangular screen with a black border displaying the following text:

```
SERVICE CODES
** CONTINUOUS MEMORY CODES-FIX LAST **
P0000 NO CODES PRESENT
** END OF LIST **
```

Figure 12-34 Sample ABS memory code list

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. Press **Y** to continue.

The self-test initiated screen displays (Figure 12-35).

A rectangular screen with a black border displaying the following text:

```
SELF-TEST INITIATED
WAIT FOR CODE CLEARING
```

Figure 12-35 Sample code clearing in progress screen

- When the test finishes a codes cleared screen displays (Figure 12-36).

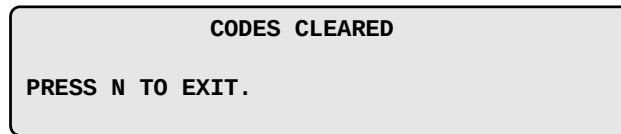


Figure 12-36 Sample ABS codes cleared message

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 (Figure 12-37).

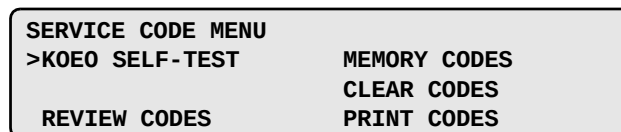


Figure 12-37 Review codes available on the menu

When this selection is available, it indicates recorded codes are in scan tool memory from either, or both tests.



To review codes:

- Select **REVIEW CODES**.
A code list, similar to the lists displayed at the end of the self-tests, displays.
- 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, GEM, ICM & Transfer Case Systems through the 16 Pin Connector

For 1996–2004 626 and B-Series models, you can select AIRBAG, GEM, ICM, or TRANSFERCASE from the System Selection menu to open the MAIN MENU for the specified system (Figure 12-38).

MAIN MENU (AIRBAG)	CUSTOM SETUP
>CODES MENU	
DATA DISPLAY	
MOVIES	

Figure 12-38 Sample Airbag testing Main Menu

When the ECM sets a code, it continuously flashes the SRS warning lamp. The DTCs and data stream information are available through the OBD-II diagnostic link connector (DLC).

The CODES MENU selection from the MAIN MENU for the specific system offers the choices shown in Figure 12-39.

SERVICE CODE MENU	CLEAR CODES
>KOE0 SELF-TEST	
MEMORY CODES	
LAMP FAULT CODES	

Figure 12-39 Sample Airbag Service Code menu

The DATA DISPLAY selection is available on most 1996 and later vehicles. It operates similarly to Data (No Codes) for engine testing.

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

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

13.1 Testing Engine, Transmission, ABS, and SRS Systems

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

- “Code Reading Connectors and Locations” on page 143
- “Transmission Manual Code Reading” on page 147
- “ABS Manual Code Reading” on page 147
- “Codes & Data (Slow)” on page 148
- “Clearing Codes” on page 148
- “Actuator Tests” on page 149

13.1.1 Code Reading Connectors and Locations

Refer to Figure 13-1 and Table 13-1 on page 144 for diagnostic connector locations.

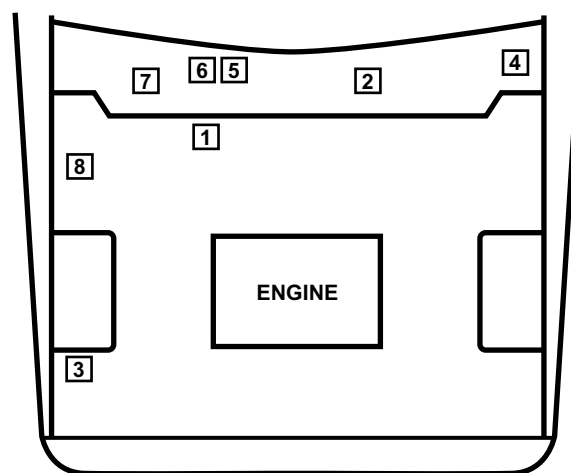


Figure 13-1 Common connector locations

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


To read codes from most 1987 and earlier vehicles:

- Use Figure 13-2 and Table 13-2 on page 145 to locate and connect to the diagnostic connector for most 1987 and earlier models.

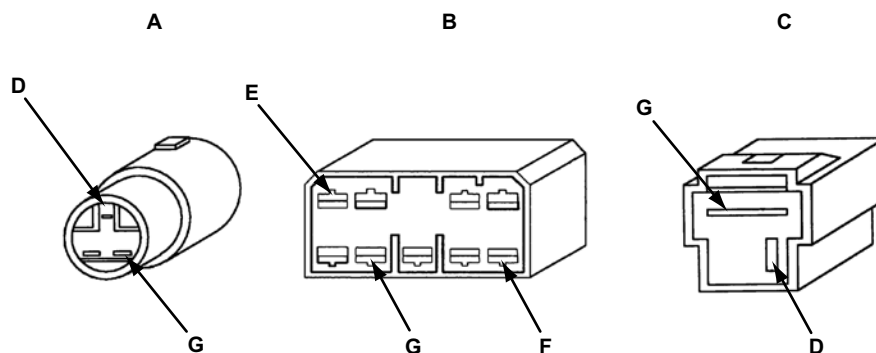


Figure 13-2 Diagnostic connectors for most 1987 and earlier vehicles

- A—3-pin connector
- B—9-pin connector
- C—2-pin connector
- D—Green (preferable) or Yellow
- E—Engine: Green (preferable) or Yellow
- F—Transmission: Green or Yellow
- G—Black

Table 13-2 Mitsubishi diagnostic connector locations for most 1987 and earlier vehicles

CONNECTOR	INSTRUCTIONS
3-PIN	Right front fender, near head lamp. Use MULTI-1 adapter and connect colored leads as shown.
9-PIN	In glovebox, next to latch. Use MULTI-1 adapter and connect colored leads as shown, using black terminal converters.
2-PIN	Use MULTI-1 adapter and connect colored leads as shown, using white terminal converters.



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

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

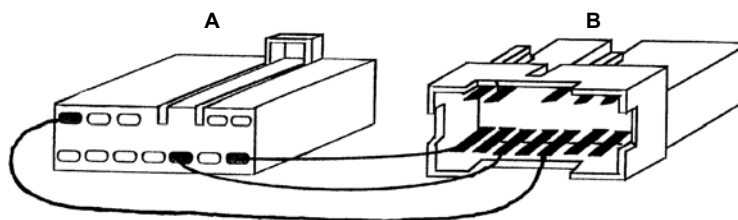


Figure 13-3 Connector and adapter for SRS system on most 1994 and earlier vehicles

- A—HYUN-2 adapter
- B—Connector



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 146).

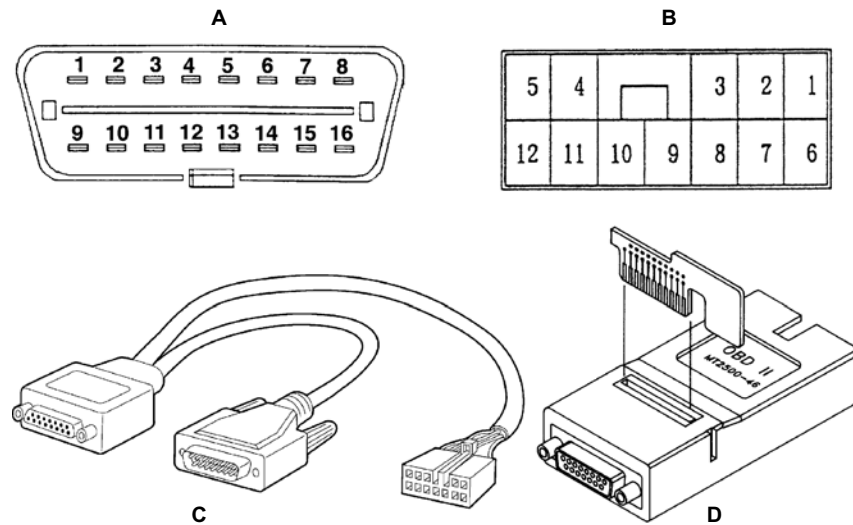


Figure 13-4 connectors and adapters for most OBD-II vehicles

A—16 pin connector

B—12-pin connector

C—Mitsu-1 adapter

D—OBD-II adapter



NOTE:

Most OBD-II vehicles have 16-pin and 12-pin connectors and use the MITSU-1 adapter connected through the OBD-II 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.



To read SRS codes from most 1994 and earlier vehicles:

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

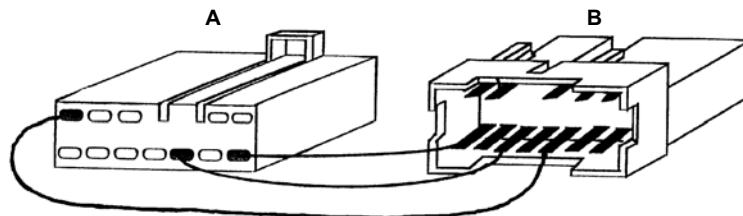


Figure 13-5 Connector and adapter for most 1994 and earlier SRS

A—HYUN-2 adapter

B—12-pin connector

13.1.2 Transmission Manual Code Reading

Mitsubishi models transmit Type 11 manual transmission codes, see Figure 13-6 and Table 13-3 on page 147.

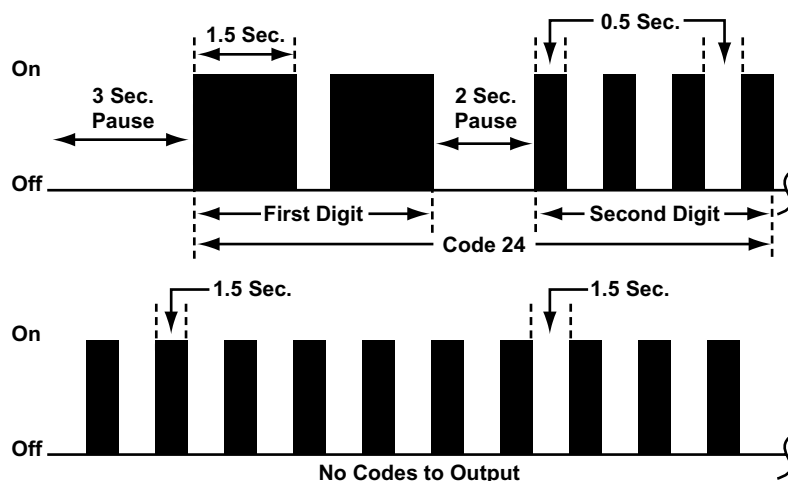


Figure 13-6 Mitsubishi transmission Code Type 11

Table 13-3 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 (Figure 13-14 on page 150): 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.	

13.1.3 ABS Manual Code Reading

Mitsubishi models transmit Type 11 ABS codes, see Figure 13-7 below and Table 13-4 on page 148.

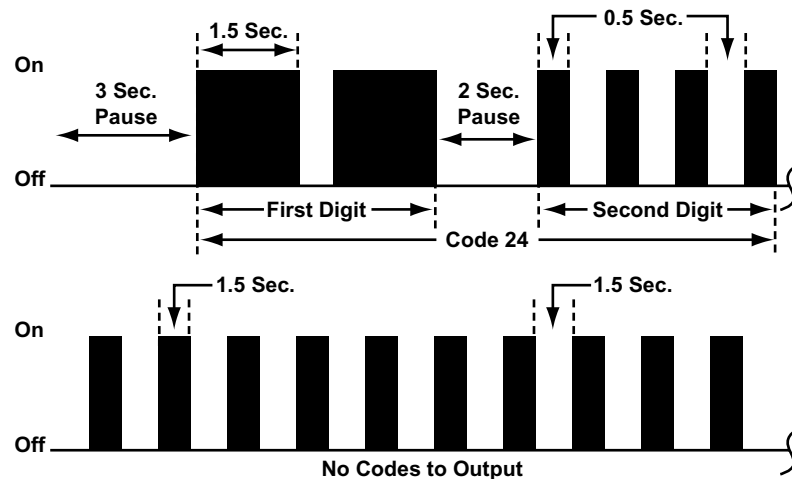


Figure 13-7 Mitsubishi ABS Code Type 11

Table 13-4 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 (Figure 13-14 on page 150): jump pin 1 to ground; or connect an analog meter across pins 4 or 5 to pin 8. 12-pin diagnostic connector (Figure 13-14 on page 150): 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.	

13.1.4 Codes & 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 & DATA(SLOW) (Figure 13-8).

```

MAIN MENU - - ENGINE
>CODES & DATA(SLOW)
CUSTOM SETUP
  
```

Figure 13-8 Sample MAIN MENU with CODES & DATA(SLOW)

13.1.5 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 Exit menu (Figure 13-9).

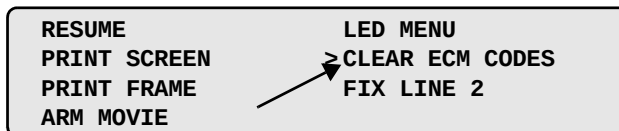


Figure 13-9 CLEAR ECM CODES selection

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.

13.1.6 Actuator Tests

Most pre-OBD-II and all 2002–03 OBD-II models have the ACTUATOR TESTS selection on the MAIN MENU (Figure 13-10). All actuator tests, except injector and timing tests (see “Injector Tests (Engine Running Only)” on page 150,) are key-on, engine-off (KOEO) tests.

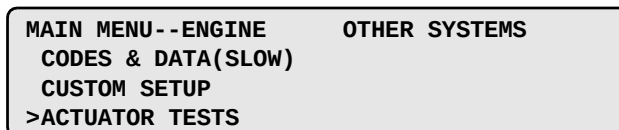


Figure 13-10 Sample MAIN MENU with ACTUATOR TESTS

A list of available tests displays when ACTUATOR TESTS is selected from the menu (Figure 13-11). The available tests vary by year and model.

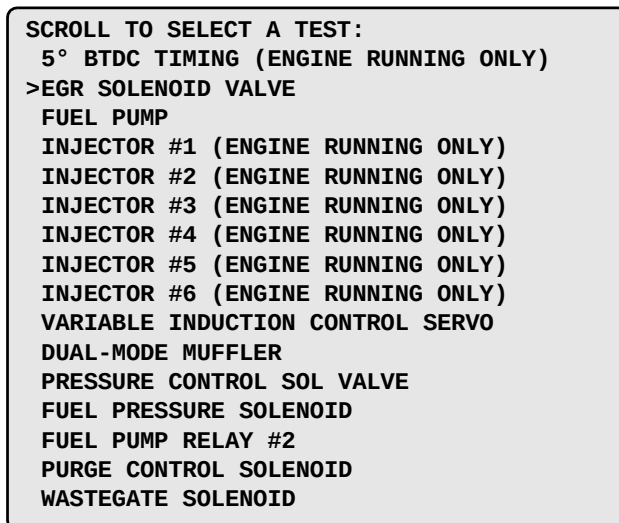


Figure 13-11 Complete list of Chrysler Imports actuator tests

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 (Figure 13-12).

**ACTIVATING EGR SOLENOID VALVE
FOR 5 SECONDS.**

Figure 13-12 Sample actuator test initiated

Approximately 5 seconds later, the ECM deactivates the actuator (Figure 13-13).

**EGR SOLENOID VALVE
TEST HAS BEEN COMPLETED.
PRESS Y TO REPEAT TEST.
PRESS N FOR ACTUATOR TEST MENU.**

Figure 13-13 Sample actuator test complete

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 screen like Figure 13-14 displays.

**EGR SOLENOID VALVE
TEST HAS BEEN REJECTED.
PRESS Y TO REPEAT TEST.
PRESS NO FOR ACTUATOR TEST MENU.**

Figure 13-14 Sample key-on, engine-off (KOEO) test

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 (Figure 13-15).

**DISABLING INJECTOR #1
FOR 5 SECONDS.**

Figure 13-15 Sample injector test initiated

About 5 seconds later, the ECM stops the test and re-enables the injector (Figure 13-16).

**INJECTOR #1 (ENGINE RUNNING ONLY)
TEST HAS BEEN COMPLETED.
PRESS Y TO REPEAT TEST.
PRESS N FOR ACTUATOR TEST MENU.**

Figure 13-16 Sample injector test completed

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)

14.1 Testing Engine Systems

Nissan and Infiniti engine system testing includes:

- “Code Reading Connectors and Locations” on page 151
- “Code Types 07” on page 152
- “Functional Tests” on page 157

14.1.1 Code Reading Connectors and Locations

Figure 14-1 and Figure 14-2 on page 152 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 152, 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.

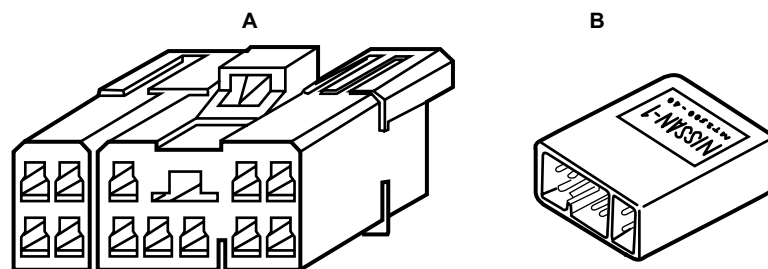


Figure 14-1 Vehicle diagnostic connector

A—Diagnostic connector

B—NISSAN-1 adapter

**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.

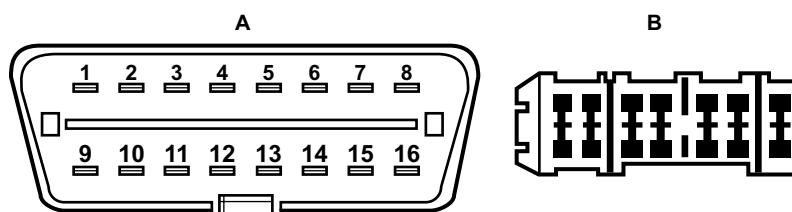


Figure 14-2 Nissan diagnostic connectors

A—16-pin DLC

Use OBD-II adapter.

B—14-pin connector

Use the NISSAN-2 adapter.

14.1.2 Code Types 07

**NOTE:**

For transmission codes on models with the 4EAT transmission, see “Testing Transmission Systems” on page 161.

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 151).

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

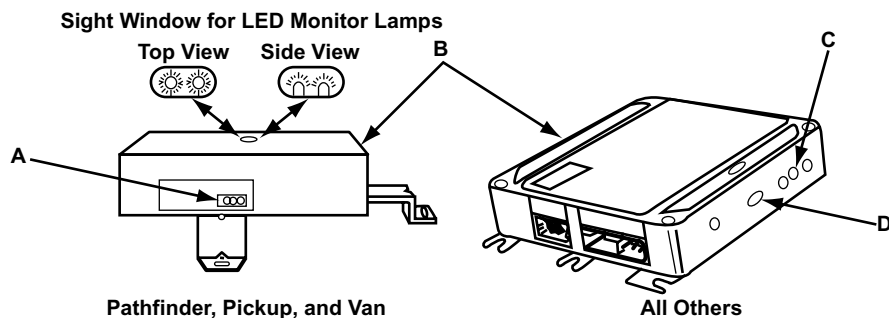


Figure 14-3 ECM switch locations

A—Diagnostic mode switch

B—ECM

C—Mode selector

D—LED monitor lamps

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 155). 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.

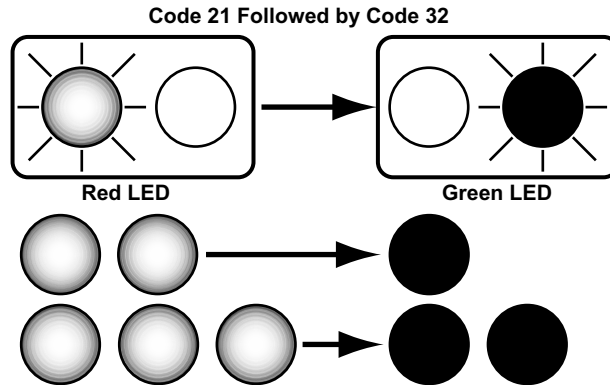


Figure 14-4 Nissan Code Type 07a—five mode system

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.

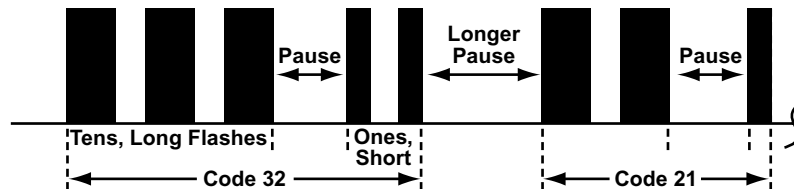


Figure 14-5 Nissan Code Type 07b

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:

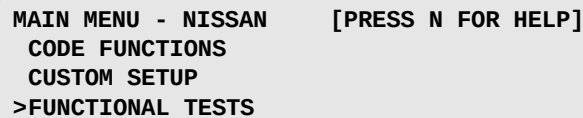
1. Locate the ECM below the glove box on the toe board.
2. Turn the ignition on with the engine off.
3. Verify that the LED and the CHECK ENGINE lamp light briefly for a bulb check. If either does not light, correct the problem before proceeding.
4. Turn the diagnostic selector switch on the ECM fully 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.

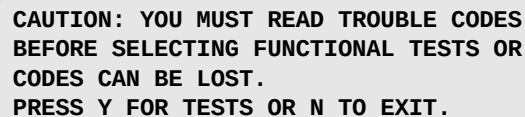
The FUNCTIONAL TESTS selection is available (Figure 14-6) for most 1987–96 models with electronic concentrated control systems (ECCS).



```
MAIN MENU - NISSAN      [PRESS N FOR HELP]
CODE FUNCTIONS
CUSTOM SETUP
>FUNCTIONAL TESTS
```

Figure 14-6 FUNCTIONAL TESTS selection

Select FUNCTIONAL TESTS and a screen like Figure 14-7 displays.



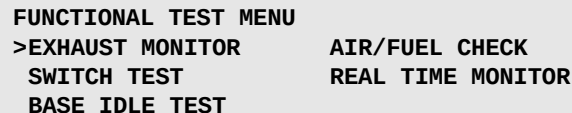
```
CAUTION: YOU MUST READ TROUBLE CODES
BEFORE SELECTING FUNCTIONAL TESTS OR
CODES CAN BE LOST.
PRESS Y FOR TESTS OR N TO EXIT.
```

Figure 14-7 Read Trouble Codes warning

IMPORTANT:

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

Pressing Y opens the Functional Tests menu (Figure 14-8).



```
FUNCTIONAL TEST MENU
>EXHAUST MONITOR      AIR/FUEL CHECK
SWITCH TEST           REAL TIME MONITOR
BASE IDLE TEST
```

Figure 14-8 Functional Tests menu

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 screen like Figure 14-9 displays.

MAKE SURE ENGINE IS RUNNING AND WARM
(IN CLOSED LOOP) BEFORE MONITORING THE
EXHAUST OXYGEN CONTENT.
PRESS Y TO CONTINUE

Figure 14-9 EXHAUST MONITOR selected

2. Start the engine and warm it to normal operating temperature.
3. Press Y.

The request is processed, then a screen like, then a screen like Figure 14-10 displays.

HOLD ENGINE AT 2000 RPM TO MONITOR
EXHAUST OXYGEN SENSOR.
EXHAUST _____ LEAN

Figure 14-10 Exhaust Monitor Test

4. 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 screen like Figure 14-11 displays.

MAKE SURE ENGINE IS RUNNING AND WARM
(IN CLOSED LOOP) BEFORE MONITORING THE
EXHAUST OXYGEN CONTENT.
PRESS Y TO CONTINUE.

Figure 14-11 AIR/FUEL CHECK selected

2. Start the engine and warm it to normal operating temperature, then press Y.

The request is processed, then a screen like Figure 14-12 displays.

HOLD ENGINE AT 2000 RPM TO MONITOR
AIR/FUEL MIXTURE COMPENSATION.

EXHAUST _____ LEAN COMPENSATION _____ RICH

Figure 14-12 Air/Fuel Check test

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 13).

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 screen like Figure 14-13 displays.

ENTER TEST WITH KOEO. START SIG OR IDLE
SW CHANGES LED 4, VEHICLE SPEED SENSOR
CHANGES LED 3 & EACH DISPLAY ALTERNATIVES
PRESS Y TO CONTINUE, N TO EXIT.

Figure 14-13 SWITCH TEST selected

2. Start the engine and warm it to normal operating temperature.
3. Press Y.

The request is processed, then a screen like Figure 14-14 displays.

TEST EACH SWITCH INDIVIDUALLY:
 VEHICLE SPEED SENSOR___ABOVE 12MPH/20KPH
 START SIGNAL OR IDLE SW_____HIGH
 NOTE: START/IDLE SW INDICATES CHANGE ONLY

Figure 14-14 Switch 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 screen like Figure 14-15 displays.

START ENGINE THEN PRESS Y TO CONTINUE.
 NOTE: OK TO DRIVE CAR.

Figure 14-15 REAL TIME MONITOR selected

2. After you start the engine, press Y.

The request is processed, then a screen like Figure 14-16 displays.

REAL TIME FAULT MONITOR:
 AIRFLOW CKT___NORMAL FUEL PUMP___NORMAL
 CRANK ANGLE SENSOR SIGNAL_____NORMAL
 IGNITION COIL PRIMARY SIGNAL_____NORMAL

Figure 14-16 Real Time Monitor test

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 screen similar to Figure 14-17 displays.

RUN ENGINE AT 2000 RPM FOR 2 MINUTES,
THEN SNAP THROTTLE 3 TIMES AND
RETURN TO IDLE FOR 1 MINUTE. [3:00]
PRESS Y WHEN IDLE STABILIZES.

Figure 14-17 BASE IDLE TEST selected

2. Start the engine and warm it to normal operating temperature.
3. Press **Y**.
The scan tool momentarily processes this request.
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. Press **Y** to continue the test.

A screen like Figure 14-18 displays.

AUXILIARY AIR CONTROL (AAC)
VALVE SHOULD NOW BE CLOSED.
SET BASE IDLE NOW.
PRESS N WHEN DONE.

Figure 14-18 Base Idle 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.

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 (see “Identifying a Vehicle” on page 7), 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 14-19 and Table 14-4 on page 162).

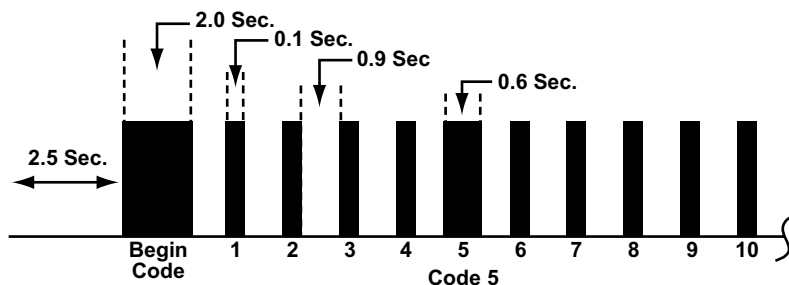


Figure 14-19 Nissan Code Type 07c

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, and 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 14-19). If no codes are present, the lamp flashes evenly 10 times after a long start flash.

14.3 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.

14.3.1 Manual Code Reading

Nissan and Infiniti vehicles transmit Type 07b SRS codes (Figure 14-20 and Table 14-5).

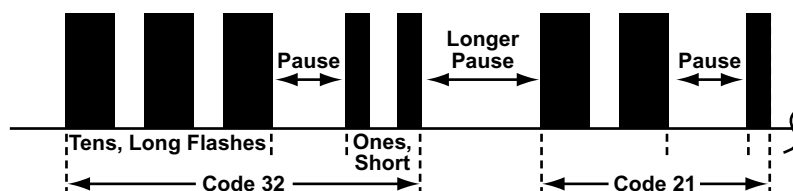


Figure 14-20 Nissan Code Type 07b

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 (Figure 14-21) lights for 7 seconds, turn ignition switch off within 1 second.

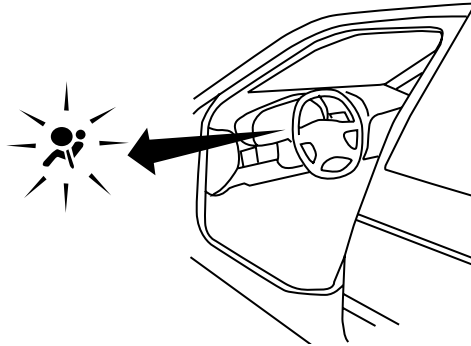


Figure 14-21 AIRBAG warning lamp

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.

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 165
- “Connecting the Scan Tool to the Vehicle”
- “Reading Engine Codes” on page 174
- “D-Check and Read Memory Connector Locations”
- “Automatic Code Reading” on page 198
- “Code Type 08” on page 203

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 166 (Table 15-1, Figure 15-1)
- “1983–84 Turbo common connector locations” on page 166 (Table 15-2, Figure 15-2)
- “Justy common connector locations” on page 167 (Table 15-3, Figure 15-3)
- “Loyale common connector locations” on page 167 (Table 15-4, Figure 15-4)
- “1990–94 Legacy and 1993–95 Impreza 1.8L common connector locations” on page 168 (Table 15-5, Figure 15-5)
- “SVX common connector locations” on page 169 (Table 15-6, Figure 15-6)
- “XT and XT6 common connector locations” on page 169 (Table 15-7, Figure 15-7)
- “1995 Legacy, 1995 Impreza 2.2L and 1996-05 Subaru common connector locations” on page 170 (Table 15-8, Figure 15-8)

See also “D-Check and Read Memory Connector Locations” on page 191

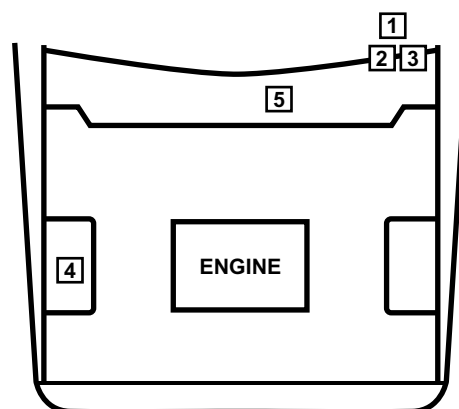


Figure 15-1 Carbureted engine common connector locations

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)

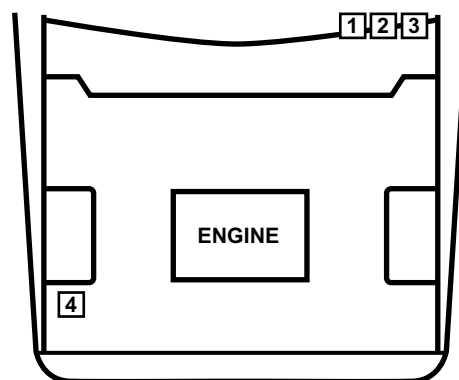


Figure 15-2 1983–84 Turbo common connector locations

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)

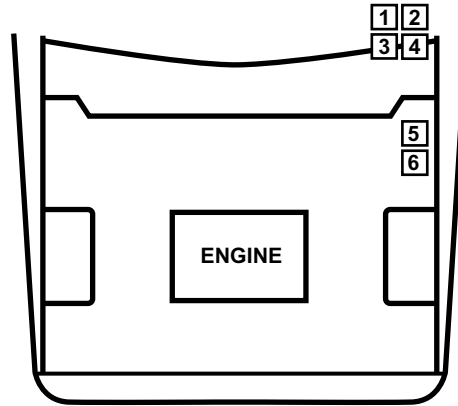


Figure 15-3 Justy common connector locations

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)

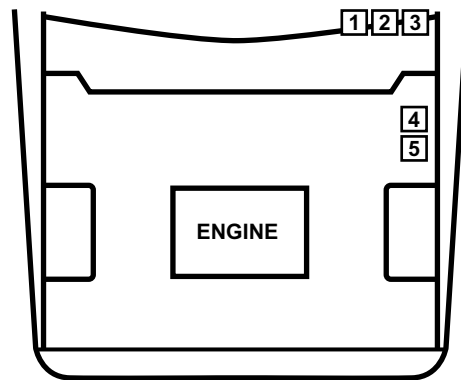


Figure 15-4 Loyale common connector locations

Table 15-4 Loyale connector locations*

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)
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).	

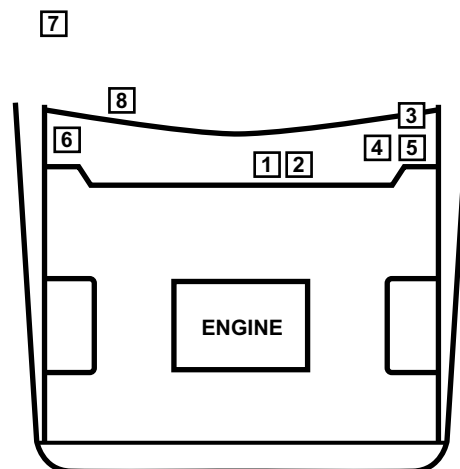


Figure 15-5 1990–94 Legacy and 1993–95 Impreza 1.8L common connector locations

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)

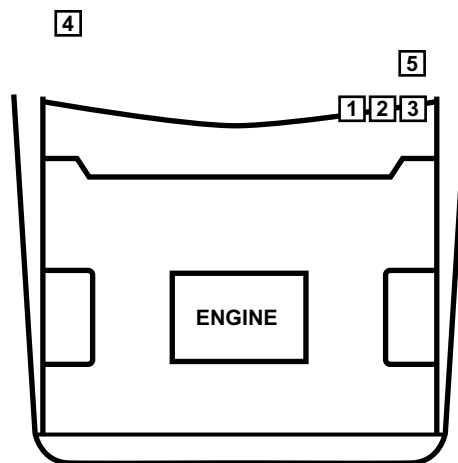


Figure 15-6 SVX common connector locations

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)

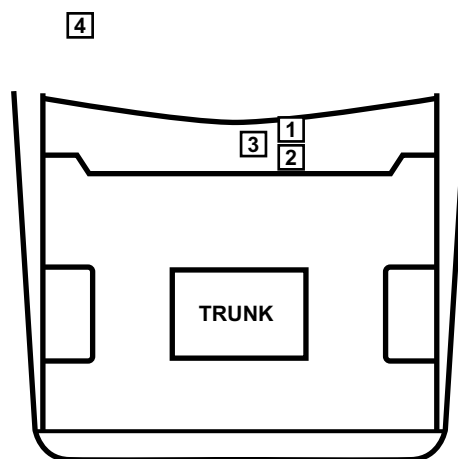


Figure 15-7 XT and XT6 common connector locations

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

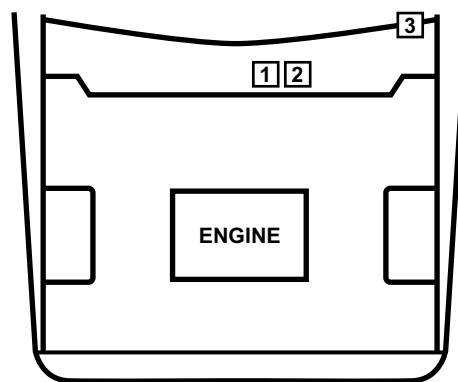


Figure 15-8 1995 Legacy, 1995 Impreza 2.2L and 1996-05 Subaru common connector locations

Table 15-8 1995 Legacy, Impreza 2.2L and 1996 to 2005 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	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)
Legacy		16-pin OBD-II connector for engine and transmission	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 171 (Figure 15-9)
- “Connections Using the MULTI-2 Adapter” on page 172 (Figure 15-13)
- “Connections Using the Power Pac” on page 172
- “Connections Using the OBD-II Adapter” on page 173 (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).

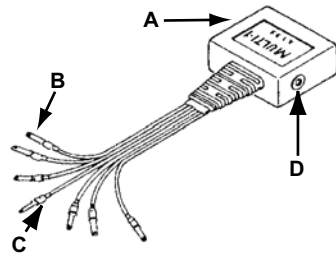


Figure 15-9 MT2500-90 MULTI-1 adapter

- A—MULTI-1 adapter (MT2500-90)
- B—Ground - black wire (connect the MT2500-41 ground adapter here) (Figure 15-10)
- C—MULTI-1 blue wire (see Table 15-9 for connection to vehicle connector)
- D—12 volt power jack (connect the MT2500-100/200 power cable here) (Figure 15-11, Figure 15-12)

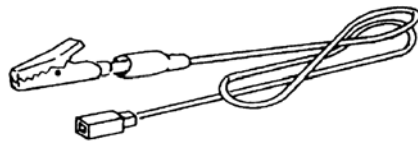


Figure 15-10 MT2500-41 ground adapter

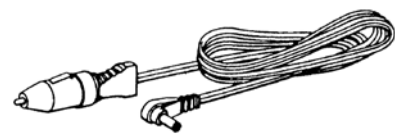


Figure 15-11 MT2500-100 lighter power cable

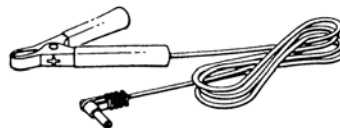


Figure 15-12 MT2500-200 battery power cable

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.

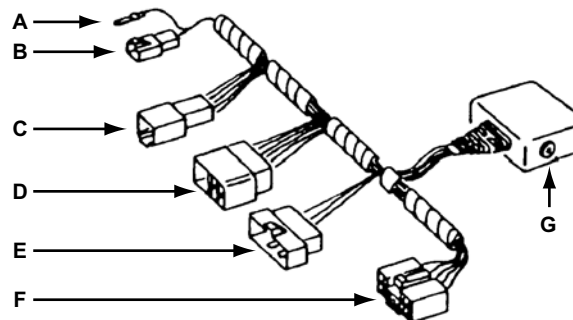


Figure 15-13 MT2500-42 MULTI-2 Asian adapter

- A—Ground - black wire (connect the MT2500-41 ground adapter here) (Figure 15-10)**
- B—Mazda & Ford (MULTI-2E)**
- C—Isuzu & Geo with GM system (MULTI-2D)**
- D—Subaru (MULTI-2C)**
- E—Mazda & Ford (MULTI-2B)**
- F—Special applications (MULTI-2A)**
- G—12 volt power jack (connect the MT2500-100/200 power cable here) (Figure 15-11, Figure 15-12)**

Connections Using the Power Pac

On Subaru vehicle systems that only have flash codes, the optional MT2500-600 Power Pac can be used instead of the power cables. The Power Pac installs in the data cable connector.



NOTE:

On OBD-II systems, the Power Pac is not necessary because the scan tool receives power through the diagnostic connector.

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.

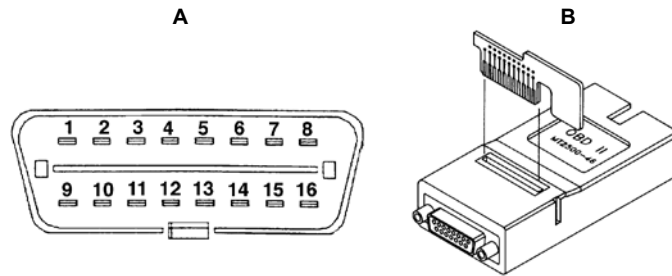


Figure 15-14 OBD-II adapter and Personality Key™

A—16-pin DLC

B—OBD-II adapter and 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 174 (Table 15-9)
- “Subaru Vehicle Connection Diagrams” on page 183 (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

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

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

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
		1.8L H4-T	MFI	X				Figure 15-30	Figure 15-42	Figure 15-42	Table 15-4
	Hatchback	All	All	X				Figure 15-26, Figure 15-27	Figure 15-36		Table 15-1
	Justy	All	All	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-3
	Sedan	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 15-30	Figure 15-42	Figure 15-42	Table 15-4
	Wagon	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 15-30	Figure 15-42	Figure 15-42	Table 15-4
	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
		1.8L H4-T	MFI	X				Figure 15-30	Figure 15-42	Figure 15-42	Table 15-4
	Hatchback	All	All	X				Figure 15-26, Figure 15-27	Figure 15-36		Table 15-1
	Justy	All	All	X	X			Figure 15-17, Figure 15-18	Figure 15-42	Figure 15-42	Table 15-3
	Sedan	1.8L H4	SPI	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
		1.8L H4-T	MFI	X				Figure 15-30	Figure 15-42	Figure 15-42	Table 15-4
	Touring Wagon	1.8L H4	SPI	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
		1.8L H4-T	MFI	X				Figure 15-30	Figure 15-42	Figure 15-42	Table 15-4
	Wagon	1.8L H4	SPI	X	X			Figure 15-17, Figure 15-18	Figure 15-40	Figure 15-40	Table 15-4
		1.8L H4-T	MFI	X				Figure 15-30	Figure 15-42	Figure 15-42	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

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

Vehicle Identification Number				Adapter				User's Manual Section and Figure Numbers			
Year	Model	Engine	Fuel System	MULTI-1	MULTI-2C	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

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
1995	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
	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
1996 to 2005	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
	All	All	All				X	Figure 15-31			Table 15-8
	Impreza Coupe	All	All					OBD-II			
	Impreza Sedan	All	All					OBD-II			
	Impreza Wagon	All	All					OBD-II			
	Legacy Outback	All	All					OBD-II			
1996	Legacy Sedan	All	All					OBD-II			
	Legacy Wagon	All	All					OBD-II			
	SVX	All	All					OBD-II			

Table 15-9 Subaru Vehicle Connections Table

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*

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*

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			

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 application for your vehicle.



To read codes on vehicles with a 7-pin Check connector:

- Connect the blue wire of the MULTI-1 adapter to pin 3 of the Check connector (Figure 15-15). Use the ground extension on the MULTI-1 black wire.

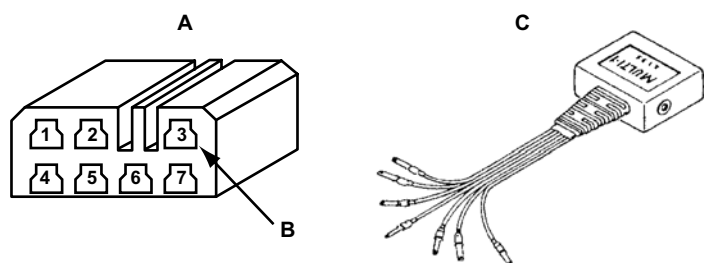


Figure 15-15 7-pin Check connector

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

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

C—MULTI-1 adapter



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

- Connect the blue wire of the MULTI-1 adapter to pin 4 of the Check connector (Figure 15-16).

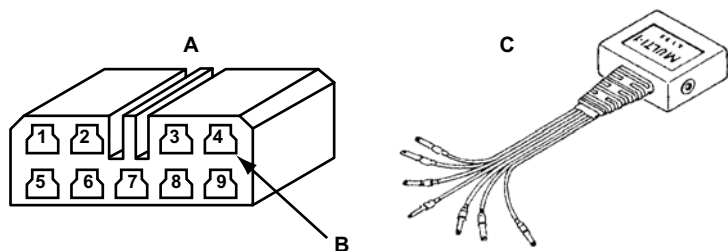


Figure 15-16 Yellow 9-pin Check connector

A—9-pin Check connector (color: yellow)

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

C—MULTI-1 adapter



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).

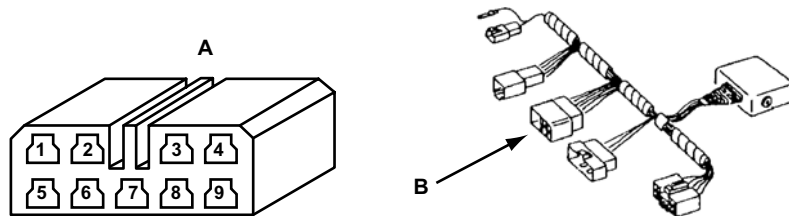


Figure 15-17 9-pin Check connector and MULTI-2C

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

B—MULTI-2 adapter

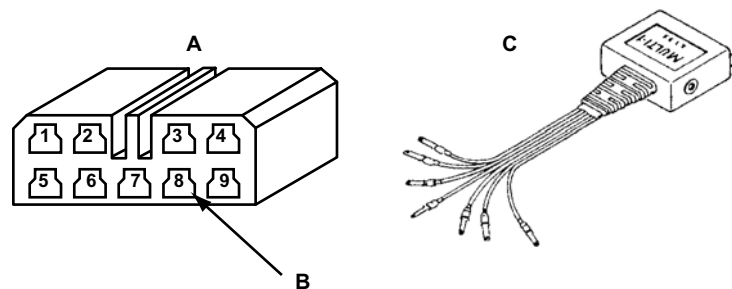


Figure 15-18 9-pin Check connector and MULTI-1

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

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

C—MULTI-1 adapter



To read codes on vehicles with an 11-pin Check connector:

- Connect the blue wire of the MULTI-1 adapter to pin 13 of the Check connector (Figure 15-19).

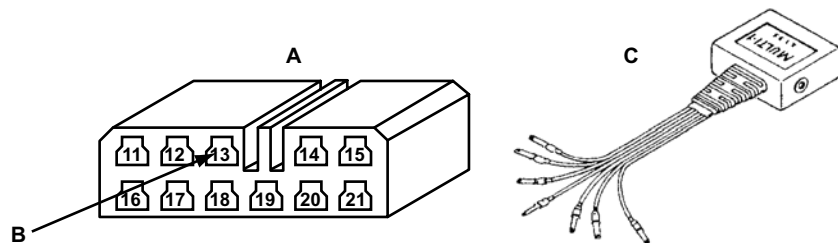


Figure 15-19 11-pin Check connector

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

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

C—MULTI-1 adapter



To read codes on vehicles with an 11-pin Check connector:

- Connect the blue wire of the MULTI-1 adapter to pin 15 of the Check connector (Figure 15-20).

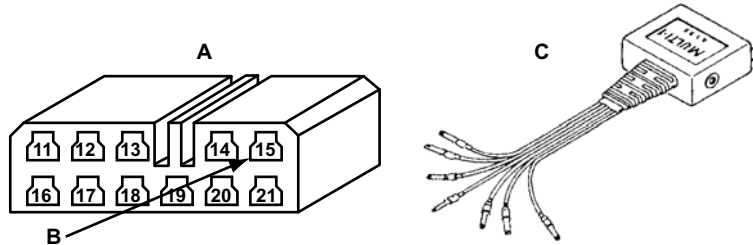


Figure 15-20 11-pin Check Connector

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

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

C—MULTI-1 adapter



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

- Connect the blue wire of the MULTI-1 adapter to pin 10 of the Check connector (Figure 15-21).

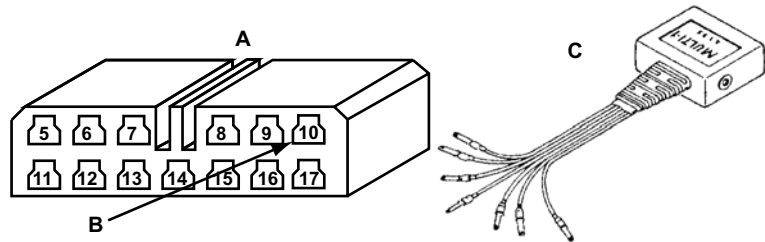


Figure 15-21 13-pin Check connector

A—13-pin Check connector (color: yellow)

B—Pin 10 (connect the MULTI-1 blue wire here)

C—MULTI-1 adapter

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

- Connection depends on the color of your 13-pin Check connector. Determine if your Check connector is natural or yellow in color:
 - a. If your Check connector is natural in color, connect the blue wire of the MULTI-1 adapter to pin 11 of the Check connector (Figure 15-22).

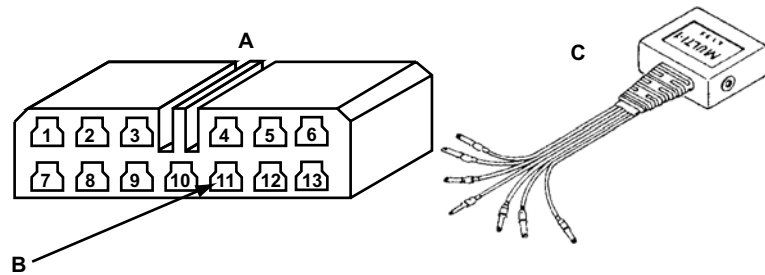


Figure 15-22 13-pin Check connector

A—13-pin Check connector (color: natural)

B—Pin 11 (connect the MULTI-1 blue wire here)

C—MULTI-1 adapter

- b. If your Check connector is yellow in color, connect the blue wire of the MULTI-1 adapter to pin 6 of the Check connector (Figure 15-23).

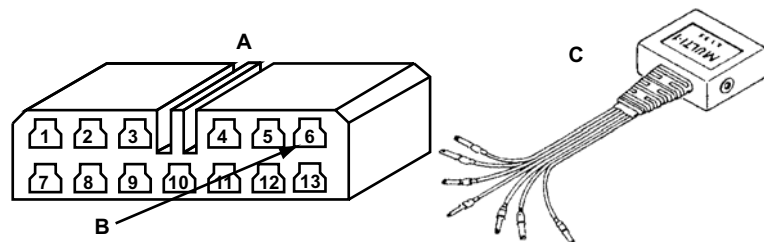


Figure 15-23 13-pin Check connector

A—13-pin Check connector (Color: yellow)

B—Pin 6 (connect the MULTI-1 blue wire here)

C—MULTI-1 adapter



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

- Connection depends on the color and/or location of your 13-pin Check connector. Determine if your Check connector is either under the hood and black, under the dash or inside the trunk:
 - 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).

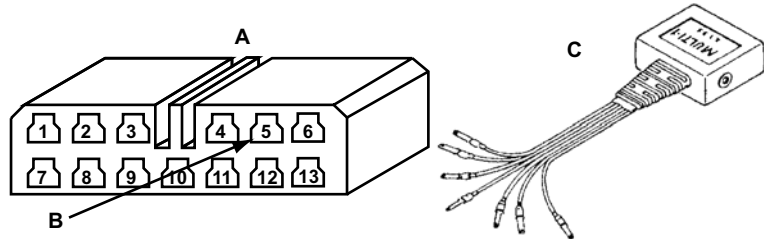


Figure 15-24 13-pin Check connector

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

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

C—MULTI-1 adapter

- b. If your Check connector is located under the dash or inside the trunk, connect the blue wire of the MULTI-1 adapter to pin 6 of the Check connector (Figure 15-25).

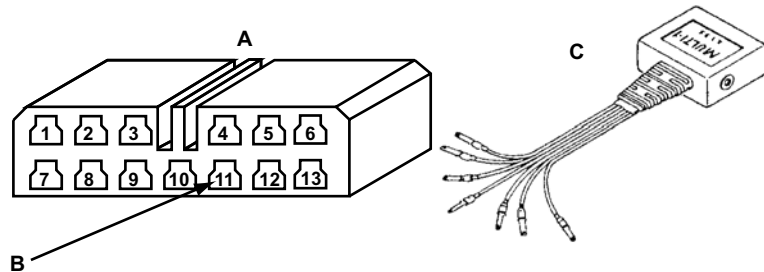


Figure 15-25 13-pin Check connector

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

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

C—MULTI-1 adapter

**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 your Check connector is 13-pin, connect the blue wire of the MULTI-1 adapter to pin 11 of the Check connector (Figure 15-26).

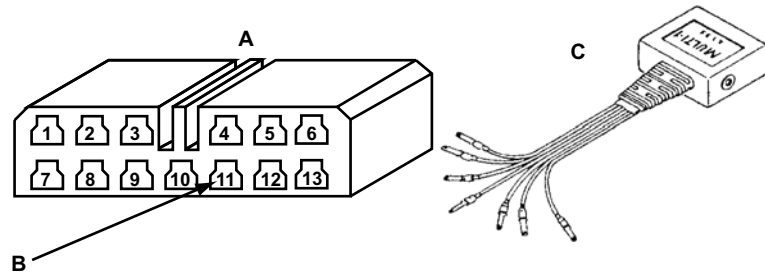


Figure 15-26 13-pin Check connector

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

B—Pin 11 (connect the MULTI-1 blue wire here)

C—MULTI-1 adapter

- b. If your Check connector is 17-pin, connect the blue wire of the MULTI-1 adapter to pin 7 of the Check connector (Figure 15-27).

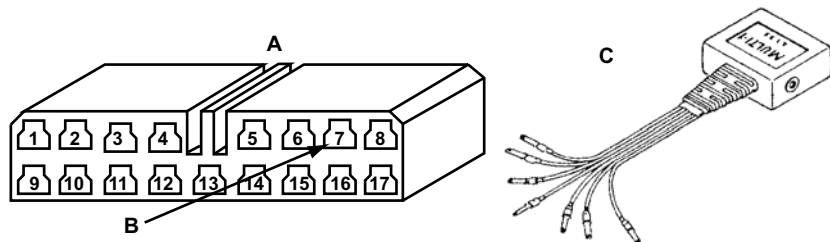


Figure 15-27 17-pin Check connector

A—17-pin Check connector (color: varies)

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

C—MULTI-1 adapter



To read codes on vehicles with a 17-pin Check connector:

- Connect the blue wire of the MULTI-1 adapter to pin 4 of the Check connector (Figure 15-28).

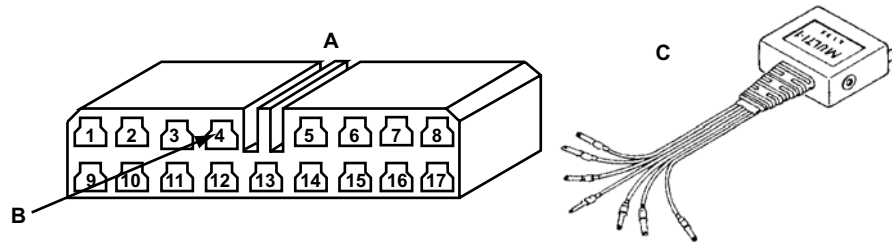


Figure 15-28 17-pin Check connector

A—17-pin Check connector (color: varies)

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

C—MULTI-1 adapter



To read codes on vehicles with a 17-pin Check connector:

- Connect the blue wire of the MULTI-1 adapter to pin 7 of the Check connector (Figure 15-29).

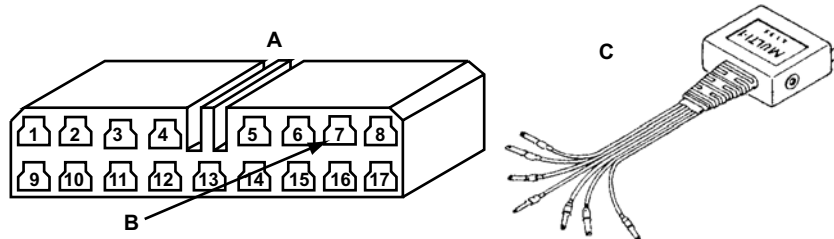


Figure 15-29 17-pin Check connector

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

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

C—MULTI-1 adapter



To read codes on vehicles with a 17-pin Check connector:

- Connect the blue wire of the MULTI-1 adapter to pin 11 of the Check connector (Figure 15-28).

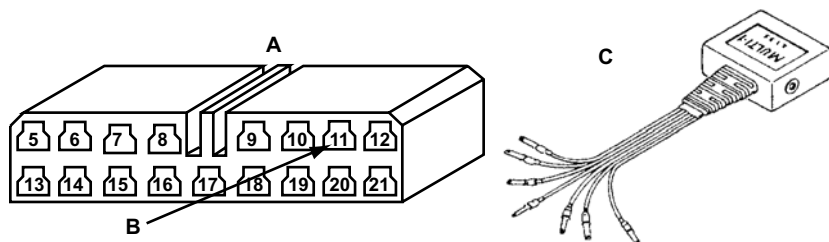


Figure 15-30 17-pin Check connector

A—17-pin Check connector (color: black)

B—Pin 11 (connect the MULTI-1 blue wire here)

C—MULTI-1 adapter



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).

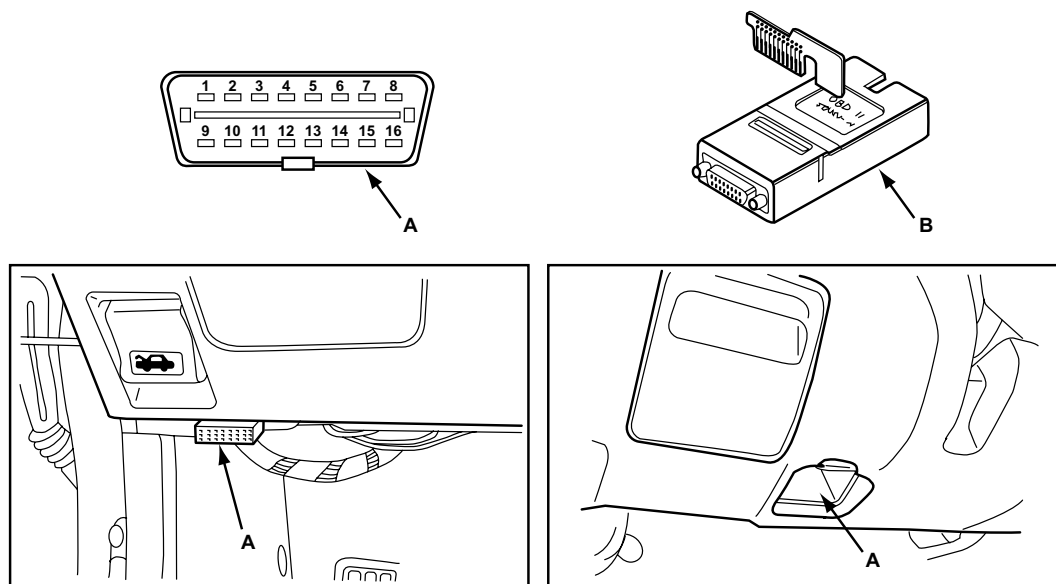


Figure 15-31 16-pin OBD-II connector and OBD-II adapter with Personality Key™ device and common connector locations

A—16-pin DLC

B—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. These connector locations vary by model and may be difficult to locate and identify. Figure 15-32 shows some typical locations where the D-Check connectors and Read Memory connectors may be found on various Subaru models. Refer to the appropriate figure for the vehicle being tested to locate and identify the connectors. Included in this section are the following.

- Common Connector Locations for 1983-1995 Subaru Vehicles
 - “Common locations for D-Check and Read Memory connectors” on page 192 (Figure 15-32)
- Vehicles without ECM memory (D-Check only)
 - “1983 ECC carbureted” on page 193 (Figure 15-33)
 - “1984 ECC carbureted” on page 193 (Figure 15-34)
 - “1983–84 EGI-MGI (Turbo), 1985–87 all except XT” on page 194 (Figure 15-35)
 - “1985–89 ECC overhead cam” on page 194 (Figure 15-36)
 - “1986–87 XT” on page 195 (Figure 15-37)
- Vehicles with ECM memory (D-Check & Read Memory)
 - “1986 SPI connectors” on page 195 (Figure 15-38)
 - “1987 Justy” on page 196 (Figure 15-39)
 - “1987–94 SPI connectors” on page 196 (Figure 15-40)
 - “1987-91 XT models (connector in the trunk)” on page 197 (Figure 15-41)
 - “1988–94 Justy Carbureted, 1990-94 Justy MFI, 1990-94 Legacy, and 1987–94 L-Series” on page 197 (Figure 15-42)
 - “1992-95 SVX models (connectors in left kick panel)” on page 198 (Figure 15-43)

Common Connector Locations for 1983-1995 Subaru Vehicles

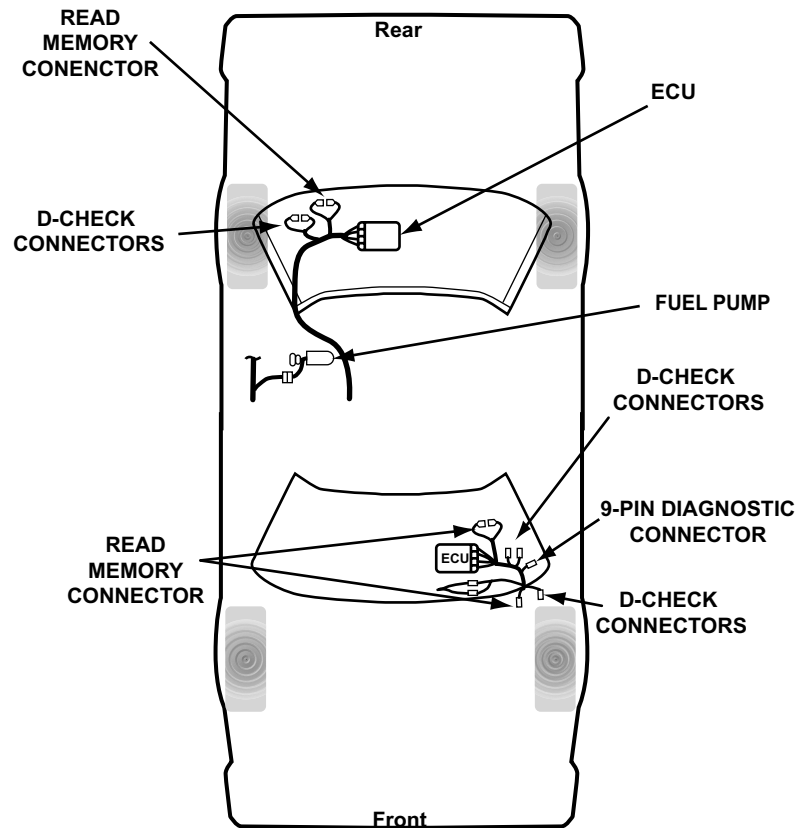


Figure 15-32 Common locations for D-Check and Read Memory connectors

Vehicles without ECM Memory (D-Check Only)

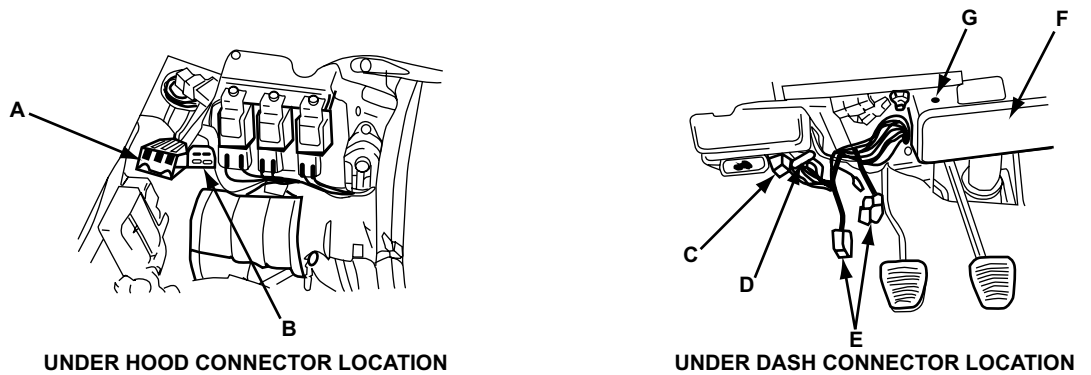


Figure 15-33 1983 ECC carbureted

- A—Check connector 2
- B—Check connector 1
- C—Check connector 4
- D—Check connector 3
- E—D-Check connectors
- F—ECU
- G—ECU LED

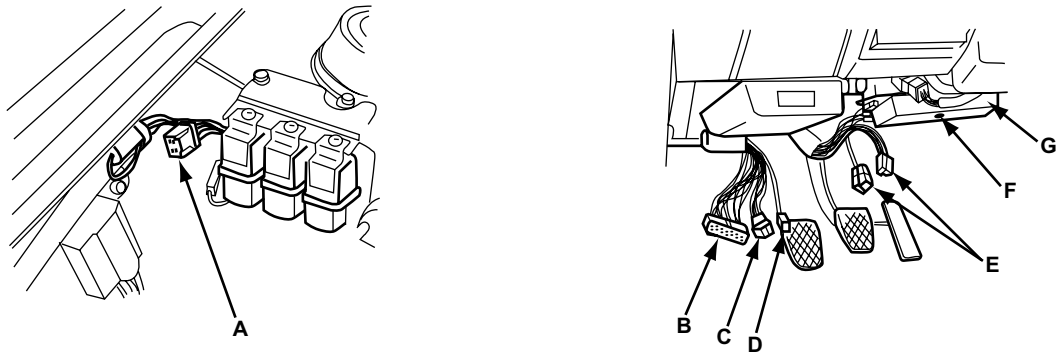


Figure 15-34 1984 ECC carbureted

- A—Check connector 1
- B—Check connector 2
- C—Check connector 3
- D—Check connector 4
- E—D-Check connectors
- F—ECU LED
- G—ECU

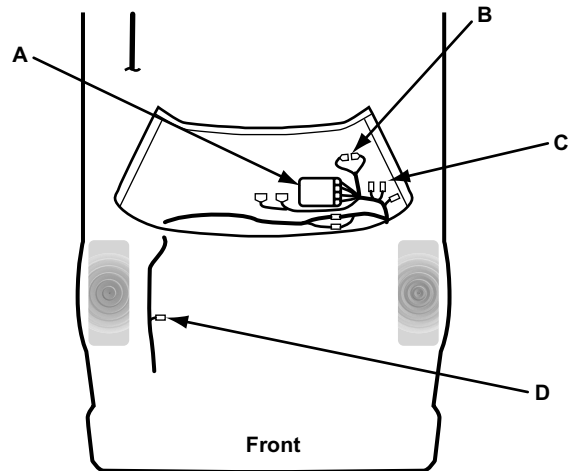
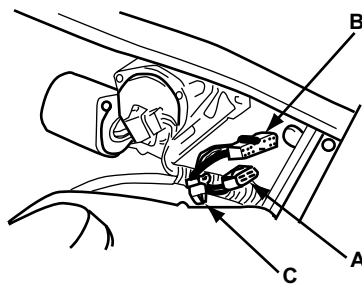
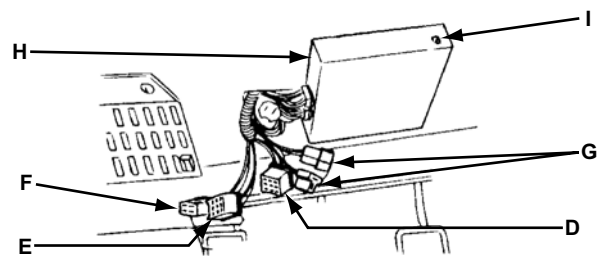


Figure 15-35 1983-84 EGI-MGI (Turbo), 1985-87 all except XT

- A—ECM
- B—D-Check connectors
- C—Check connectors 1, 2, and 3
- D—Check connector 4



UNDER HOOD CONNECTOR LOCATION



UNDER DASH CONNECTOR LOCATION

Figure 15-36 1985-89 ECC overhead cam

- A—Check connector 1
- B—Check connector 2
- C—Check connector 3
- D—Check connector 4
- E—Check connector 5
- F—Check connector 6
- G—D-Check connectors
- H—ECU
- I— ECU LED

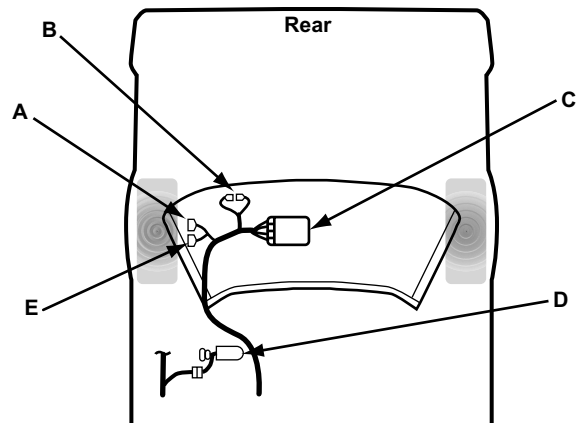


Figure 15-37 1986-87 XT

- A—Check connector 1
- B—D-Check connectors
- C—ECM
- D—Fuel pump
- E—Check connector 2

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

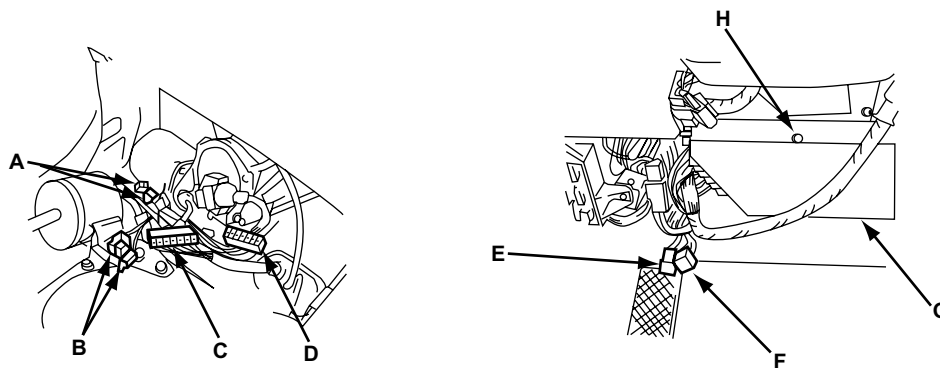


Figure 15-38 1986 SPI connectors

- A—Read Memory connectors
- B—D-Check connectors
- C—Check connector 3
- D—Check connector 4
- E—Check connector 1
- F—Check connector 2
- G—ECU
- H—ECU LED

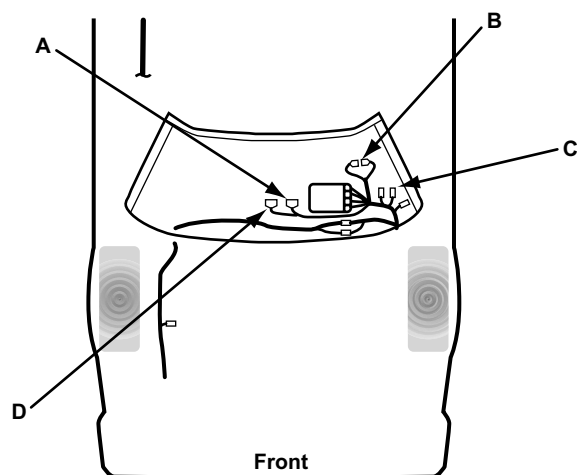


Figure 15-39 1987 Justy

- A—Fuel pump relay
- B—Read Memory connectors
- C—D-Check connectors
- D—Ignition relay

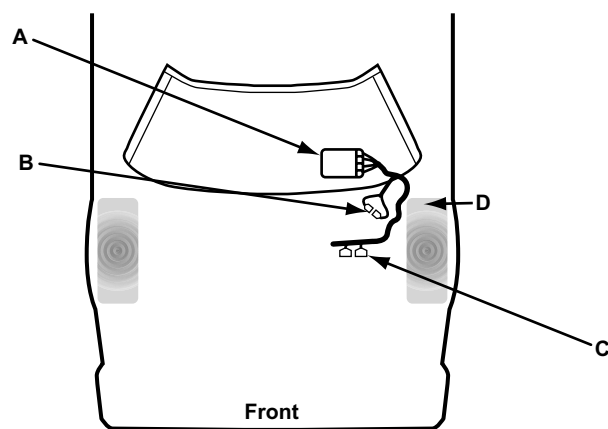


Figure 15-40 1987–94 SPI connectors

- A—ECM & Check connector (under dash)
- B—Read Memory connectors (under hood)
- C—D-Check connectors (under hood)
- D—Check connectors (under dash and under hood)

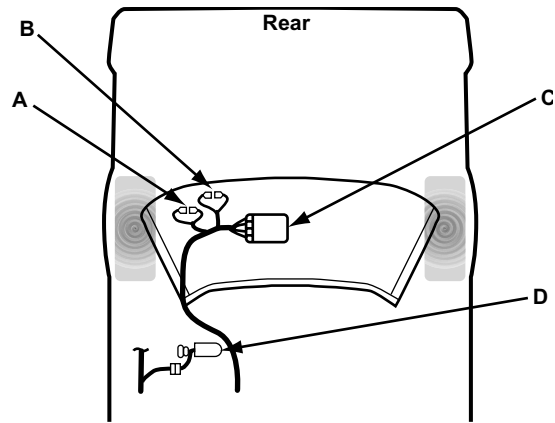


Figure 15-41 1987-91 XT models (connector in the trunk)

- A—Read Memory connectors
- B—D-Check connectors
- C—ECM
- D—Fuel pump

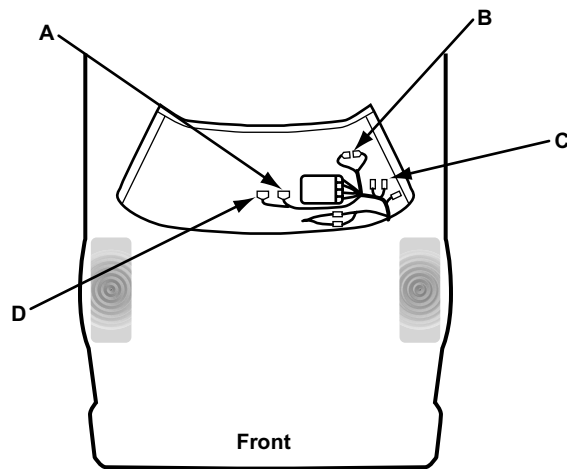


Figure 15-42 1988–94 Justy Carbureted, 1990-94 Justy MFI, 1990-94 Legacy, and 1987–94 L-Series

- A—Fuel pump relay
- B—Read Memory connectors
- C—D-Check connectors
- D—Ignition relay

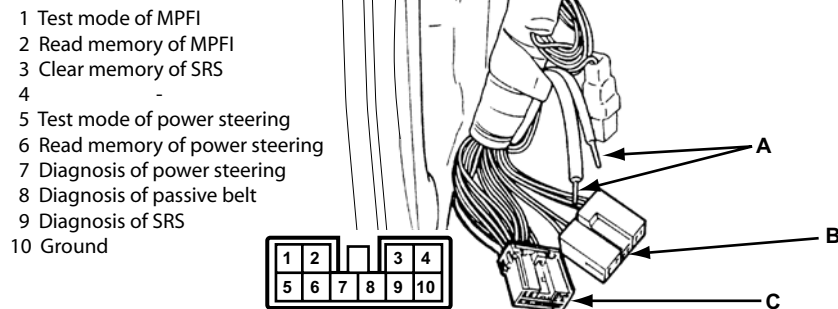


Figure 15-43 1992-95 SVX models (connectors in left kick panel)

A—Diagnosis terminals

B—Select monitor connector (Yellow)

C—Diagnosis connector (Black)

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 209.

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 191). 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 191) 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 191) 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 191) 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 191) 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 205.)
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 205.)
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 191) 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.

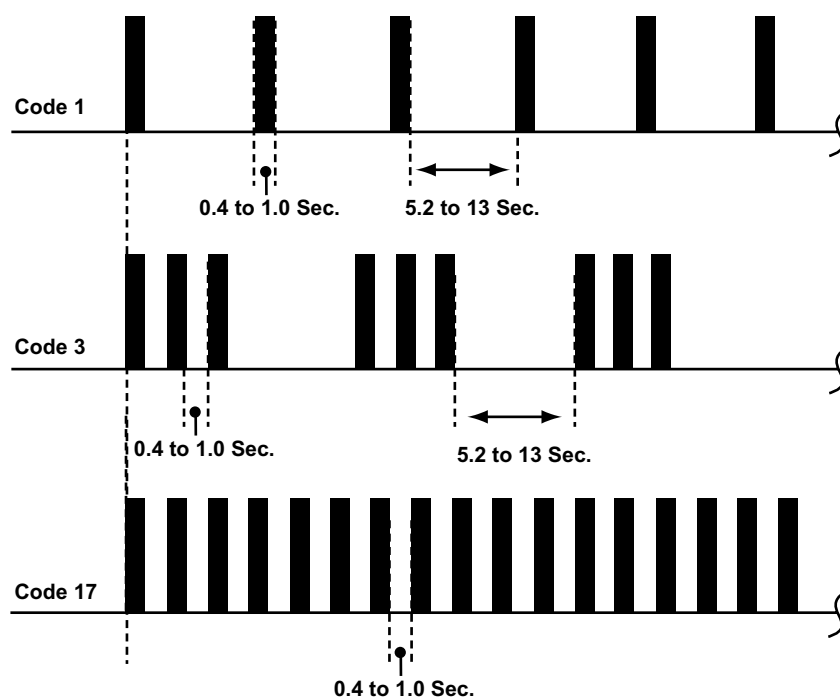


Figure 15-44 Subaru Code Type 08 (Straight Count)

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.

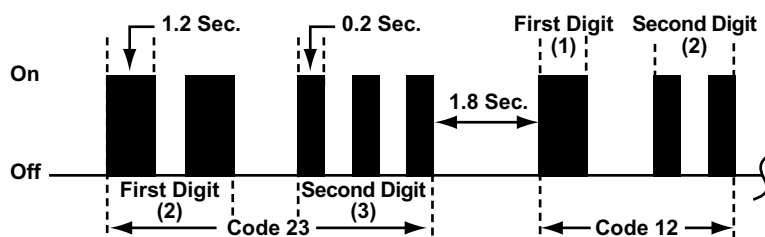


Figure 15-45 Subaru Code Type 08a

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 206) 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 indicates Code 5 because the fifth flash is long. If no codes are present the flashes are all short (0.1-second). The code is followed by a 2.5-second pause and a 2-second flash, then the pattern repeats.

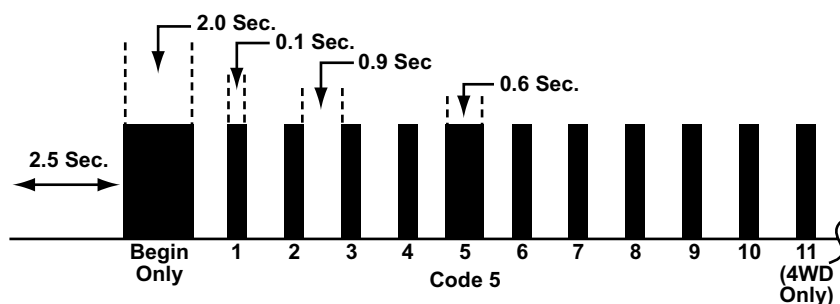


Figure 15-46 Subaru Code Type 08b

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.

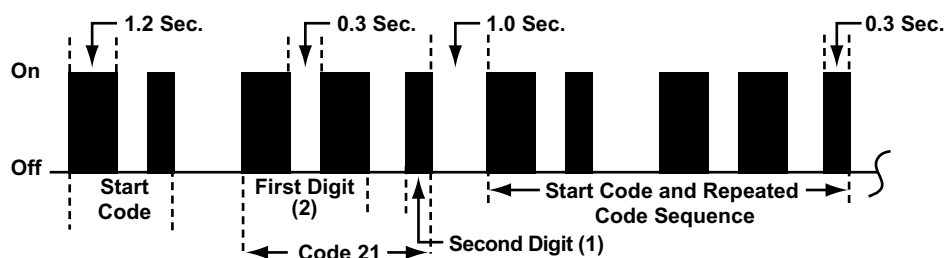


Figure 15-47 Subaru Code Type 08c

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.

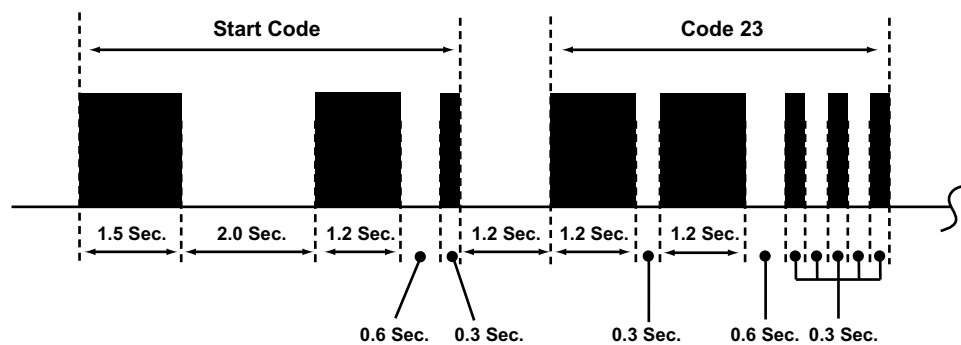


Figure 15-48 Subaru Code Type 08d

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 209
- “1987–92 4EAT Transmission (Version 1)” on page 209
- “1990–96 4EAT Transmission (Version 2)” on page 210
- “1990-96 4EAT Transmission (Version 2) History Codes” on page 211
- “1989-94 Justy ECVT Transmission” on page 211
- “1996-05 Subaru Models with an OBD-II 16-pin Connector” on page 212

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 15).

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 203:

- “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 1996-2005 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 205). 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 this procedure to check the 4EAT transmission for history codes in 1990–95 Legacy, 1992–96 SVX, and 1993–95 Impreza. A vehicle that flashes the POWER lamp 2 times 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 approximately 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 205).

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 no codes are present, the ECVT (2WD) or CLUTCH TEMP (4WD) lamp flashes evenly 2-times per second. If codes are present, the lamp flashes Code Type 8a (long/short) (Figure 15-45 on page 205).

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 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 from PARK-to-REVERSE-to-NEUTRAL-to-DRIVE-to-Ds, and then back 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, 2 times per second.
12. If codes are present, the lamp flashes Code Type 8a (long/short) ("Subaru Code Type 08a" on page 205, Figure 15-45).

15.2.6 1996-05 Subaru Models with an OBD-II 16-pin Connector

1996-2005 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 165 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 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 15).

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” section on page 203.

Subaru ABS systems use the following code types:

- “Code Type 08 (Straight Count)” on page 204 for ABS systems without memory
- “Code Type 08c” on page 207 for ABS systems with memory
- “Code Type 08d” on page 208 for ABS systems with TCS
- Manufacturer Specific Codes for 2005 Subaru ABS systems

ABS Code Types by Model

- 1990 Legacy Touring Wagon—Code Type 08 (Straight Count) (Figure 15-44 on page 204).
- 1990–92 Legacy Wagon—Code Type 08 (Straight Count) (Figure 15-44 on page 204).
- 1990–92 Sedan 2.2L—Code Type 08 (Straight Count) (Figure 15-44 on page 204).
- 1992–97 SVX—Code Type 08 (Straight Count) (Figure 15-44 on page 204).
- 1993–04 All Others—Code Type 08c (Figure 15-47 on page 207).
- 1995–97 Legacy Sedan with TCS—Code Type 08d (Figure 15-48 on page 208).
- 1995–97 Legacy Outback with TCS—Code Type 08d (Figure 15-48 on page 208).
- 1995–97 Legacy Wagon with TCS—Code Type 08d (Figure 15-48 on page 208).
- 2005 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 on page 215)
- 1992–1997 SVX (Figure 15-49 on page 215)
- 1993–1994 Legacy/Outback, Sedan and Wagon (Figure 15-50 on page 216)
- 1995–1996 Legacy/Outback, Sedan and Wagon w/o TCS (Figure 15-51 on page 218)
- 1995–1996 Legacy/Outback, Sedan and Wagon with TCS (Figure 15-51 on page 218)
- 1993–1996 Impreza Coupe, Sedan and Wagon w/o TCS (Figure 15-51 on page 218)
- 1997 (early) Legacy/Outback, Sedan and Wagon (Figure 15-53 on page 220)
- 1997 (late)–1999 Legacy/Outback, Sedan and Wagon (Figure 15-51 on page 218)
- 1998–2001 Impreza Coupe, Sedan and Wagon (Figure 15-51 on page 218)
- 2001 Forester (Figure 15-51 on page 218)
- 2000–2004 Legacy/Outback, Sedan and Wagon (Figure 15-54 on page 221)
- 2003–2004 Baja (Figure 15-51 on page 218)
- 2005 All Subaru Models ((Figure 15-55 on page 222)

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 204 for reading codes from the flashing LED.



NOTE:

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 instrument panel lamp is on, check the power supply circuit.

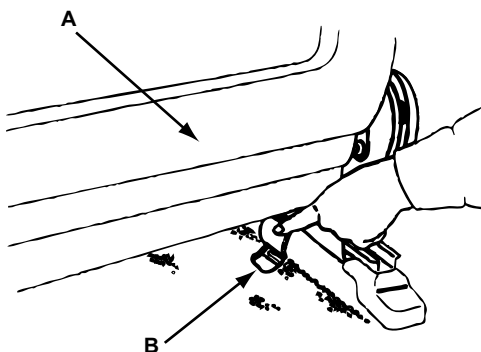


Figure 15-49 1990-92 Legacy and 1992-97 SVX ABS LED location

A—Right front seat

B—LED

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)

**NOTE:**

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 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

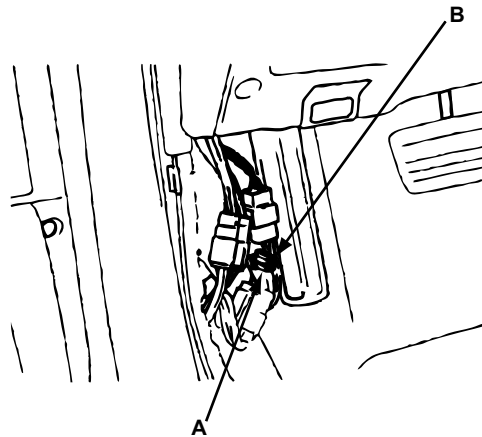


Figure 15-50 1993–94 Legacy ABS Check connector location

A—Terminal K

B—Terminal L

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)



NOTE:

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)

**NOTE:**

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.

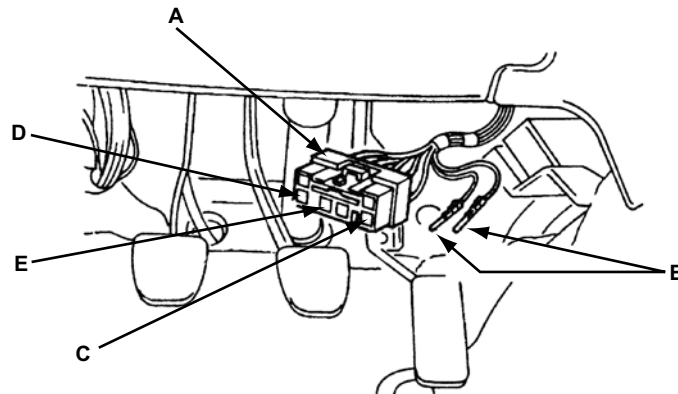


Figure 15-51 1995-99 Legacy, 1998-04 Impreza, 2001-04 Forester and 2003-04 Baja ABS Diagnostic Connector Location

A—Diagnosis connector

B—Diagnosis terminals

C—Pin 6 (L Terminal)

D—Pin 3 (K Terminal)

E—Pin 4 (with TCS)

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).



NOTE:

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.

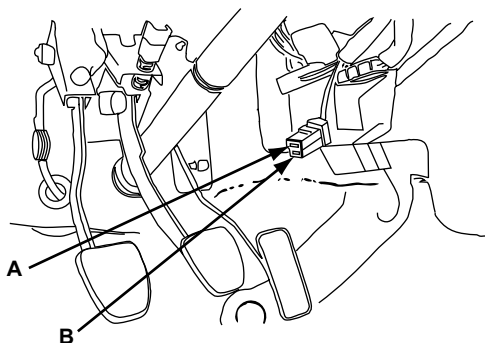


Figure 15-52 1993–96 Impreza ABS Check connector location

A—Terminal L

B—Terminal K

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).



NOTE:

Code 11 displays first, then the stored codes display in order, beginning with the most recent stored codes.

The code display repeats for up to five minutes.



To clear code memory:

1. Disconnect the diagnosis terminal from diagnosis connector terminal 2.
2. Connect the diagnosis terminal to diagnosis connector terminal 2 for at least 0.05 second and then disconnect it.
3. Repeat step 2 an additional two times (3 times total) within twelve seconds.

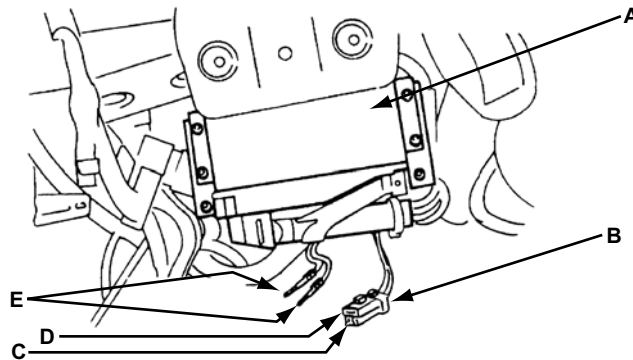


Figure 15-53 1997 Impreza and 1997 (early) Legacy ABS diagnostic connector location

- A—ABS control module
- B—ABS diagnosis connector
- C—Terminal 2
- D—Terminal 1
- E—Diagnosis terminal

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).



NOTE:

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 three 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.

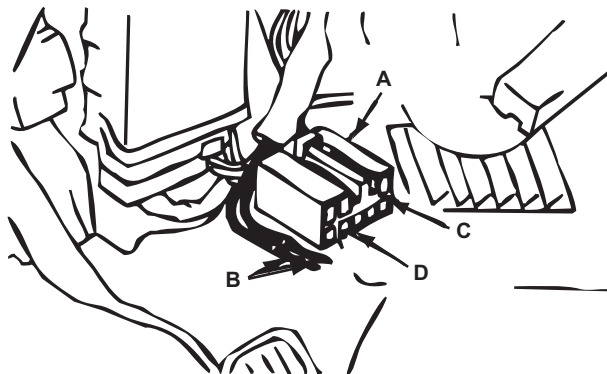


Figure 15-54 2000–04 Legacy ABS diagnosis connector location

- A—Diagnostic connector
- B—Diagnosis terminal
- C—8 terminal
- D—5 terminal

2005 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 & DATA menu and follow any instructions on the scan tool display.

**To clear code memory:**

- Select CLEAR CODES from the CODES & DATA menu and follow any instructions on the scan tool display.

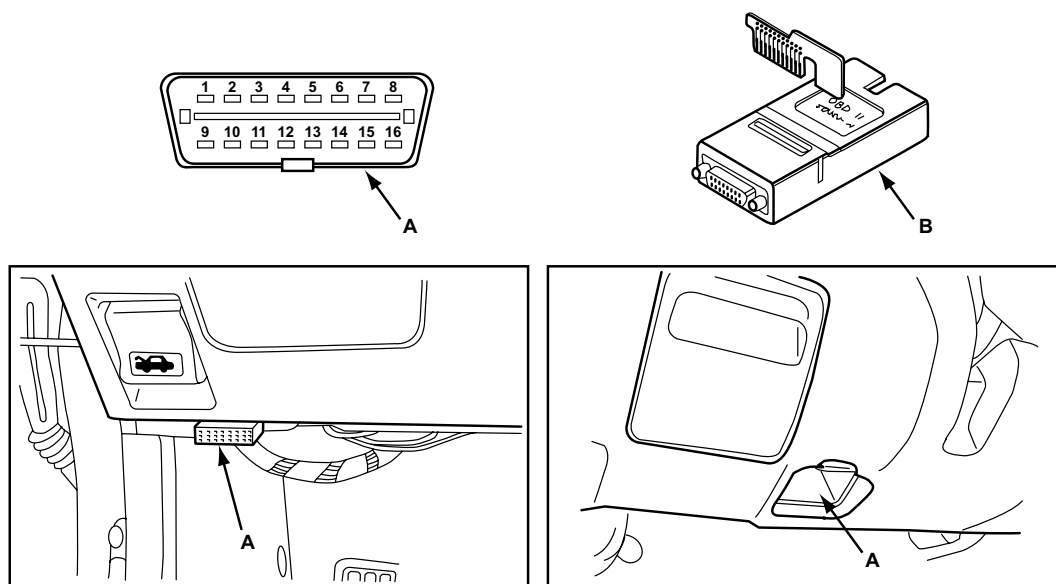


Figure 15-55 16-Pin OBD-II connector and common locations

A—16-pin DLC

B—OBD-II adapter and Personality Key™

15.4 Testing Airbag (SRS - Supplemental Restraint Systems)

The following sections include information for testing Subaru airbag (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, 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, 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 15)

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 203.

Subaru airbag (SRS) systems use the following code types:

- “Code Type 08 (Straight Count)” on page 204
- “Code Type 08c” on page 207 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 on page 224)
- 1995–1999 Legacy/Outback, Sedan and Wagon (Figure 15-57 on page 225)
- 1998–2004 Impreza Coupe, Sedan and Wagon (Figure 15-57 on page 225)
- 1998–2004 Forester and Wagon (Figure 15-57 on page 225)
- 2000–2004 Legacy/Outback Sedan and Wagon (Figure 15-58 on page 226)
- 2003–2005 Baja (Figure 15-58 on page 226)
- 2005 Forester (Figure 15-59 on page 227)
- 2005 Impreza (Figure 15-59 on page 227)
- 2005 Legacy/Outback Sedan and Wagon (Figure 15-60 on page 228)

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 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 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.

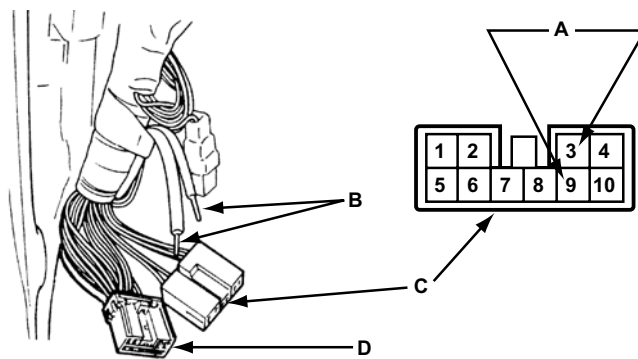


Figure 15-56 SVX airbag

A—Pins 3 and 9

B—Diagnostic terminals

C—Airbag (SRS) Diagnostic connector (Black)

D—Subaru Select Monitor connector (yellow)

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 airbag (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 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 1998–2004 Impreza, 1995–1999 Legacy, and 1998–2004 Forester airbag (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.

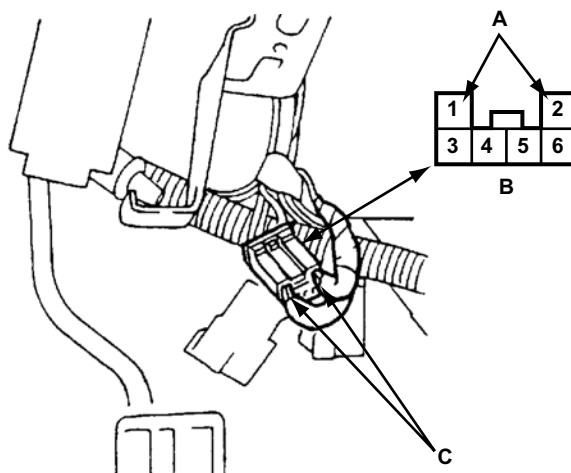


Figure 15-57 1998-2004 Impreza, 1995-1999 Legacy, and 1998-2004 Forester Airbag (SRS) Diagnosis Connector Location

A—Pins 1 and 2

B—Airbag (SRS) Diagnostic connector

C—Diagnostic terminals

2003–2004 Legacy/Outback, Sedan and Wagon 2003–2005 Baja

**To retrieve 2000–2004 Legacy/Outback and 2003–2005 Baja airbag (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 2003–2005 Baja 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 15-56).
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.

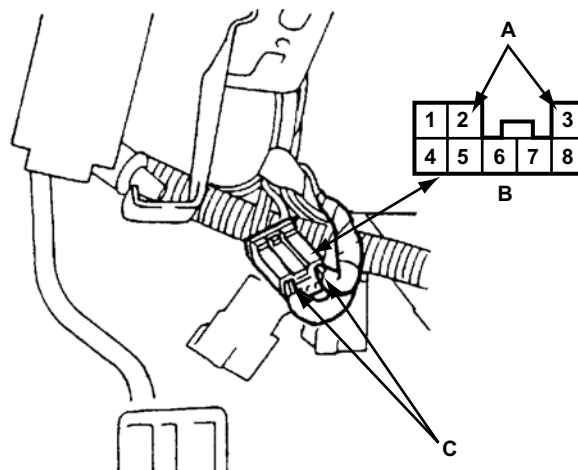


Figure 15-58 2000–04 Legacy and 2003–05 Baja Airbag (SRS) Diagnosis connector

A—Pins 2 and 3

B—Airbag (SRS) Diagnostic connector

C—Diagnostic terminals

2005 Forester 2005 Impreza Sedan and Wagon



To retrieve 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 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.

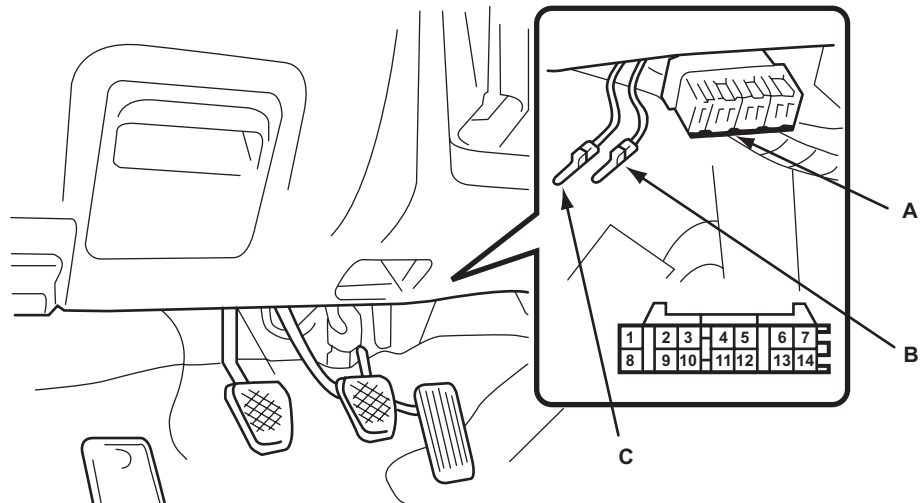


Figure 15-59 2005 Forester and 2005 Impreza SRS Diagnostic connector (gray)

A—Airbag (SRS) Diagnostic Connector

B—Diagnostic terminal B

C—Diagnostic terminal A

2005 Legacy/Outback Sedan and Wagon**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 & DATA menu and follow any instructions on the scan tool display.

**To clear code memory:**

- Select CLEAR CODES from the CODES & DATA menu and follow any instructions on the scan tool display.

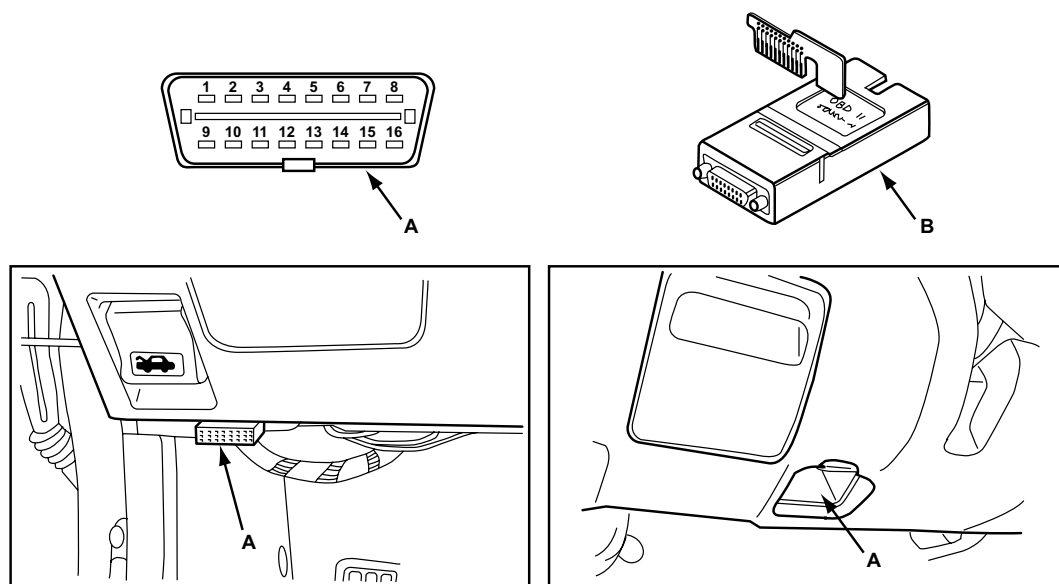


Figure 15-60 16-Pin OBD-II connector and common locations

A—16-pin DLC

B—OBD-II adapter and Personality Key™

This chapter contains information for testing Toyota, Lexus and Scion vehicles with the Asian Import Vehicle Communication Software (VCS). 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 Toyota & Lexus Vehicles

Available engine types vary depending on the model and year. In most cases, you can find the engine type by locating the Vehicle Emission Control Information (VECI) sticker, or “emissions decal,” inside the engine compartment. If a VECI sticker is not available, engine type is sometimes noted on the vehicle nameplate (Figure 16-1), which may be:

- In the engine compartment on the bulkhead
- In either fender well area
- On a door or a door post

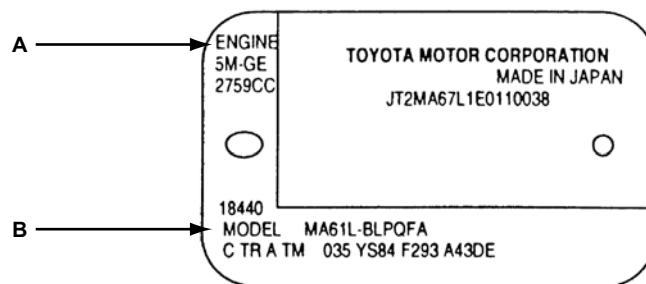


Figure 16-1 Toyota vehicle nameplate

A—Engine type

B—Model number

16.2 Testing Engine Systems

Toyota, Lexus, and Scion engine testing includes:

- “Code Reading Connectors and Locations” on page 230
- “Code Sensitivity—OBD-II and some Pre-OBD-II” on page 231

- “Data (No Codes)” on page 231
- “Manual Code Reading” on page 232
- “Actuator Tests” on page 232

16.2.1 Code Reading Connectors and Locations

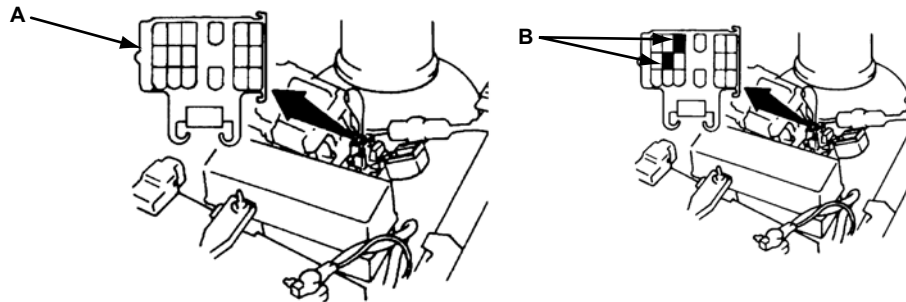


Figure 16-2 Toyota/Lexus diagnostic connector requiring TOY-1 adapter

A—Use TOY-1 adapter

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

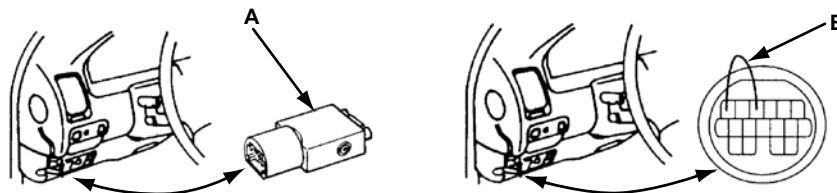


Figure 16-3 Toyota/Lexus diagnostic connector requiring TOY-2 adapter

A—Use TOY-2 adapter

B—Optional: Jump E1 to TE1 to flash codes

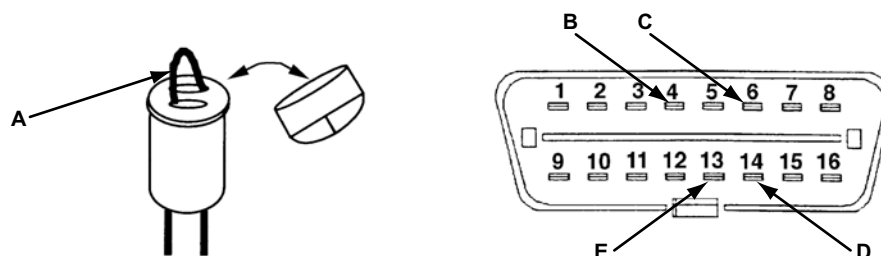


Figure 16-4 Toyota/Lexus diagnostic connectors—other

A—Jump T to E1 to flash codes

B—CG (Chassis Ground)

C—A/B

D—TS

E—TC

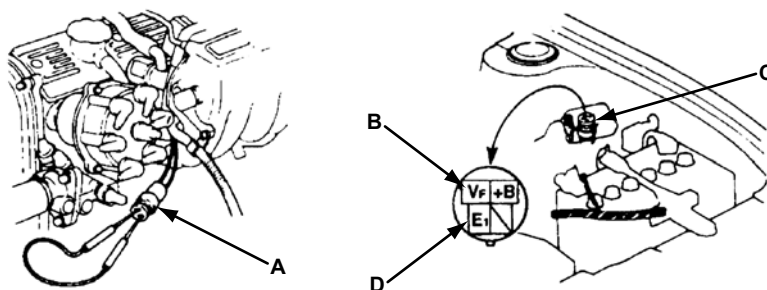


Figure 16-5 1983-84 Supra and Cressida connectors—use MULTI-1 adapter

A—Check connector, short to activate code.

B—Blue

C—Service connector

D—Black

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.



To place some Toyota and Lexus ECMs in a code-sensitive test mode:

1. With the scan tool connected to the vehicle, turn the key on with the engine off.
2. Select **DATA (NO CODES)** from the MAIN MENU.
3. Press **N**.
4. Select **AUTO CODE READ**.

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 & DATA mode except that codes must be read separately using the CODE FUNCTIONS selection.

With DATA (NO CODES) selected, the scan tool does not affect PCM operation and the vehicle can be driven (Figure 16-6).

```

RPM 1234 INJ(mS)___2.7 IDLE SW__OFF
** DATA (NO CODES. OK TO DRIVE **
NO CODES AVAILABLE IN THIS MODE
LEFT O2_____LEAN RIGHT O2_____LEAN
  
```

Figure 16-6 Data (No Codes)

16.2.4 Manual Code Reading

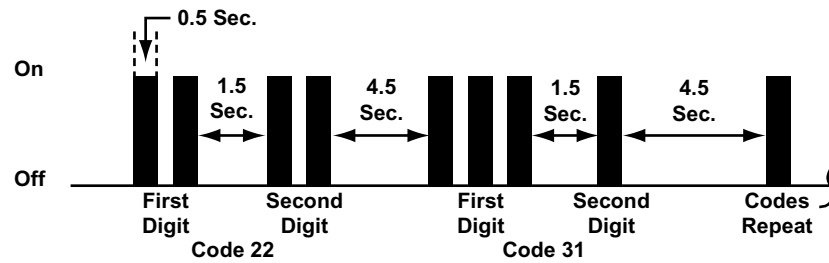


Figure 16-7 Code Type 09

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.

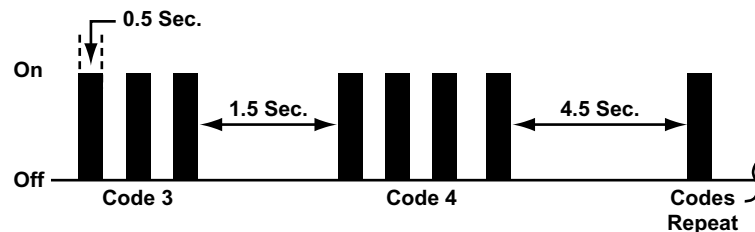


Figure 16-8 Code Type 10

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 screen similar to Figure 16-9 displays.

BEFORE RUNNING TEST, ENSURE THAT
KEY IS ON AND ENGINE IS RUNNING

PRESS Y TO ACTIVATE TEST

Figure 16-9 EGR SYSTEM selected

2. Press Y.
A screen similar to Figure 16-10 displays.

EGR SYS ___ ON EGR TEMP (°F) ___ 97
ST TRIM B1 (%) ___ 12 ST TRIM B2 (%) ___ 0
SCROLL UP/DOWN TO TURN ON/OFF
PRESS N TO ABORT THE TEST

Figure 16-10 EGR 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, press N.
The display indicates that the test is completed (Figure 16-11).

EGR SYSTEM
TEST HAS BEEN COMPLETED
PRESS Y TO REPEAT TEST
PRESS N FOR ACTUATOR TEST MENU

Figure 16-11 EGR Test complete

**To conduct a fuel pump test:**

1. Select **ACTUATOR TESTS > FUEL PUMP** from the MAIN MENU.
A screen similar to Figure 16-12 displays.

**BEFORE RUNNING TEST, ENSURE THAT
KEY IS ON AND ENGINE IS RUNNING**

PRESS Y TO ACTIVATE TEST

Figure 16-12 FUEL PUMP selected

2. Press Y.
A screen similar to Figure 16-13 displays.

**ACTIVATING FUEL PUMP
FOR 30 SECONDS**

IN PROGRESS

PRESS N TO ABORT TEST.

Figure 16-13 Fuel Pump Test

“IN PROGRESS” flashes and an operational pump vibrates and makes noise for 30 seconds, after which a screen similar to Figure 16-14 displays.

**FUEL PUMP
TEST HAS BEEN COMPLETED**

PRESS Y TO REPEAT TEST

PRESS N FOR ACTUATOR TEST MENU

Figure 16-14 Fuel Pump Test complete

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 16-15 on page 235.

16.4 Testing ABS Systems

Toyota, Lexus and Scion ABS provides code information.

16.4.1 Code Reading Connectors

ABS diagnostic connectors and adapters are shown in Figure 16-16 on page 235.

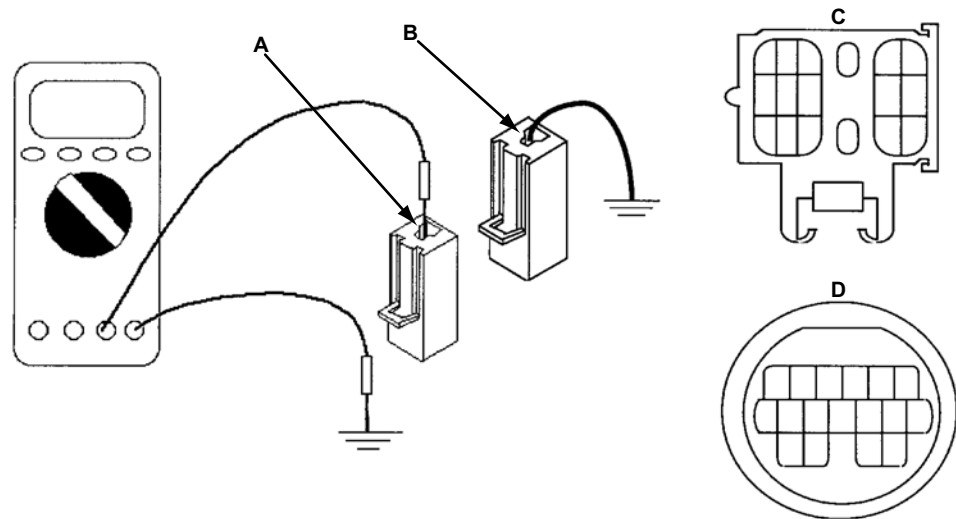


Figure 16-15 Transmission connectors

- A—Positive meter lead to pin DG
- B—Jump to ground (ignition and OD switches on)
- C—Use TOY-1 adapter
- D—Use TOY-2 adapter

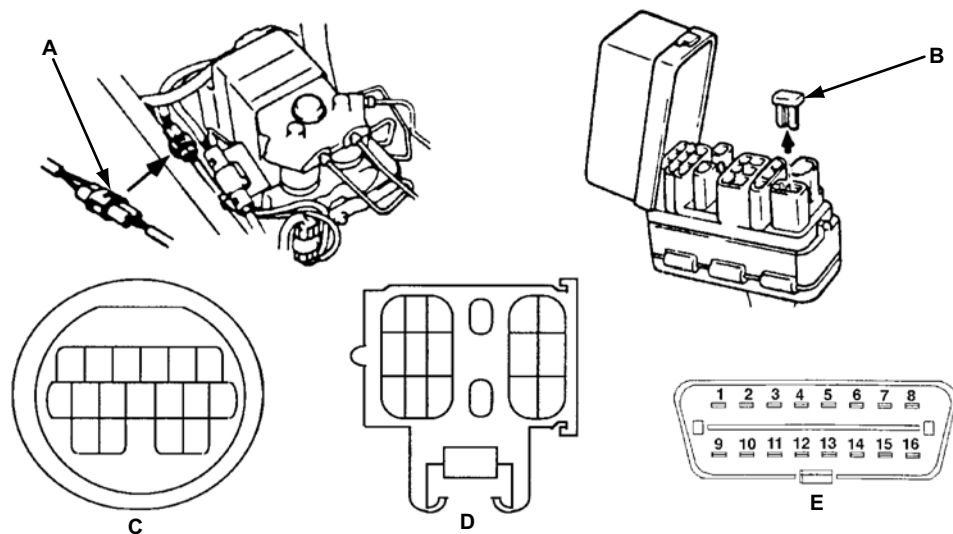


Figure 16-16 Antilock brake system connectors

- A—Disconnect service wire (some models)
- B—Disconnect Wa to Wb jumper (some models)
- C—Use TOY-2 adapter
- D—Use TOY-1 adapter

E—Use OBD-II adapter**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 16-17).

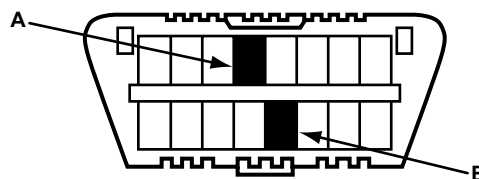


Figure 16-17 DLC3

A—Terminal # 4 - CG

B—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 16-17).
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 16-18).
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 16-19). Ensure that terminal Tc remains grounded.

Several seconds after the clearing procedure is complete (Step 3), the SRS warning lamp blinks in a 50 ms/second cycle to indicate codes have been cleared (Figure 16-19)

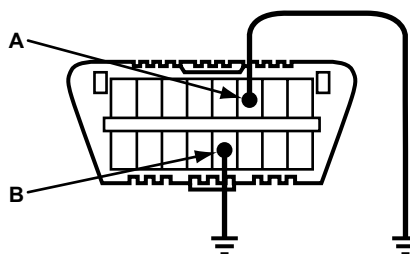


Figure 16-18 Ground DCL3 terminals

A—Terminal # 6 - A/B

B—Terminal #13 - Tc

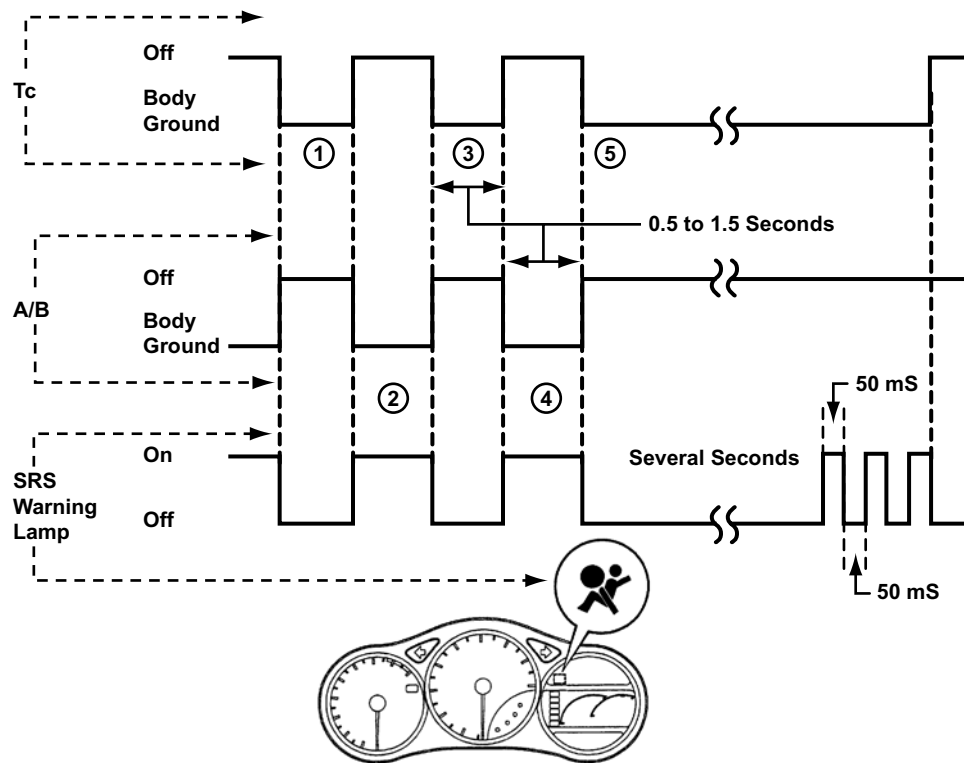


Figure 16-19 SRS (airbag) code clearing

**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 16-17 on page 236).
Codes should now display.
3. Some vehicles may require this method:
 - a. Within 10 seconds after codes begin to display, remove the jumper.
 - b. Wait up to 3 seconds for the ABS warning lamp to light up.
 - c. Reconnect the jumper between terminals #4 and #13 of the DLC3 within 2 to 4 seconds after ABS warning lamp lights.
 - d. Disconnect the jumper after the ABS warning lamp is on for 2 to 4 seconds.
4. Switch the Ignition off while jumper wire is still in place.

This chapter explains how to test 1994–later OBD-II vehicles. Most vehicles are equipped with two testing modes: Generic OBD-II and Enhanced OBD-II. The EPA requires all 1996–later vehicles sold in the USA to meet OBD-II standards.

Some 1994–95 vehicles may appear to be OBD-II equipped, they may not be fully compliant. Check the VECI label to determine if a 1994–95 vehicle is an OBD-I or OBD-II model.

The following information and procedures are specific testing in Generic OBD-II mode. For general scan tool testing information, see the user's manual for your diagnostic tool.

17.1 OBD-II and What it Means

The term OBD stands for On Board Diagnostics. OBD-II is a system that the Society of Automotive Engineers (SAE) developed in order to standardize automotive electronic diagnosis so technicians could use the same scan tool to test any make and model without special adapters.

The SAE established guidelines that provide the following:

- A universal diagnostic test connector, known as the data link connector (DLC), with dedicated pin assignments.
- A standardized location for the DLC, visible under the dash on the driver's side.
- A standardized list of diagnostic trouble codes (DTCs).
- The ability of the vehicle system to record a snapshot of operating conditions when an emissions-related fault occurs.
- Expanded diagnostic capabilities that record a code whenever a condition occurs that affects vehicle emissions.
- The ability to clear stored codes from vehicle memory with the scan tool.
- A glossary of standard terms, acronyms, and definitions used for system components.

In addition, SAE has published hundreds of pages defining a standard communications protocol that establishes the hardware, software, and circuit parameters of OBD-II systems. Unfortunately, the vehicle manufacturers have different interpretations of this protocol. As a result, the generic OBD-II communications scheme used varies, depending on the vehicle.

SAE publishes recommendations, not laws, but the Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) made many SAE recommendations legal requirements, which were phased in over a three-year period. Beginning in 1994, vehicles with a new engine management computer were supposed to comply with OBD-II standards. For 1995, OBD-II systems were to appear on about 40% of the new vehicles sold. The government granted waivers for some 1994–95 OBD-II systems to give manufacturers time to fine-tune their systems. Beginning with the 1996 model year, all new vehicles sold in the USA must be fully OBD-II compliant.

17.2 Selecting The Generic Test Mode

The OBDII GENERIC selection is available from the Manufacturer Selection menu (Figure 17-1).

SCROLL TO SELECT A MANUFACTURER
 >SUBARU (1983-2001)
 TOYOTA (1983-2001)
 OBDII GENERIC (1994-2001) ←

Figure 17-1 Sample Manufacturer Selection menu



To select the Generic Test mode:

- Select **OBDII GENERIC**.

The scan tool displays connection instructions (Figure 17-2).

CONNECT OBD-II ADAPTER WITH K2 TO 16-PIN
 OBD-II DIAGNOSTIC CONNECTOR. NO REPAIR
 TIPS AVAILABLE IN GENERIC MODE.
 PRESS Y TO CONTINUE.

Figure 17-2 Connection instructions

17.3 Connecting To The Vehicle

The 16-pin OBD-II adapter (MT2500-46) is used to connect the scan tool to the DLC (Figure 17-3). The adapter attaches to the end of the data cable with captive screws.



NOTE:

The K-2A 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 17-4).

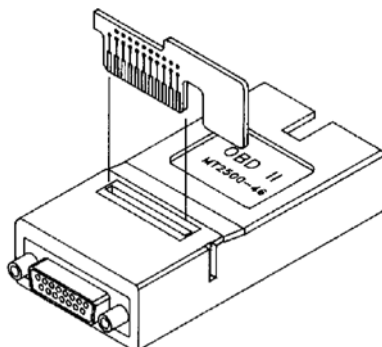


Figure 17-3 16-pin OBD-II test adapter

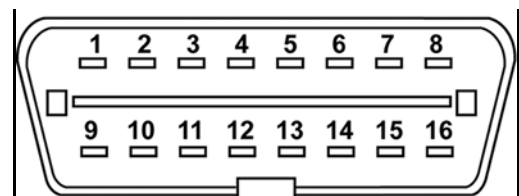


Figure 17-4 DLC configuration

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 17-5). Although out of the normal line of sight, the DLC should be clearly visible to a crouching technician.

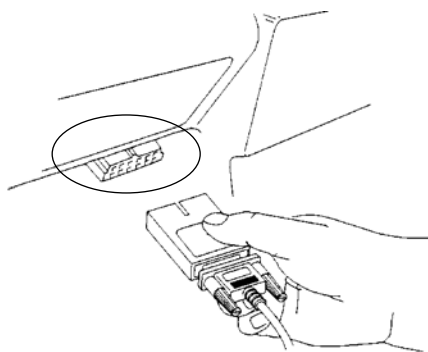


Figure 17-5 OBD-II diagnostic connector location

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 (Figure 17-2 on page 240) and press **Y**. The Main Menu displays (Figure 17-6).

MAIN MENU - - ENGINE [PRESS N FOR HELP]

>CODES AND DATA MENU

CUSTOM SETUP

Figure 17-6 Sample Main Menu

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 (Figure 17-7) displays.



CODES AND DATA MENU	
>CODES ONLY	DATA (NO CODES)
O2 MONITORS	FREEZE FRAME
PENDING CODES	

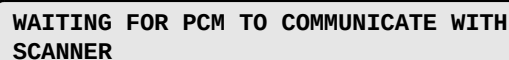
Figure 17-7 Codes and Data Menu

Five menu choices are available:

- **CODES ONLY**—displays diagnostic trouble codes (DTCs).
- **O2 MONITORS**—displays various signal characteristics of O2S response.
- **PENDING CODES**—displays codes that occurred once, but must occur again before a DTC is set.
- **DATA (NO CODES)**—displays various sensor, switch, and actuator inputs and outputs.
- **FREEZE FRAME**—displays certain data parameter 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 the message in Figure 17-8.



WAITING FOR PCM TO COMMUNICATE WITH
SCANNER

Figure 17-8 Waiting to communicate message

If communication is not established within 5 seconds, the scan tool displays the message in Figure 17-9 on page 243.

NO COMMUNICATION. IS KEY ON? IS DLC
CONNECTED? WAIT 15 SECONDS.
PRESS N TO REENTER VEHICLE
IDENTIFICATION OR SEE REFERENCE MANUAL.

Figure 17-9 No communication message

This message stays on the screen until communication is established, or until **N** is pressed. 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 (Figure 17-9).

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 until **N** is pressed.

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

1 st DTC CHARACTER	SYSTEM WHERE A CODE WAS 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

2 nd 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

3 rd 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

Clear trouble codes from PCM memory through the scan tool. The CLEAR CODES selection is available from the Codes Only Exit menu, but not from the Data (No Codes) Exit menu.



To clear the codes:

1. Press **N** from any codes display.

The Exit menu displays.

2. Select **CLEAR CODES**.

The scan tool returns to the CODES ONLY mode, and the display indicates that codes are cleared by stating NO CODES PRESENT.

If the code-clearing operation fails for any reason, the previous codes reappear. If this occurs, press **N** to return to the EXIT menu and repeat the CLEAR CODES operation.

O2 Monitors

This selection lets you view various O2S signal response characteristics.

There are two different monitors: one for pre-converter sensors and one for post-converter sensors. The PCM looks for three main things from the pre-converter oxygen sensor:

- Maximum voltage
- Minimum voltage
- Switching rate

The PCM looks for the sensor signal to rise above 600 millivolts, fall below 300 millivolts, and switch in less than 100 milliseconds to monitor the pre-converter O2S. The PCM performs a

fuel control routine and examines the pre-converter sensor readings during known air/fuel mixtures. The PCM looks for specific sensor values, based on the mixture levels it provides.

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

Both sensors are also monitored continuously for open and short circuits.

Select O2 MONITORS and a screen similar to Figure 17-10 displays.

SCROLL TO SELECT A TEST:
>RICH TO LEAN SENSOR THRESHOLD VOLTAGE
LEAN TO RICH SENSOR THRESHOLD VOLTAGE
LOW SENSOR VOLTAGE FOR SWITCH TIME CALC

Figure 17-10 Sample O2 Monitors screen

There are 9 sensor response signal tests available (Figure 17-11).

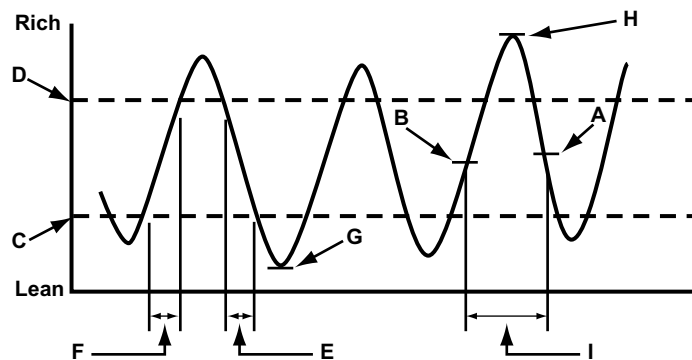


Figure 17-11 O2 sensor monitor tests

- A—Test 1: Rich to lean sensor threshold voltage
- B—Test 2: Lean to rich sensor threshold voltage
- C—Test 3: Low sensor voltage for switch time calculation
- D—Test 4: High sensor voltage for switch time calculation
- E—Test 5: Rich to lean sensor switch time
- F—Test 6: Lean to rich sensor switch time
- G—Test 7: Minimum sensor voltage for test cycle
- H—Test 8: Maximum sensor voltage for test cycle
- I—Test 9: Time between sensor transitions

Pending Codes

Pending codes set when operating conditions are out of the normal range, but not all the criteria to set a DTC occur. For example, a failure must occur on two consecutive trips or drive cycles before certain OBD-II codes set. In this case, a pending code is recorded during the first trip when the failure first occurs.

Data (No Codes)

OBD-II vehicles transmit PCM operating data to the scan tool, but do not DTCs in this mode. The scan tool does not affect PCM operation, and the vehicle can be driven normally for road testing (Figure 17-12). Use the CODES ONLY selection to read DTCs.

OBD II DATA	
** DATA (NO CODES). OK TO DRIVE **	
(NO CODES AVAILABLE IN THIS MODE)	
ENGINE 0	THROTTLE(%) 0.0

Figure 17-12 Sample Data (No Codes) display

Freeze Frame

This selection lets you view certain data parameter readings that the vehicle stores the instant that a code (DTC) is set. Parameters displayed will vary, depending on the code.

The following chapters provide definitions and operating ranges for the Asian Import vehicle 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).

The scan tool displays some data parameters 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 scan tool 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 model, engine, or control system. In these instances, all of the applicable parameter names displayed on the scan tool 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.

18.1 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).

- $MAP = BARO - \text{vacuum}$
- $\text{Vacuum} = BARO - MAP$
- $BARO = MAP + \text{vacuum}$

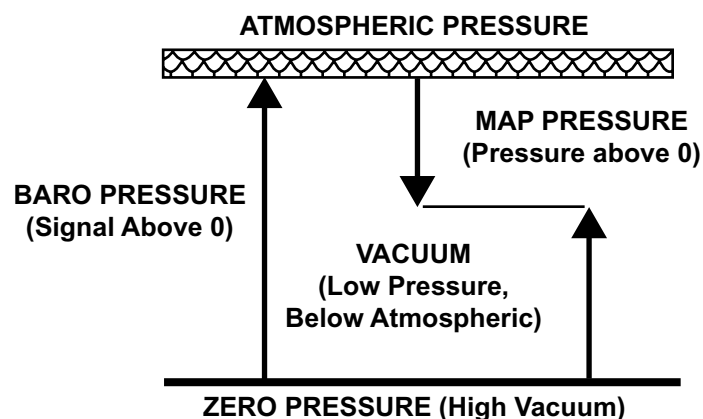


Figure 18-1 Air pressure relationships

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 kilopascals (kPa) or inches of mercury ("Hg). The preset measurements for all three values are in kPa.

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X	
XFER CASE LCKD	438
Z	
ZRDTY	415

18.3 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.

4WD ACTIVE _____ **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)0.0 to 13.50 V

Indicates the switched (ABS IGN) and unswitched (ABS BATT) voltages to the ABS ECM.

ABS LAMPON/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 STATUSON/OFF

Indicates the status of the ABS service repair lamp, reads ON when ABS service is needed.

ABS STOPYES/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_VOLT0.0 to 16.0 V

Indicates the battery positive voltage.

ABSLAMPON/OFF

Indicates the ABS warning lamp

BOOON/OFF

Indicates the brake on and off status.

BRAKE LAMPON/OFF/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 CMDON/OFF

Indicates the commanded ABS control module output signal to the brake lamps.

BRAKE SWON/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.

CCNTABS0 to 255

Indicates ABS continuous codes.

DTC_CNT0 to 255

Indicates the number of trouble codes set.

ENABLE RELAYON/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).

G-SENSOR (V)0.0 to 5.0 V

Indicates the output voltage signal from the centrifugal force (G-force) sensor as the vehicle decelerates.

L-FRONT EMBR-FRONT EMBON/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 SOLR-FRONT SOLON/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.

LF MOTOR AMPSRF MOTOR AMPSREAR MOTOR AMPS0 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 FBKRF MOTOR FBKREAR MOTOR FBK0 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 displayed the MOTOR AMPS parameters.

LF WHEEL (MPH)RF WHEEL (MPH)RR WHEEL (MPH)WHEEL SPD FLWHEEL SPD FR WHEEL SPD RLLR WHEEL (MPH)WHEEL SPD RR0 to vehicle max.

Indicates the speed if 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_WSPD0 to vehicle max.

Indicates the left front wheel speed sensor.

LR_WSPD0 to vehicle max.

Indicates the left rear wheel speed sensor.

PMP_MTRON/OFF

Indicates the hydraulic pump motor.

PMPSTATON/OFF

Indicates the pump motor status.

PUMP (V)0 to 16 V

Indicates the voltage signal being supplied to drive to the ABS pump.

R_WSPD0 to vehicle max.

Indicates the rear wheel speed sensor.

RF_WSPD0 to vehicle max.

Indicates the right front wheel speed sensor.

RR_WSPD0 to vehicle max.

Indicates the right rear wheel speed sensor.

VEH SPEED0 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.

VLV_CTRON/OFF

Indicates the ABS valve control relay.

18.4 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)0 to 22.5 Ω

Indicates the resistance of the airbag mounting ground.

CRSHSN10 to 22.5 Ω

Indicates the resistance of the crash sensor.

D_Airbag(Ohms)0 to 22.5 Ω

Indicates the driver's airbag resistance.

D_AirBAG2(Ohms)0 to 22.5 Ω

Indicates the driver's side airbag resistance.

D_ABAGR(Ohms)0 to 22.5 Ω

Indicates the driver's airbag resistance to ground.

D_PReTNR(Ohms)0 to 22.5 Ω

Indicates the driver's seat belt pretensioner resistance.

DABPAB _____ 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 _____ 0/1

Indicates a count of the number of times the airbags have been deployed.

DR_PTENS(Ohms)0 to 22.5 Ω

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

DRV IMPACT ID _____ 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 BELTPASS BELT _____ BUCKLED/UNBUCKLED

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

DS_AB(Ohms)0 to 22.5 Ω

Indicates the driver's airbag resistance.

DSBELTR(Ohms)0 to 22.5 Ω

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

DTC_CNTnot available

Indicates the number of trouble codes set.

EXTXRSH0.0 to 17.0 V

Indicates the external crash sensor test voltage.

IGN_(V)0.0 to 17.0 V

Indicates the RCM ignition voltage.

LAMP SRS LAMP _____ ON/OFF

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

OCSactual

Indicates the occupant classification system.

OPS_STactual

Indicates the front passage occupant classification system.

P_ABAGR(Ohms)0.0 to 22.5 Ω

Indicates the passenger side airbag module resistance.

P_ABAGR2(Ohms)0.0 to 22.5 Ω

Indicates the passenger side airbag #2 resistance.

P_Airbag(Ohms)0.0 to 22.5 Ω

Indicates the passenger side airbag module resistance.

P_AirBAG2(Ohms)0.0 to 22.5 Ω

Indicates the passenger's side airbag resistance.

P_PReTNR(Ohms)0.0 to 22.5 Ω

Indicates the passenger retractor (pretensioner) circuit resistance.

PABAGR(Ohms)0.0 to 22.5 Ω

Indicates the passenger side airbag module resistance.

PASS IMPACT ID _____ 10 to 99

Indicates a two digit ID number and typically reads 43.

PBSW_C(A)actual

Indicates the passenger buckle switch current measurement.

PS_AB(Ohms)0.0 to 22.5 Ω

Indicates the passenger side impact air bag resistance.

PS_BUKLIN/OUT

Indicates the passenger buckle switch status.

PS_PTENS(Ohms)0.0 to 22.5 Ω

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

PSBELTR(Ohms)0.0 to 22.5 Ω

Indicates the passenger's seat belt pretensioner resistance.

SEAT_TRACTRAK_SWFORWARD/REVERSE

Indicates the seat track position.

TIME ON (HOURS) _____ 0 to 21.25 hours

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

VBATT (V) _____ **0.0 to 25.0 V**

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

18.5 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. 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 & 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 misdiagnosis based on incorrect interpretation of data for the vehicle being tested.

For example: A technician diagnosing an intermittent power-door lock problem is sitting in the driver's seat, watching BCM data while pushing the door lock button. He or she notices an inactive FRONT DOOR LOCK RELAY parameter, yet the REAR DOOR LOCK RELAY parameter toggles as expected. Thinking this indicates a fault, a lot of time and money 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 represents a device which the BCM can command, but 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 toggle the parameters in a different manner.

BACK DIM DUTY CYCLE (%)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 based on the position of the IP dimmer switch (Thumbwheel). 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.

BATT (V)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.

COURTESY LAMP SWON/OFF

Indicates the position of the courtesy lamp switch, reads ON when the switch is turned on and OFF at all other times. The BCM uses this data in controlling the courtesy lamp operation.

DIMMING INPUT (V)0.0 to 5.0 V

Indicates the position of the IP dimmer switch (thumbwheel). 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 turned on and the IP dimmer switch is in the FULL BRIGHT position.

DIMMING LEVEL (%)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 (Thumbwheel). 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.

DRIVER/LR DOOR AJAR SWPASS/RR DOOR AJAR SWON/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.

FLASH TO PASS SWON/OFF

Indicates the position of the flash to pass switch. Reads ON only when the switch is pulled and held to momentarily activate the high beams, reads OFF when the switch is released.

FRONT FOG LAMP SWON/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 WIPERS ACTIVEYES/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.

HEADLAMPON/OFF

Indicates the status of the headlamp switch signal circuit. A closed switch is displayed ON.

HEADLAMP WASHERON/OFF

Indicates the position of the headlamp washer switch. Reads ON when the switch is activated.

HIGH BEAM SELECTON/OFF

Indicates the position of the high beam switch. Reads ON when the switch is in the position that activates the high beams.

HOOD OPEN SWON/OFF

Indicates the status of the hood ajar switch signal circuit. An open switch (door open) is displayed as ON.

IGNITION 0ON/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 1ON/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

IGNITION 3ON/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 ACCESSORYACTIVE/INACTIVE

Indicates the input to the control module from the ignition switch accessory circuit. Reads ACTIVE when ignition accessory switch circuit is closed, reads INACTIVE at all other times.

Ignition Accessory switch closed positions are:

- ACC
- ON (Run)

INADVERTENT POWER RELAYON/OFF

Indicates the state of the inadvertent power battery rundown protection feature of the BCM. OFF is displayed when all inadvertent power circuits are functioning normally.

INDICATOR DIMMING0 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 (Thumbwheel). 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 DEFEATON/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.

KEY IN IGNITIONYES/NO

Indicates whether the ignition key is inserted into the ignition switch. Reads YES with key in ignition switch.

LEFT FRONT SOLAR SNSR (V)LIGHT SENSOR (V)R FRONT SOLAR SENSOR (V)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.

LOW BEAM DUTY CYCLE (%)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%).

PARK BRAKE SWITCHRELEASE/SET

Indicates the position of the park brake pedal. Reads SET when the switch is closed (park brake is engaged). The BCM uses this data in controlling the park brake indicator, the reminder chime feature and the DRL system.

PARK LAMP SWITCHON/OFF

Indicates the park lamp switch signal circuit status. A closed switch is displayed as ON.

REAR FOG LAMP SWON/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, reads OFF at all other times.

STEERING WHEEL CONTROL(V)0.0 to 5.0 V

Indicates if voltage is supplied to the steering wheel controls.

STEERING WHEEL SW PWR0.0 to 5.0 V

Indicates the voltage of the steering wheel controls power supply.

18.6 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.

1ST GEAR2ND GEAR3RD GEAR4TH GEARactual

Indicates the gear commanded by the module.

2ND SELECTEDYES/NO

Indicates the gear selected.

40 CYCLESCMPLT/INCMPI

Indicates whether a DTC has remained active for 40 drive cycles.

4WD ENGAGEDON/OFF

Indicates the 4WD switch status.

4WD LOW SWON/OFF

Indicates the position of the four-wheel drive low switch. Reads ON when the switch is on.

5V REF (V)0.0 to 5.12 V

Indicates the reference voltage on which system sensors operate. The nominal reference value is 5.0 V, but it may vary slightly, depending on system calibration and charging system voltage.

A/C CLUTCHON/OFF

Indicates the status of the A/C compressor clutch, it reads ON when the clutch is engaged.

A/C CLUTCH RELAYA/C RELAYON/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 SWLO/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 CUTA/C CUT SIGA/C SIGON/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 ENABLEDON/OFF

Indicates the status of the air conditioning switch.

A/C HI-SIDE (psi)A/C PRESS (psi)A/C PRESS (kPa)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 VSVON/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)0.0 to 16.0 V

Indicates the air conditioning load signal voltage.

A/C MAG CLUTCHON/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 MONA/C MONITORCOMPL/INCOMP

Indicates the status of the air conditioning system monitor. Reads COMPL (completed) if the monitor successfully ran, INCOMP (incomplete) if not.

A/C PRESS(V)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 RELAYON/OFF

Indicates the status of the air conditioning relay.

A/C REQUESTA/C REQUEST SWYES/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 303 for information on the feedback signal from the A/C compressor clutch.

A/C SWON/OFF

Indicates the status of the air conditioning switch.

A/C SWITCHON/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 SWITCH0.0 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)0.0 to 5.0 V

Indicates the air conditioner evaporator temperature sensor output voltage.

A/C TEMP S (°)variable

Indicates the ECM calculated air conditioner evaporator temperature.

A/F LEARNEDYES/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 352 and "BLM" on page 316 for more information.

A/F LEFT (V)A/F RIGHT (V)TARGET A/F (V)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 $\pm 3\%$	Normal
3.75 V	Go richer 4–10%	Normal
5.00 V	Go richer 10–20%	Lean

A/F RATIOA/F RATIO(:1)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 SSR TEST B1COMPL/INCOMPL

Indicates the check mode test results for the bank 1 air fuel ratio sensor.

A/F SSR TEST B2COMPL/INCOMPL

Indicates the check mode test results for the bank 2 air fuel ratio sensor.

A/T D SWITCHA/T D SWTON/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 SWITCHON/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 SWITCHON/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 SWITCHON/OFF

Indicates the status of the A/T R position switch. Reads ON only when the shift selector lever is in the R position.

AAT-40 to 389°F or -40 to 199°C

Indicates the ambient air temperature.

ABSOL PRES (V)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(%)0 to 100%

Indicates the absolute throttle position.

ABV VAC(%)0 to 100%

Indicates the air bypass valve solenoid (vacuum) control status.

ABV VENT(%)0 to 100%

Indicates the air bypass valve solenoid (vent) control signal status.

AC HI PRESS OPNHI/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_SIGON/OFF

Indicates the air conditioning request signal status.

AC (CMPL)CAT (CMPL)CAT MONITORCOMP MONEGR (CMPL)EVAP (A/FS) (CMPL)
EVAP MONITORFUEL SYS (CMPL)HEATER CAT (CMPL)MISFIRE (CMPL)O2S (A/FS)
MONITORO2S (A/FS) HTR (CMPL)O2S (A/FS) (CMPL)SEC AIR MONITORSEC AIR
(CMPL)COMPL/INCMPL
CAT MONITORCOMPONENT MONITOREVAP MONITORFUEL SYS MONITORMISFIRE
MONITORO2S(A/FS) MONITORSEC AIR MONITORAVAILABLE/NOT AVAILABLE
AC (ENA)CAT (ENA)COMP MONEGR (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)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.

ACC RELAYOFF/ON

Indicates the status of the accessory relay, PID displays ON when the ACC relay is on.

ACCEL ENRICHPOWER ENRICHYES/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 LRN VAL #1ACCEL LRN VAL #20 to 124.512

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

ACCPA(%)0 to 100%

Indicates the status of tolerator pedal position A.

ACCPB(%)0 to 100%

Indicates the status of tolerator pedal position B.

ACCSON/OFF

Indicates the status of the air conditioning compressor cycling switch.

ACM BATTERY VOLTAGE0.0 to 14.5 V

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

ACMRLYON/OFF

Indicates the state of the AC main relay.

ACPOPEN/CLOSED

Indicates the air conditioning pressure switch.

ACSWON/OFF

Indicates the air conditioning switch.

ACT VLV TMNG(°)not available

Indicates the actual valve timing.

ACT VSV (ON/OFF)ON/OFF

Indicates the A/C cut status for active test data support.

ACTUAL CKP0 to 255

Indicates whether the 7X synchronization pulses from the ignition module are being received by the PCM.

ACTUAL CMP0 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 (%)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 displayed value should increase smoothly as the accelerator moves from closed to WOT.

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)0.0 to 4.98V

Indicates the ETCS accelerator sensor fully closed value No. 1 (AD).

ACIS VSVON/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 ControlALT CTRL0.0 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.

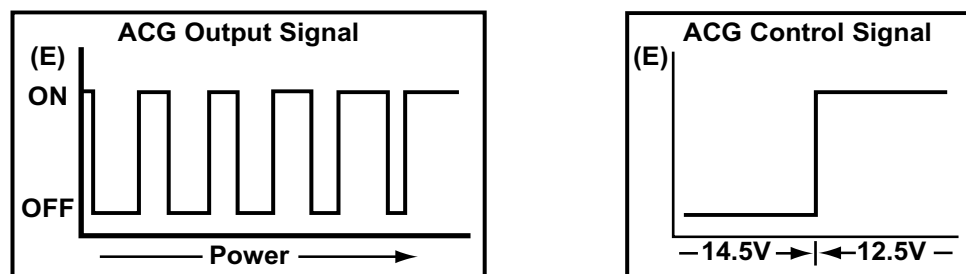


Figure 18-2 ACG output signal and ACG control signal

ACM(%)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.

A/F ALPHA-B1 (%)A/F ALPHA-B2 (%)50 to 150%

Indicates the mean value of the air-fuel ratio feedback correction factor per cycle.

AF B1 HEATERAF B2 HEATERAF B1 S1 HEATERAF B2 S1 HEATERON/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 LAMBDAAF B2 LAMBDAAF LAMBDAAF LAMBDA B1AF LAMBDA B20.0 to 99.9

Indicates the A/F Sensor equivalence ratio, which is the current measured air/fuel ratio derived 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 FBAF FB (ST FUEL TRIM)AF FB (ST FUEL TRIM) B1AF FB (ST FUEL TRIM) B20.0 to 99.9

Indicates the A/F ratio feedback corrective commands and displays the air fuel ratio feedback coefficient.

AF FB AVGAF FB AVG (LT FUEL TRIM)AF FB AVG (LT FUEL TRIM) B1AF FB AVG (LT FUEL TRIM) B20.0 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. Displays the air fuel ratio feedback coefficient.

AF FB CMDAF FB CMD B1AF FB CMD B20.0 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 CONDOPEN/CLOSED

Indicates the Air/Fuel Ratio Feedback Condition, it displays the current loop operating status.

AF SENSORAF SENSOR (mA)AF SENSOR B1AF SENSOR B20.0 to 99.9

Indicates the signal from the air-fuel ratio (A/F) sensor, which detects the oxygen content of the exhaust gases.

AI STATUSOK/NG

Indicates the status of the air injection system based on pressure sensor feedback to monitor air flow pressure and volume.

AICV VSVON/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 (VSV/ON) to allow an extra air intake to open. At all other times the AICV is closed (VSV/OFF).

AIR CONTRL SOLON/OFF

Indicates the air control (secondary air injection) solenoid valve status. Reads ON when secondary air is routed to the exhaust port.

AIR CONTRL SOLAIR DIVERT SOLNORM/DIV or PORT/DIV

Indicates the ECM output 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 SOLON/OFF

Indicates whether the ECM has commanded the secondary air intake valve to open the secondary runners, it reads:

- ON when the ECM has commanded the solenoid to open the secondary valve
- 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(A) (kPa)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)0 kPa to 639.9 kPa

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

AIR PUMPnot available

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

AIR PUMPON/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 RELAYON/OFF

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

AIR PUMP SIGNALLOW/HIGH

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

AIR SWITCH SOLPORT/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 1IAT 2IAT SENSOR 1 (°)IAT SENSOR 2 (°)INTAKE AIR (°)
INTAKE AIR TEMPERATURE SENSOR(2)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)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)0 to 625 mS

Indicates the volume of intake air to the engine as milliseconds.

AIRFLOW (g/s)AIRFLOW (m3/h)AIRFLOW (kg/h)0 to 500 g/s, 0 to 255 m3/h, or 0 to 408 kg/h

Indicates the amount of air flowing into the engine. The ECM calculates this value of intake airflow based on the MAF sensor output. Readings, which display as grams-per-second (g/s), cubic meters-per-hour (m3/h), or kilograms-per-hour (kg/h) should be low at idle and increase as the throttle opens.

AIRFLOW (V)AIRFLOW (mV)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 RESETON/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.

AKNOCKAKNOCK-1AKNOCK-2not available

Indicates the status of the knock sensor signal.

ALL_LAMPSON/OFF

Indicates the status of all warning lamps.

ALL_SEGnot available

Indicates the status of all segments.

ALTERNATORALTERNATOR (%)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(%)0 to 100%

Indicates the generator field current control duty signal status.

ALTT(V)ALTT_(V)0.0 to 16.0 V

Indicates the generator output voltage.

AMBIENT TEMP-40 to 419°F or -40 to 215°C

Indicates the air temperature outside of the vehicle. A fixed reading of -40°F or -40°C would indicate an open sensor circuit. A fixed reading of 419°F or 215°C would indicate a shorted sensor circuit.

APP 1 (V)APP 2 (V)APP 3 (V)APSAPP SENSOR 1 (V)APP SENSOR 2 (V)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 AGREEAPP1/APP2 AGREEAPP1/APP3 AGREEAPP2/APP3 AGREEYES/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.

These parameters read as follows:

- YES if the sensor signals agree and correspond to the same accelerator pedal positions.
- NO if the sensor signals disagree and correspond to different accelerator pedal positions.

APP AVE0 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 SWON/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 (°)0 to 180°

Indicates the accelerator pedal position (APP) as degrees of throttle opening.

APP SENSOR (A)APP SENSOR-A (V)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)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(%)0 to 100%

Indicates the accelerator pedal position.

APP1 (V)APP2 (V)APP3 (V)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(%)0 to 100%

Indicates the accelerator pedal position sensor 2.

ARPMDEsnot available

Indicates the desired RPM.

ASCD OD CUTOD CUT #1ON/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 RELAYON/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.

ASTactual

Indicates the time since start in seconds.

ASYNCH PULSEYES/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 BON/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

SOL A	SOL B	LOCKUP CONTROL
ON	OFF	LOW RANGE
ON	CYCLED ON/OFF	MIDDLE RANGE
ON	ON	HIGH RANGE

ATCHKLOW/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 A/T trouble codes.

ATF TEMP 1-40 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 PRESS0 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(V)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.

ATSDLBnot available

Indicates the status of the (H) serial data line from FI to A/T.

AUTO LRN TIMERON/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 OILON/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.

B1S1 HTR AMPSB1S2 HTR AMPSB2S1 HTR AMPSB2S2 HTR AMPS0.0 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)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 SWON/OFF

Indicates the status of the back-up light switch, it reads ON when the back up lights are on.

BAROBARO SBARO SensorBARO TCMBAROPRES10 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)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)125 to 160 Hz

Indicates the barometric pressure.

BARO(V)2.6 to 4.6 V

Indicates the barometric pressure.

BARO_EGR_SOLON/OFF

Indicates the BARO/SEGRP solenoid status.

BASADJON/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) 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)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 (°)–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 SENSORvariable

Indicates the brake boost pressure sensor (booster pressure) signal expressed as kilo Pascal (kPa), millimeters of mercury (mmHg), or inches of mercury (inHg).

BLMBLOCK LEARN0 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 352, 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 352 for more information.

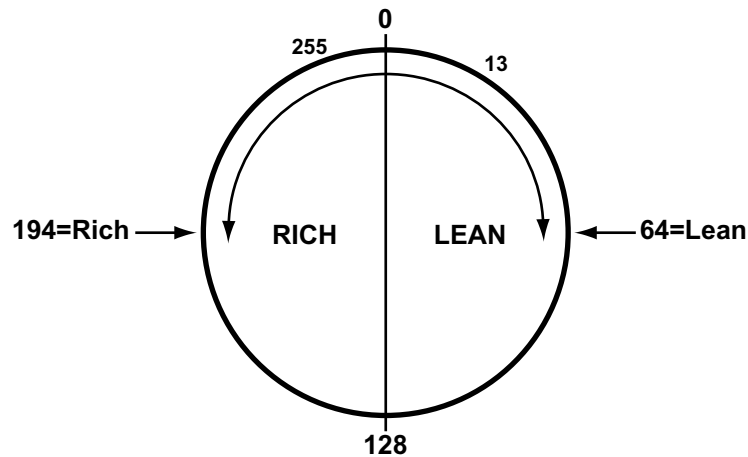


Figure 18-3 Rich/lean correction from base midpoint (0)

Depending on the vehicle, block learn is stored in either volatile or nonvolatile ECM memory.

[Continued on Next Page]

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 CELL0 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 INFOnot available

Indicates the block F Information (H) data.

BLOWER FAN SWON/OFF

Indicates the blower motor switch.

BOOBrakeOnOffBRAKE SWBRAKE SWITCH BBRAKE SWITCHBRAKE SWTON/OFF

Indicates the status of the brake pedal switch, it reads:

- ON when the brakes are applied
- OFF when the brakes are not applied

BOOST PRS VSVBOOST VSVON/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 SENSORvariable

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

BPAON/OFF

Indicates the brake pressure applied switch.

BRAKE BOOSTER PRESS SENSOR8.9 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 SW1BRAKE SW2ON/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)0 to 1.000 sec
O2 LR B1S1(ms)O2 LR B2S1(ms)O2 RL B1S1(ms)O2 RL B2S1(ms)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 AIRON/OFF

Indicates the secondary air injection bypass.

BYPASS AIR 1ON/OFF

Indicates the secondary air injection bypass 1.

C SHAFT SPD (km.h) (MPH)0 to vehicle max.

Indicates the vehicle speed calculated from the countershaft RPM on a manual transmission.

C.C. CANCEL HISTORY0000(H) to 8000(H)

Indicates the cruise control cancel history, which shows the reason why the 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

CACBYPON/OFF

Indicates the charge air cooler solenoid valve.

CALC B1 TWC(°)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(°)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 TMP572 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 VACUUM0 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 ID1111111 to 9999999

Indicates the ECM calibration ID number, which is used for service identification.

CAL/LD VAL(%)CAL/LD VALUECALC LOAD (%)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 THRTIDLE SWIDLE SWITCHON/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. CALC CLSD THRT is an ECM calculated value based on throttle position sensor input signal.

CAM HI TO LOCAM LO TO HI0 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 (°)0 to 25°

Indicates the actual PCM commanded camshaft retard in degrees.

CAM PHASE DES (°)0 to 25°

Indicates the PCM desired camshaft phase angle.

CAM PHASE DUTY (%)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 VARI0 to 25%

Indicates the difference in degrees between the desired and actual camshaft angle.

CAM SENSORCRANK SENSORYES/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 1CAN CIRC 2CAN CIRC 3CAN CIRC 4CAN CIRC 5CAN CIRC 6CAN CIRC 7
CAN CIRC 8CAN CIRC 9UNKNOWN/NORM(OK)**

Indicates the condition of controller area network (CAN) circuits 1 to 9.

CAN CTRL VSVON/OFF

Indicates the status of the canister control vacuum switching valve for active test support data.

CASeGND (V)-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 MONCOMPL/INCMP

Indicates the status of the catalytic converter monitor. Reads COMPL (completed) if the monitor successfully ran, INCMP (incomplete) if not. Input from the ECT, IAT, and TP sensors are required to enable this monitor, CKP and VSS inputs may also be required.

**CAT MON TEMPCAT MONITOR CONDITIONCAT MONITOR CONDITION B1CAT
MONITOR CONDITION B2OK/NG**

Indicates the catalytic monitoring system temperature condition, which indicates the capability to detect catalytic system deterioration.

**CAT TMP B1S1CAT TMP B2S1CAT TMP B1S2CAT TMP B2S2-40 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 and/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_readyYES/NO

Indicates that the catalyst efficiency monitor has successfully completed.

CATEMP11-40 to 11,756.3°F or -40 to 6,513.5°C

Indicates the catalyst temperature for bank 1, sensor 1.

CATEMP21-40 to 11,756.3°F or -40 to 6,513.5°C

Indicates the catalyst temperature for bank 1, sensor 2.

CC ENGAGEDYES/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 INHIBITEDYES/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 SWCC RES/ACCCC RES/ACC SWCC SET/CST SWON/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.

CCP COMMANDON/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.

CDCVON/OFF

Indicates the canister drain cut valve control signal.

CHASSIS PITCHYES/NO

Indicates the pitch status of the chassis, it reads:

- YES when pitch conditions exist
- NO when pitch conditions do not exist

CHIMEON/OFF

Indicates the chimer control.

CHRGLPON/OFF

Indicates the generator warning light status.

CHTCHT SENSOR-40 to 399°F or -40 to 199°C

Indicates the cylinder head temperature.

CHT_FAULTYES/NO

Indicates the cylinder head temperature status.

CHTILON/OFF

Indicates the operating status of the cylinder head temperature indicator lamp (CHTIL) and should only read ON if the lamp is on.

CHTIL_FAULTYES/NO

Indicates the cylinder head temperature indicator lamp status.

CKP A NO PULSECKP B NO PULSECKP NO PULSE0 to 255

Indicates the crankshaft position sensor A (or B) disappearance counter (Counts).

CKP A NOISECKP B NOISECKP NOISE0 to 255

Indicates the crankshaft position sensor A (or B) noise counter (Counts).

CKP RESYNCS0 to 255

Indicates a count of the number of times the PCM had to synchronize the crankshaft position (CKP) sensor.

CKP SENSOR(RPM)variable

Indicates the engine speed based on the signal from the crankshaft position (CKP) sensor.

CL O2SXnot available

Indicates the feedback condition and the reason why the fuel system is in a given (closed loop but faulty O2S) operating mode.

CLEAR FLOODYES/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.

CLOSEDOPEN/CLOSED

Indicates the state of closed loop operation.

CLR DISTactual

Indicates the distance since the diagnostic trouble codes were cleared.

CLUTCH SWITCHON/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.

CLV0 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 PULSECMP 2 NO PULSECMP A NO PULSECMP B NO PULSECMP NO PULSE (COUNTS)not available

Indicates the camshaft position (CMP) sensor disappearance counter (Counts).

CMP NOISE 1CMP NOISE 2CMP A NOISECMP B NOISEnot available

Indicates the camshaft position (CMP) A (or B) noise counter. This counter detects the noise compared with CKP sensor A (or B).

CMP CTRL CMD (°)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 (°)0 to 180°

Indicates the camshaft position sensor control in degrees, which is the cam angle controlled by the camshaft actuator.

CMP RESYNCS0 to 255

Indicates a count of the number of times the PCM had to synchronize the camshaft position (CMP) sensor.

CMP SENSOR(RPM)variable

Indicates the engine speed based on the signal from the camshaft position (CKP) sensor.

CMP_FAULTYES/NO

Indicates the camshaft position sensor status.

CmprCompMon rdyCmprCompMon_rdyYES/NO

Indicates whether the comprehensive component monitor has successfully completed.

COLD STARTUPYES/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 temperature.

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.

COLPON/OFF

Indicates the refrigerant pressure switch (middle pressure) status.

COMMEGR(%)0 to 100%

Indicates the commanded EGR status.

COMMEVAP(%)0 to 100%

Indicates the commanded evaporative purge.

COMMTAC(%)0 to 100%

Indicates the commanded throttle actuator control.

COND FANON/OFF

Indicates the FAN signal.

COND FAN LOON/OFF

Indicates the FAN 1 control signal.

COOL FAN(%)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 TEMPECT (°)–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)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.

COOLING FANLOW RAD FANFAN CTRLHIGH RAD FANON/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.

CPPRELEASED/DEPRESSED

Indicates the clutch pedal position switch

CPP_SWRELEASED/DEPRESSED

Indicates the clutch pedal position switch.

CRANKYES/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 RPM0 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 REQUESTYES/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.

CRANKINGON/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 RPM0 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 SWON/OFF

Indicates state of the brake switch for cruise control, it reads ON when the brake pedal is depressed.

CRUISE CANCEL SWON/OFF

Indicates the status of the cruise control cancel switch, it reads ON when the cruise control cancel switch is pressed.

CRUISE CONTROLON/OFF

Indicates the cruise control state, it reads ON when the cruise control is active.

CRUISE INDICATORCRUISE LAMPCRUISE LIGHTON/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 SWCRUISE MASTER (MAIN) SWTCRUISE SWMAIN SWON/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 SWTON/OFF

Indicates the status of the cruise control resume switch, it reads ON when the switch is turned on and electrically closed.

CRUISE SET SWTON/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 (°)0 to 180°

Indicates the throttle valve position requested by the cruise control module.

CTPCTP (APS)CTP SWON/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)not available

Indicates the voltage signal from the air pump electric current sensor.

CYL6 5 4 3 2 1

Indicates each cylinder. The displayed number shows each cylinder.

CYL 1 (2, 3, 4, 5, or 6) MISFIRE1 to 6

Indicates the cylinder misfire counter (counts). It indicates the number of misfires that occurred at the specific cylinder.

Cyl. DEACT. PERFORMANCE TSTOFF/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 COMMANDV4/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 MISFIRES0 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 DEACT SOL COMMANDON/OFF

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

CYL 4 DEACT SOL COMMANDON/OFF

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

CYL 6 DEACT SOL COMMANDON/OFF

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

CYL 7 DEACT SOL COMMANDON/OFF

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

CylHdTemp (V)CHTS(V)0.25 to 4.75 V

Indicates cylinder head temperature expressed as voltage. The higher the voltage, the lower the temperature.

D SWITCHON/OFF

Indicates the transmission D range switch.

D/C Converter Control ELD UnitELDnot available

Indicates the total vehicle electric load based on current in the main power harness. It is taken from the electric load detector (ELD) sensor signal, which is installed on the main fuse box.

D/C CTRL VOL (V)0.0 to 25 V

Indicates the battery charging voltage of the D/C converter in standard (14.5 V) mode.

D/M MUFFLER SWON/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 on the dash.

DAMPING CTRLON/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)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.

DCRKMFnnot available

Indicates the crankshaft sensor for misfire detection disconnect counter.

DCT_CNTactual

Indicates the number of trouble codes set.

DECEL ENLEANDECEL FUEL C/OFFFC AIRFLOWYES/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.

DECHOKEYES/NO

No additional information is available for this parameter.

DES IDLE RPMDESIRED IDLE0 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 RPM0 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 IDLEDSDactual

Indicates the desired idle speed in RPM.

DESIRED TP (%)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.

DISTANCE SINCE DTC CLEAREDvariable

Indicates the distance accumulated since an emission diagnostic trouble code was cleared. The distance displayed will increase as the vehicle is driven.

DPFE (V)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			

DPFEGRnot available

Indicates the delta feedback pressure exhaust gas recirculation.

DRIVE CountDRIVECNT0 to 255

Indicates the number of times the engine has been started since the last DTC P1000 (monitor readiness) set.

DRIVE DIST (km)(mile)actual distance

Indicates the drive distance.

DRIVE TIME (min)actual minutes

Indicates the total drive time in minutes.

DRV STATUSIDLE, 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 CountDTC Count (pcm)DTC_CNT0 to 255

Indicates the DTC count. The count includes DTC needing no action.

DTC STOREDactual count

Indicates the total number of current DTCs set this ignition cycle.

E-ABV STEPE-ABV STEP POS0 to 125

Indicates the position of the supercharger bypass valve stepper motor. Reads 125 when the valve is fully open, and 0 when closed.

EACV0 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 RLYON/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 FBKvariable

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 LIGHTON/OFF

Indicates the status of the economy light. The light is turned ON when the fuel system is in the lean-burn zone.

ECRK1ECRK2not available

Indicates the crankshaft sensor 1 (or 2) disconnect/noise counter for V6 engines.

ECT-40 to 399°F or -40 to 199°C

Indicates the engine coolant temperature.

ECT(V)0.0 to 5.0 V

Indicates the engine coolant temperature voltage.

ECT 1 (°)ECT SENSOR (°)-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)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 1ON/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 2ON/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_FAULTYES/NO

Indicates the engine coolant temperature status.

ECYL1ECYL2not available

Indicates the cylinder sensor 1 (or 2) disconnect/noise counter for V6 engines.

EGR BOOST SOLON/OFF

Indicates the EGR boost sensor solenoid valve control signal.

EFE COMMANDON/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 COMMANDEGR SOLENOID EGR SYSEGR SYSTEMON/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 L COMEGR V L COMMANDnot available

Indicates the ECM command for EGR valve lift.

EGR LIFTnot available

Indicates the actual EGR valve lift subtracted from zero-lift, which is learned from the EGR valve life sensor.

EGR LIFT SENSOREGR VLS0.0 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 MONCOMPL/INCOMP

Indicates the status of the exhaust gas recirculation (EGR) system monitor. Reads COMPL (completed) if the monitor successfully ran, INCOMP (incomplete) if not. This monitor is enabled during EGR operation after certain base operating conditions are satisfied.

EGR POS(%)0 to 100%

Indicates the exhaust gas recirculation valve position.

EGR POS(V)0.0 to 5.0 V

Indicates the exhaust gas recirculation valve position.

EGR STEPSEGR STEP POS0 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)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 (°)-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(%)0 to 100%

Indicates the exhaust gas recirculation solenoid valve (vacuum) status.

EGR VENT SOL(%)0 to 100%

Indicates the exhaust gas recirculation solenoid A.

EGR_FAULTYES/NO

Indicates the exhaust gas recirculation status.

EGR_mon_readyYES/NO

Indicates the EGR system monitor has successfully completed.

EGRBARO0.0 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.

EGRBAROON/OFF

Indicates the BARO/SEGRP solenoid.

EGRC SOLENOIDON/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.

EGRCFaultYES/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.

EGRFOpenYES/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.

EGRFShortYES/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.

EGRMDSDvariable

Indicates the desired EGR motor position.

EGRVFaultYES/NO

Indicates whether the PCM detected a fault in the EGR vacuum solenoid circuit, YES means a fault is present.

EGRVR (%)0 to 100%

Indicates the signal the EGR valve position sensor as a percentage (EGR valve duty cycle percentage). A low reading indicates low EGR flow, while a high reading indicates high EGR flow.

EGRVR_FAULTYES/NO

Indicates the exhaust gas recirculation valve duty cycle status.

EGT SENSOR (°C), (°F), (V)3.4 to 0.9 V, 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 LOADELEC LOAD SIGELEC LOAD SWLOAD SIGNALON/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

ENG LOAD (%)0 to 100%

Indicates current engine operating load as a percentage of maximum engine load.

ENG RESTART CONDOK/NG

Indicates whether the engine can be restarted after the engine was shut down by the auto idling stop system.

ENG OIL PRESS SWOFF/ON

Indicates the presence of engine oil pressure. This should remain on from engine start to engine shut off.

ENG OIL TEMP-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 TIME0 to 65,535 sec

Indicates the time lapse since the engine was started during this key cycle.

ENG SPD0 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 TORQ (N-M)0 to 65025 Nm

Indicates engine torque as calculated by the PCM.

ENGINE LOAD (%)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 MOUNTIDLE/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 LIFEnot available

No additional information is available for this parameter.

ENGINE OIL PRESSUREvariable

Indicates engine oil pressure as kilo Pascal (kPa), millimeters of mercury (mmHg), inches of mercury (inHg), and kilograms per square centimeter (kgf/cm²).

ENGINE RPMRPM0 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 (%)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)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) (V)–40 to 199°C, –40 to 389°F or 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.

EPSEPS SIGNALLOW/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 RATnot available

Indicates the desired equivalence ratio (Lambda).

EQ RAT1not available

Indicates the (A/F) ratio as commanded by the ECM for bank 1, sensor 1.

ESC ACTIVEYES/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 COUNTER0 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 FAILUREYES/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)–40 to 199°C or –40 to 389°F

Indicates the estimated coolant temperature as calculated by the ECM.

ETC_ACT (°)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 (%)0 to 100%

Indicates the ECM desired throttle plate opening in degrees.

EVAP BYPASS SOLON/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 CVS VALVEEVAP CVS VLVON/OFF

Indicates the status of the evaporative canister vent shut solenoid valve. The valve closes the canister vent.

EVAP MONEVAP mon readyCOMPL/INCOMP 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 INCOMP (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 PC DUTY (%)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 SOLON/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 the solenoid is OFF.

EVAP PF SWON/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)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 leaks and faulty components.

EVAP PURGE (%)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)0.0 to 5.0 V

Indicates the evaporative emission canister purge valve voltage.

EVAP SOLENOIDPURGE VSVPURGE SOLON/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 TSTPASS/FAIL

Indicates whether the EVAP diagnostic monitor has successfully completed.

EVAP VENT SOLON/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

EVAP_mon_readyYES/NO

Indicates the evaporative monitor has successfully completed.

EVAPCPON/OFF

Indicates the evaporative emission canister purge valve duty cycle. Displays whether the canister purge solenoid is on or off.

EVAPCP%0 to 100%

Indicates the evaporative emission canister purge valve duty cycle.

EVAPCPFaultYES/NO

Indicates whether the PCM detects a fault in the EVAP canister purge solenoid circuit. Reads YES if a fault is detected.

EVAPCV%EVAPCV(%)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

EVAPCVFaultEVAPCV_FAULTYES/NO

Indicates whether the PCM detects a fault in the canister vent solenoid circuit. Reads YES when a fault is present.

EVAPPrgFlw (V)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

EVAPSOAKactual

Indicates that the EVAP monitor soak time conditions have been met.

EVAPVM%0 to 100%

Indicates the evaporative emission vapor management valve status.

EVAPVM_FAULTYES/NO

Indicates the evaporative emission vapor management valve fault.

EVAPVMAON/OFF

Indicates the commanded state of the EVAPVM.

EVMV(A)not available

Indicates the evaporative vapor management current.

EXH BYPASS VSVON/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 VSVEXH GAS CTL VSVON/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.

**EXHAUST OXYGENREAR O2LEFT O2RIGHT O2RICH/LEAN
F BNK UPO2S #1 STATUSO2S #2 STATUSR BNK UPREAR O2 STATUSRICH/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 363 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)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 #1FAIL #2ON/OFF

Indicates whether the PCM has executed a fail safe function.

FAIL #1FAIL #2ON/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.

FAN 1ON/OFF

Indicates the FAN1 control signal.

FAN 2ON/OFF

Indicates the FAN2 control signal.

FAN 3ON/OFF

Indicates the FAN3 control signal.

FAN CTRL ECT (°C) (°F) (V)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 CTRLFAN LOW CTRLON/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(%)0 to 100%

Indicates the variable fan duty cycle.

FAST IDLE SOLON/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 MOTORactual

Indicates the status of the electrical fan motor for active test data support.

FAN SPEED (RPM)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.

FATON/OFF

Indicates the DLC FAT terminal.

FAULT CODE DISPLAYactual

Indicates the diagnostic trouble codes.

FC CTPON/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.

FCILON/OFF

Indicates the fuel cap off indicator lamp status.

FCIL_FAULTYES/NO

Indicates a fuel cap off indicator lamp fault.

FIA CTRL SOLON/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)–32512 to 32768 Hz

Indicates the flexible fuel output frequency.

FLIFLI (%)FUEL SENDER (V)FUEL LEVEL (V)(%)FUEL LVL SENSOR (V)(%)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_FAULTYES/NO

Indicates the a flex fuel sensor fault.

FLUID TEM (V)0.0 to 5.0 V

Indicates the transmission fluid temperature voltage.

FPON/OFF

Indicates the fuel pump status.

FP (%)0 to 100%

Indicates the fuel pump status in percentage.

FP MODEON/OFF

Indicates the fuel pump has been turned on or off in response to a PCM command.

FP RES RELAYON/OFF

Indicates the fuel pump (FP) resistor relay status.

FP RLYON/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)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

FPMonitorON/OFF

Indicates whether the fuel pump has turned on or off in response to a PCM command.

FP_RLYON/OFF

Indicates the fuel pump relay status.

FPFaultYES/NO

Indicates whether the PCM has detected a fault in the fuel pump circuit.

FPFault reads YES when a fault is present.

FPMFPMonitorON/OFF

Indicates the fuel pump monitor.

FPTDR (V)LOW/HIGH

Indicates the input level voltage level of the FPTDR line.

FR ACM SOL CURRENTnot available

Indicates the actual electric current applied to the front ACM control module as amperes.

FR ACM SOL MAX CURRENTFR ACM SOL MIN CURRENTnot available

Indicates the maximum or minimum current applied to the front ACM control module for the ignition cycle as amperes.

FRP PSI37 to 150 psi

Indicates the fuel rail pressure.

FRP(V)not available

Indicates the fuel rail pressure voltage.

FRP_DSDactual

Indicates the fuel rail pressure desired.

FRP_FAULTYES/NO

Indicates a fuel rail pressure fault.

FRT-40 to 399°F or -40 to 199°C

Indicates the fuel rail temperature.

FRT(V)0.0 to 5.0 V

Indicates the fuel rail temperature voltage.

FRZSTR (1)actual count

Indicates the status of the freeze data as a count. A count is recorded every time the ECM stores freeze data.

FSSFSS B1FSS B2not available

Indicates the status of the fuel system, which may be divided by cylinder banks (1 or 2).

FT CELL0 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 LEARNENABLED/DISABLED

Indicates whether 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)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 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) 0.0 to 5.0 V

Indicates the fuel tank pressure transducer voltage.

EVAPCPON/OFF

Indicates the evaporative emission canister purge valve duty cycle. Displays whether the canister purge solenoid is on or off.

EVAPCPON/OFF

Indicates the evaporative emission canister purge valve duty cycle. Displays whether the canister purge solenoid is on or off.

FTP_FAULT YES/NO

Indicates a fuel tank pressure transducer fault.

FTT SENSOR (°C) (°F) (V) 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 CUT 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 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 (%) FRONT FUEL (%) REAR -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 percentage if the PCM is decreasing the pulse width from programmed values
- A positive percentage if the PCM is increasing the pulse width from programmed values

FUEL LEVEL (AVERAGE)FUEL LEVEL (L)0 to 72 liters or 0 to 19 gallons

Indicates the amount of fuel remaining in the tank.

FUEL LEVEL (mV)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)0.0 to 5.0 V

Indicates the fuel tank level signal voltage.

FUEL METER CTRL (%)0 to 100%

Indicates the status of the fuel meter control, which is the percentage of remaining fuel in the fuel tank.

FUEL MISFIREactual count

Indicates the accumulated misfire counter for 2VI method fuel system problems.

FUEL PMP SP CTLLO/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 SOLON/OFF

Indicates the fuel pump regulator control.

FUEL PRESS(V)0.0 to 5.0 V

Indicates the fuel tank level signal voltage.

FUEL PRS UP VSVON/OFF

Indicates the status of the fuel pressure up vacuum switching valve.

FUEL PUMPON/OFF

Indicates the fuel pump status, reads ON when the ECM senses a running fuel pump.

FUEL PUMP CTRLLOW/HIGH

Indicates the fuel pump control relay status, which determines whether the fuel pump is operating vat high or low) capacity. Status is determined by intake manifold pressure and engine RPM.

FUEL PUMP RELAYPUMP RELAYON/OFF

Indicates the current state of the fuel pump relay.

FUEL REF VOL (V)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 STATUSFUEL SYSCL/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 SYS1FUEL SYS2FUELSYS1FUELSYS2OL/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 TANK CAP(L)0 to 34 gallons or 0 to 128 liters

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

FUEL TEMP (°)–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 VOLATILO/HI

Indicates the rate that the fuel can vaporize in the cylinder as calculated by the control module. HI will display when calculated fuel volatility is high. LO will display when the fuel volatility is low.

FUEL(PSI)35 to 120 psi

Indicates the fuel pressure.

FUEL_GAUGEON/OFF

Indicates the fuel gauge indicator control.

FUEL_LEVEL(%)0 to 100%

Indicates the fuel level in percentage.

FUEL_mon_readyYES/NO

Indicates the fuel monitor has successfully completed.

FuelLvlInp(%)0 to 100%

Indicates the fuel level in percentage.

FuelLvlInp(V)0.0 to 5.0 V

Indicates the fuel level in voltage.

FuelPumpAON/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).

FUELPWFUELPW(mS)0.0 to 99.9 mS

Indicates the fuel pulse width.

FUELPW1 (mS)FUELPW2 (mS)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)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.

GEARactual

Indicates the gear commanded by the module.

GEAR POSITIONvariable

Indicates the estimated gear position, calculated from both the "Main shaft speed sensor" and the "countershaft speed sensor".

GEN L TERMINALON/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 LIGHTactual

Indicates the generator warning light.

GEN OUT(V)0.0 to 16.0 V

Indicates the generator output voltage.

GEN. FIELDON/OFF

Indicates the status of the generator field, reads ON when the system is charging.

GEN(%)0 to 100%

Indicates the generator field current control duty signal.

GEN_FAULTYES/NO

Indicates the generator output fault.

GEN_LAMPON/OFF

Indicates the generator lamp circuit.

GEN_MONON/OFF

Indicates the generator monitor.

GENERATOR (%)0 to 100%

Indicates the level of charge that the PCM is requesting as a percentage.

GENFDC%0 to 100%

Indicates the generator field duty cycle.

GENVDS DGENVDS D(V)actual

Indicates the generator voltage desired.

HAC PRS ZONEON/OFF

Indicates the high air charging pressure zone signal.

HEADLIGHT SWON/OFF

Indicates the headlamp switch.

HFCON/OFF

Indicates the fan control high speed status.

HFC_FAULTYES/NO

Indicates the fan control high speed fault status.

HI A/C PRESSYES/NO

Indicates A/C system pressure and reads YES when the pressure is high.

**HI PS PRESSHI PS PRESSUREP/S OIL PRESSURE SWITCHP/S PRESS SWPSP_SW
PSP SWTPSP SWITCHON/OFF**

Indicates the status of the power steering pressure (PSP) switch. Should read OFF when the steering wheel directs the wheels straight ahead, and read ON when the steering wheel is turned or held turned in either direction. Turning the steering wheel builds pressure in the power steering system.

HIGH ALTITUDEYES/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 BATTERYYES/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)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)–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 HEATERHO2S (AF) B2 S1 HEATERHO2S S-1 HEATERHO2S B1 S2 HEATERHO2S B2 S2 HEATERON/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 HEATERHO2S 2 HEATERHO2S 3 HEATERON/OFF

Indicates the PCM command status to the HO2S 1, HO2S 2, and HO2S 3 heater circuits.

HO2S B1 H CURHO2S B2 H CURHO2S 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 CURHO2S B2 S2 H CURHO2S B2 S2 C (A)HO2S S2 H C (A)HO2S S2 HEATER CURRENT (mA)HO2S S2 HEATERHO2S S2 HTRnot available

Indicates the drive current supplied by the ECM to control the HO2S heater as amperes or milliamperes.

HO2S HEATED OXYGEN SENSOR (A/F)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)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_readyYES/NO

Indicates the heated oxygen sensor (HO2S) monitor has successfully completed.

HO2S11 (mA)HO2S12 (mA)HO2S21 (mA)HO2S22 (mA)–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 LOOPYES/NO

Indicates whether the PCM has commanded open loop operation due to high engine temperature and reads YES only when in open loop.

HTR11HTR12HTR21HTR22ON/OFF

Indicates the HO2S heater circuit status for:

- 11—Bank 1, Upstream
- 12—Bank 1, Downstream
- 21—Bank 2, Upstream
- 22—Bank 2, Downstream

HTR11FaultHTR12FaultHTR21FaultHTR22FaultHTR11_FaultHTR12_FaultHTR21_FaultHTR22_FaultYES/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)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

IAB CTRL SOLON/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 SOLON/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 SOLON/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(%)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 a direction that opens the air bypass passage. At a duty ratio less than 50%, the shaft moves in a direction that closes the air bypass passage.

IAC COMIAC COMMAND (COUNTS)not available

Indicates the PCM commanded status of the idle air control valve as a count.

IAC DIRECTIONIVSMDIR1IVSMDIR2FWD/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 STEPIVSMSTP (DEC) MOTOR POS STEPS
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 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 IAC Fault YES/NO

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

IACV(%) 0 to 100%

Indicates the idle air control percentage.

IACV(mS) not available

Indicates the idle air control in milliseconds.

IAR SOL 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 not available

Indicates the intake air shutter valve.

IAT -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)
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 thermistor-type sensor, sensor resistance decreases as temperature increases.

IAT_FAULT YES/NO

Indicates the inlet air temperature status.

IATDC -40 to 399°F or -40 to 199°C

Indicates the intake air temperature 2.

IATDC(V) 0.0 to 5.0 V

Indicates the intake air temperature 2 in voltage.

IATLC(V) 0.0 to 5.0 V

Indicates the Lysholm compressor intake air temperature signal voltage.

IDLE CTRL SOL (%) IAC COM (%) -100 to 100%

Indicates the drive percentage of the IAC solenoid valve.

IDLE LEARN COMPLETED/NOT COMPLETED/NOT APPLICABLE

Indicates whether the PCM completed the "idle learn" program.

IDLE STOP CTRLYES/NO

Indicates whether the ECM is operating in idle stop control mode.

IDLE TARGET TH (°)MOTOR TH CMD (°)0 to 180°

Indicates the PCM calculated target throttle valve position at idle in degrees.

IDLE UP SOLON/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 VSVON/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.

IDLINGON/OFF

Indicates whether the engine is running at idle.

IG LEVELIG1 LEVELHIGH/LOW

Indicates the status of the IG1 voltage level.

IG MISFIREactual count

Indicates the misfire accumulated counter for 2VI method ignition systems.

IG T ADJ (V)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.

IGDSBL0/1

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)0.0 to 25.5 V

Indicates the key-on system voltage.

IGN ACC SIGON/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 TERMON/OFF**OCT ADJOPEN/CLSD**

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 (°)IGN ADV(°)IGN TIMING(°)SPK ADV (°)SPK ADV (°BTDC)SPARK ADV (°)SPARK ADVANCETIMING (°BTDC)TOTAL ADV (°)-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 CYCLES0 to 50

Indicates the number of times the engine has been started since the last DTC set or codes were cleared.

IGN CYCLE DTCYES/NO

Indicates whether a DTC set on the current ignition cycle.

IGN EVENTS XIGNITIONsee 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 for a 6-cylinder engine
- 0 to 4000 for 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 VTDYES/NO

Indicates whether a VTD code is stored in memory.

IGNITION 1 (V)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 SWON/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)0.0 to 5.0 V

Indicates the status of the IGRTNE.

IGRTNI (V)0.0 to 5.0 V

Indicates the status of the IGRTNI.

ILLUMINAT(%)0 to 100%

Indicates the dimming control command.

IMA (V)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)not available

Indicates the IMA output current the ECM requests of the MCM for assist or regeneration.

IMA REQUEST (kW) (V)not available

Indicates the target value which the ECM requests of the motor control module for assist or regeneration.

IMA STANDBYES/NO

Indicates the status of the IMA standby status. Reads NO if the IMA cannot assist the engine.

IMA TORQUE-15 to 15 kgfm or -147 to 147 N.m

Indicates the status of the IMA motor torque.

IMMOBILIZERBAN/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.

IMRCON/OFF

Indicates the intake manifold runner control.

IMRC MON SWON/OFF

Indicates the intake manifold runner control monitor.

IMRC POS SENSORIMRC VP SENSOR (V)0.0 to 5.0 V

Indicates the intake manifold runner control solenoid valve position sensor signal voltage.

IMRC SOLIMRC SOL VLVON/OFF

Indicates the status of the intake manifold runner control solenoid valve.

IMRC VLV CMDIMT (IMRC) VLV CMDOPEN/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 SWIMT (IMRC) VLV SWTIMT VLV SWOPEN/CLOSE

Indicates the status of the intake manifold runner control solenoid valve position switch. It should read CLOSE at low engine speed.

IMTVON/OFF

Indicates the intake manifold tuning valve.

IMTV(%)0 to 100%

Indicates the duty cycle of the intake manifold tuning valve.

IMTV_FAULTYES/NO

Indicates an intake manifold tuning valve fault.

INGEARactual

Indicates the if the vehicle is in gear.

INI IAT TMP-40°F to 249°F or -40°C to 120°C

Indicates the initial intake air temperature on engine first start.

INI COOL TMP-40°F to 249°F or -40°C to 120°C

Indicates the initial coolant temperature on engine first start.

**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)0 to 65.3 mS
INJ #x (mS)0 to 32.6 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)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)

INJ1FaultINJ2FaultINJ3FaultINJ4FaultINJ5FaultINJ6FaultINJ1_FaultINJ2_FaultINJ3_FaultINJ4_FaultINJ5_FaultINJ6_FaultYES/NO

Indicates whether the PCM has detected an injector circuit fault, it reads YES when the PCM detected a fault.

INJECTOR MODEON/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 TEMPHOT/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 RPM0 to 8192 rpm

Indicates the rotational speed of the input shaft.

INT AIR CTL VSVINTAKE AIR VSVON/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 (%)0 to 99%

Indicates the control value of the intake valve timing control solenoid valve. It read:

- 0% to 2% at idle.
- 0% to 80% when revving the engine up to 2000 RPM quickly.

INT/V SOL-B1INT/V SOL-B2ON/OFF

Indicates the state of the intake valve timing control solenoid.

INT/V TIM B1 (°)INT/V TIM B2 (°)-127 to 128°

Indicates the [°CA] of intake camshaft advance angle. It read:

- -5° to 5° at idle.
- 0° to 45° when revving the engine up to 2000 RPM quickly.

INTAKE CNTRL0 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 opening of the intake tuning valve.

INTAKE CTL VSV1INTAKE CTL VSV2INTAKE VSVON/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 CTL VSV1ON/OFF

Indicates the status of the VSV for the ACIS (Acoustic Control Induction System).

INTAKE CTRL SOLON/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.

INTEGRATR0 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 316 for more information.

I/P PULLY RPM0 to engine max.

Indicates the engine speed computed from the turbine revolution sensor signal.

ISTPIMnot available

Indicates whether the ECM is in the IACV step motor inspection mode.

IVSIDLE/OFF IDLE

Indicates the idle validation switch.

KAMFUSEFAULT/OK

Indicates the status of the keep alive memory power.

KNOCKYES/NO

Indicates whether the ECM is actively making adjustments to compensate for spark knock. This value is based on knock sensor (KS) signal, it reads:

- YES if the sensor indicates knock

- NO if the sensor does not indicate engine knock

KNOCK ADVANCE (°)KNOCK CTRLnot available

Indicates the additional spark advance angle the ECM is applying to compensate for knock.

KNOCK CRRT VAL-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)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 VAL-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(°)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)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.

KSOKOK/NG

Indicates the status of the knock sensor circuit, it reads OK during normal operation and NG if a fault is detected.

L SWITCHON/OFF

Indicates the transmission L range switch.

LCHSTSON/OFF

Indicates the status of the latched starter switch signal, it reads ON when STS is turned on.

LDP_EVAPCP(A)not available

Indicates the EVAP control system incorrect purge flow detection valve status.

LDP_IDL(A)not available

Indicates the EVAP system leak detection idle current.

LDP_MON(A)not available

Indicates the EVAP system leak detection pump monitoring current.

LDP_REF(A)not available

Indicates the EVAP system leak detection pump reference current.

LDP_SLDV(A)not available

Indicates the EVAP control system small leak detection valve.

LDP_VSLD(V)not available

Indicates the EVAP control system very small leak detection valve.

LFCON/OFF

Indicates the status of the electrically driven fan.

LFC_FAULTYES/NO

Indicates a fan control low speed fault.

LFTRIM 1 (%)LFTRIM 2 (%)–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)not available

Indicates the long term fuel correction being applied at idle.

LIFT SWITCHON/OFF

Indicates the status of the lift switch, it reads ON when the lift switch is turned on.

LINE PRES(%)0 to 100%

Indicates the line pressure solenoid status in percentage.

LINE PRESS(A)not available

Indicates the line pressure solenoid status.

LOAD (%)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(%)0 to 100%

Indicates long term fuel trim 1 in percentage.

LONGFT2(%)0 to 100%

Indicates long term fuel trim 2 in percentage.

LOOPLOOP STATUS (L)LOOP STATUS (R)O2S FB CONDOPEN/CLSD LOOPOPEN/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 BATTERYYES/NO

Indicates the vehicle battery state, reads NO under normal conditions and YES when battery voltage is below specifications.

LOW CLNT LEVELYES/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 INDION/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 LAMPON/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 LEVELYES/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 PRESSYES/NO

Indicates the status of the engine oil pressure sensor, it reads:

- YES when oil pressure is low
- NO under normal operation

LOW RPM RANGEON/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 SELECTEDYES/NO

Indicates the transmission L range switch.

LT ADP B2S2 (ms)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 (%)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)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 (%)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.

M SHAFT SPD (RPM)MAINSHAFT SPD (RPM)ON/OFF

Indicates the state of the transmission mainshaft speed sensor signal. It should read ON whenever the mainshaft is turning.

M/T SHIFT LOCKON/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_DPFEactual

Indicates the EGR sensor input at the time of a misfire.

M_ENGactual

Indicates the engine RPM at the time of a misfire.

M_IATactual

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

M_LOADactual

Indicates the engine load at the time of a misfire.

M_PNPPARK NEUTRAL

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

M_RUNactual

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

M_SOAKactual

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

M_TPactual

Indicates the throttle position at the time of a misfire.

M_TRIPactual

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

M_VSSactual

Indicates the vehicle speed at the time of a misfire.

MAF (gm/Sec)MAF (g/s)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.

MAF (Hz)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)0 to 5.00 V

Indicates mass airflow (MAF), which is the amount of air entering the engine, expressed as voltage. The value is the MAF sensor signal voltage, readings should increase along with throttle opening.

MAF PERF TSTFAIL/PASS

No definition available for this parameter at this time.

MAF_FAULTYES/NO

Indicates a mass air flow fault.

MAIN RELAYON/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 valve. Reads ON when energized.

MAIN RELAY (FP)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.

MAINRLYON/OFF

Indicates the PCM control relay.

MALFUNCTION INDICATOR LAMP MIL ON/OFF

Indicates the status of the malfunction indicator lamp (MIL).

MAN VAC (kPa)(inHg) 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 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 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) 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)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 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 VON/OFF

Indicates the boost sensor solenoid valve status.

MAP/BARO SOLMAP/BARO SOLENOIDMAP/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 SOLON/OFF

Indicates the state of the MAP/BARO solenoid status.

MAP/BARO("Hg)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)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_FAULTYES/NO

Indicates the manifold absolute pressure sensor status.

MAT (°C)–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)0 to engine max.

Indicates the maximum highest engine speed the engine has ever achieved.

MC DWL (°)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°, indicating a 50% duty cycle.

MCM STANDBYOK/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.

MFCON/OFF

Indicates the manifold medium fan control status.

MFC_FAULTYES/NO

Indicates a medium fan control fault.

MFCYLMISFIRED CYLnot available

Indicates random (B) engine misfire information.

MFPINSnot available

Indicates engine misfires. This is the latched MFPLS signal low period when the ECM detects misfires. 1 LSB = 16 microseconds.

MFPLSRFMFPLSRLOW/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.

MFPMAXnot available

Indicates engine misfires. It displays the maximum data of MFPINS in microseconds.

MILMIL STATUSON/OFF

Indicates the malfunction indicator lamp.

MIL DISTactual distance

Indicates how far the vehicle has traveled with the MIL turned on.

MIL ON RUN DIST0 to 40,721 m or 0 to 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 activation conditions reoccurring, the display resets.

MIL ON RUN TIME0 to 65,535 sec

Indicates the time lapse since the MIL was triggered by a DTC being set.

MIL REQ by DTCYES/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.

MILFaultON/OFF

Indicates whether a fault has occurred in the MIL circuit.

MISFIREMISFireYES/NO

Indicates the accumulated misfires for CSF method.

MISFIRE CYCLES0 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 CYCLE0 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 1MISFIRE CYL 2MISFIRE CYL 3MISFIRE CYL 4MISFIRE CYL 5MISFIRE CYL 6MISFIRE CYL 7MISFIRE CYL 80 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 MARGIN(%)-100 to 99.22%

Indicates the misfire detecting margin used during misfire detection. A reading of 30% is considered normal.

MISFIRE RPM0 to 6375

Indicates the engine RPM at the time the last misfire code set.

MISFIRE TESTCOMPL/INCOMPL

Indicates the status of the CHECK MODE for the misfire monitor.

MISS HISTORY 1MISS HISTORY 2MISS HISTORY 3MISS HISTORY 4MISS HISTORY 5MISS HISTORY 6MISS HISTORY 7MISS HISTORY 80 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.

MOT BATT TEMP (°)-30 to 60°C or -22 to 140°F

Indicates the motor battery, or battery module, temperature.

MOT ECM SIGNALOK/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 (%)0 to 100%

Indicates the duty cycle of the TACM output signal to the motor.

MOTOR POS (V)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)0 to 5 kgfm

Indicates the state of the MOTTQLMTX.

MOUNT CTRL SOLMT CTRL SOLON/OFF

Indicates the state of the mount control solenoid valve. The valve is turned ON to decrease the engine vibration at idle.

MP_LRNYES/NO

Indicates the learned misfire correction profile.

MTSWAT/MT

Indicates the manual trans/auto transmission discrimination signal.

NCRKMFnot available

Indicates the crankshaft sensor for misfire detection noise counter.

ND WHL SPD0 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).

NLVLNLVL-1NLVL-2NLVLADnot available

Indicates the engine base noise level.

NLVLADnot available

Indicates the knock sensor signal for KCX type detection.

N SWITCHON/OFF

Indicates the status of park/neutral switch.

NEUT_SW(MTX)ON/OFF

Indicates the clutch pedal position switch/neutral switch circuit status.

NO. OF MISFIRES0 to 255

Indicates the total number of cylinder firing events detected as misfires during the last 200 crankshaft revolutions.

NON A/CON/OFF

Indicates the A/C installed confirm signal.

NP SWITCHON/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.

NSXON/OFF

Indicates the state of the NSX, it reads OFF when the clutch pedal is depressed.

NTRBCDnot available

Indicates the total number of DTCs that the ECM stores.

NUMKEYSactual

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)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)0 to 1.200 V
F UPSTM O2S (V)F DNSTM O2S (V)R UPSTM O2S (V)R DNSTM O2S (V)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(%)0 to 100%

Indicates the commanded duty cycle of the heater control circuits for oxygen sensors on banks 1 and 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)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 CROSSCOUNTS0 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 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 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 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.

O2 OE VAP Actual

Indicates that the EVAP purge leak check monitor has competed.

**O2S11 (mV) O2S12 (mV) O2S21 (mV) O2S22 (mV) 0 to 1800
O2S11 (V) O2S12 (V) O2S21 (V) O2S22 (V) 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_FAULTO2S21_FAULTYES/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

OBDSIDnot available

Indicates the on-board system identification.

OCT ADJOPEN/CLSD

Indicates the octane adjust status.

OD INHIBITON/OFF

Indicates the overdrive cancel witch/hold switch status.

OD OFF LIGHTON/OFF

Indicates the transmission control indicator light.

OIL LIFE (%)0 to 100%

Indicates the ECM calculated current oil life remaining as a percentage based on mileage, driving conditions, temperature, and load conditions.

OIL PRES0 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)0 to 5.0 V

Indicates engine oil pressure as a voltage.

OL CONDYES/NO

Indicates the ECM is in open loop due to operating conditions.

OL DRVYES/NO

Indicates the ECM is in open loop due to driving conditions.

OL DTCYES/NO

Indicates the ECM is in open loop due to a DTC.

OPEN MALFUNCOFF/ON

Indicates an ETCS open side malfunction.

OPSCactual

Indicates the oil pressure switch control counter.

OSFMFLGYES/NO

Indicates the output shaft speed failure mode.

OXS1 TESTCOMPL/INCOMPL

Indicates the status of the CHECK MODE HO2 Bank 1 sensor test.

OXS2 TESTCOMPL/INCOMPLI

Indicates the status of the CHECK MODE HO2 Bank 2 sensor test.

OVER ENG TM (S)actual time

Indicates the total time the engine was operated over the established RPM limit in seconds.

P/N SWITCHON/OFF

Indicates the park/neutral switch status.

P/S SIGNALOFF/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 SWPSP_SWON/OFF

Indicates the power steering pressure switch.

PART LOADnot available

Indicates part load. Monitors the O2S and it will set a code; Rich or Lean.

PCM IN VTD FAILYES/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 RESETYES/NO

Indicates the internal PCM reset status, it reads YES only when an internal PCM reset occurred and NO under normal operating conditions.

PDSWON/OFF

Indicates the status of the variable capacity A/C compressor pressure switch.

PFINHLOW/HIGH

Indicates the status of the output voltage level of the PFINH line.

PNPON/OFF

Indicates the clutch pedal position switch/neutral switch circuit status.

PNP SWITCHP-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 COUNT0 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 VSVON/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 SOLON/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.

PRNDL SWsee 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 ID0 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.

PROM ID may be a 2-, 3-, 4-, or 5-digit number, depending on year and model. Check the PROM ID against the manufacturer's specifications to determine if the correct one is installed.

Some service manuals refer to the PROM as the MEMCAL because it contains both memory and calibration functions.

PSMOTTRQPSSOCPSTBATPSVBATPTON/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.

PSVBATALON/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 STPULSER CAL STATUS1/0

Indicates the CRK pulser learn calculation status, which is used for misfire detection. It reads 1 if ECM is under calculation. This means the ECM is calculating the pulser tolerance compensation value.

PULSER F/B LEARNvariable

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 SOLON/OFF

Indicates the canister drain cut valve control signal.

PURGE CUT VSVON/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-50 to 350

Indicates the evaporative purge density during system operation. -40 to 0 during idle is normal range.

PURGE DUTY(%)0 to 100%

Indicates the evaporative emission canister purge valve duty cycle.

PURGE FLOW(%)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)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.

QCKMILON/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.

QXREFnot available

Indicates the status of the learned QIDL at IDLE.

R FUEL LEVEL (V)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 SWITCHON/OFF

Indicates the transmission R range switch.

R WIND DEF SWON/OFF

Indicates the rear defrost switch status.

RAD FANON/OFF

Indicates the fan control signal.

RE CVS VALVEON/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 SOLREL VTEC SOLON/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 SOL2ON/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 HEATERSON/OFF

Indicates the heated exhaust gas oxygen sensor heater (REAR O2)

REDUCED POWERACTIVE/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 1ON/OFF

Indicates the reduce torque signal 1 status.

REDUCE TORQ 2ON/OFF

Indicates the reduce torque signal 2 status.

REF 1(V)0 to 5.0 V

Indicates the voltage sensed on the 5-volt reference 1 circuit at the control module.

REF 1(V) STATUSPASS/FAIL

No definition is available for this parameter at this time.

REF 2(V)0 to 5.0 V

Indicates the voltage sensed on the 5-volt reference 2 circuit at the control module.

REF 2(V) STATUSPASS/FAIL

No additional information is available for this parameter.

REL TP (%)REL TP SENSOR (%) (°)variable

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 SOLON/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 TORQUE0 to 100%

Indicates the amount of torque that is requested by the PCM as a percentage.

RESTART FANON/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 ACTIONNO/YES/FAIL

Indicates the retard action taken by the ECM, it reads:

- NO (range) = No retarding
- YES (range) = Retarding
- FAIL (range) = Retard impossible

RETARD REQUESTNO/YES/FAIL

Indicates the status of the retard request from the TCS control unit, it reads:

- NO = No retard requesting
- YES = Retard requesting
- FAIL = TCS system failure

REV SELECTEDON/OFF

Indicates the transmission R range switch.

REVERSE LOCK SOLON/OFF

Indicates the status of the reverse select lock solenoid. When turned ON, it is impossible to select "Reverse Gear".

RO2FT1(%)-35 to 35%

Indicates the rear O2 fuel trim, bank 1 status.

RO2FT2(%)-35 to 35%

Indicates the rear O2 fuel trim, bank 2 status.

RPHRSTRLOW/HIGH

Indicates the status of the rear peakhold reset. The 2VI sensor peakhold voltage is reset by this peakhold reset signal from the ECM.

RPMactual

Indicates the engine speed.

RPM COARSE0 to 7968 rpm

Indicates engine RPM.

RPM FINE0 to 1992 rpm

Indicates engine RPM.

RPMDES0 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 CURRENTvariable

Indicates the output current to the rear ACM control module as amperes.

Rr ACM SOL MAX CURRENTvariable

Indicates the maximum current output to the rear ACM control module for the current ignition cycle as amperes.

Rr ACM SOL MIN CURRENTvariable

Indicates the minimum current output to the rear ACM control module for the current ignition cycle as amperes.

S SWITCHON/OFF

Indicates the transmission S range switch.

S/C RELAYON/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 SOLENOIDON/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 TARGET0 to vehicle max.

Indicates the speed at which the cruise control is set by the driver.

S/C VAC SOLS/C VENT SOLOPEN/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 VAC SOL	S/C VENT SOL	THROTTLE POSITION
ON	OFF	Accelerate
ON or OFF	ON	Decelerate
OFF	OFF	Steady

SC_ACT_SWON/OFF

Indicates the speed control actuator switch on.

SC_SET_LMPON/OFF

Indicates the speed control set indicator.

SCCSSCS(V)0 to 10.00 V

Indicates the speed control command switch (SCCS) voltage.

SEGRP(%)0 to 100%

Indicates the EGR valve stepping motor position.

SEGRP DES(%)0 to 100%

Indicates the EGR motor position desired.

SELTESTDTCactual

Indicates the diagnostic trouble codes.

SET LAMPON/OFF

Indicates the status of the cruise control indicator light on the instrument panel.

SET VHCL SPD0 to vehicle max.

Indicates the selected cruise control speed.

SFTCMD (H)not available

Indicates the status of the SFT command, which determines whether the ECM is in functional test mode.

SFTRIM 1 (%)SFTRIM 2 (%)–25 to 35%

Indicates whether the PCM is commanding a short-term rich or a lean 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(%)0 to 100%

Indicates the shift solenoid A/1.

SHIFT B/2(%)0 to 100%

Indicates the shift solenoid B/2.

SHIFT C/3(%)0 to 100%

Indicates the shift solenoid C/3.

SHIFT SOL AON/OFF

Indicates the status of shift solenoid 1

SHIFT SOL BON/OFF

Indicates the status of shift solenoid 2

SHIFT SOL CON/OFF

Indicates the status of shift solenoid 3

SHIFT SOL DON/OFF

Indicates the status of shift solenoid 4

SHIFT SOL EON/OFF

Indicates the status of shift solenoid 5

SHIFT INDICATORON/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 SWSHIFT/CLUTCH SWTON/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.

SHRTFT1(%)–35 to 35%

Indicates the status of the short term fuel trim 1.

SHRTFT2(%)–35 to 35%

Indicates the status of the short term fuel trim 2.

SHRTFT11(%)-35 to 35%

Indicates the status of the short term fuel trim bank 1, sensor 1.

SHRTFT12(%)-35 to 35%

Indicates the status of the short term fuel trim bank 1, sensor 2.

SHRTFT21(%)-35 to 35%

Indicates the status of the short term fuel trim bank 2, sensor 1.

SHRTFT22(%)-35 to 35%

Indicates the status of the short term fuel trim bank 2, sensor 2.

SO2S B2 H CUR (mA)variable

Indicates the current applied by the ECM to the bank 2 sensor 2 oxygen sensor heater circuit.

SO2S H CUR (mA)variable

Indicates the current applied by the ECM to the bank 1 sensor 2 oxygen sensor heater circuit.

SOAK TIME (min)actual time

Indicates the soak time, time since the engine last ran, in minutes.

SOC (%)0 to 100%

Indicates the battery charge status, which is the remaining capacity of the battery module.

SOL VON/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.

SPARK ADV(°)SPK ADV(°BTDC)SPRKADV(°)-25 to 50°

Indicates the spark advance status.

SPD TESTCOMPL/INCOMPL

Indicates the status of the CHECK MODE vehicle speed sensor test.

SRC_CANENABLE/DISABLE

Indicates is the starter motor relay is enabled.

ST ALPHA (%)ST ALPHA B2 (%)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)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 (%) -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 (%) 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.

ST1OFF/ON

Indicates the status of the ignition switch starter signal. ON indicates cranking.

STA SIGNALSTARTERSTARTER SIGON/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: (°)–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 in the case of 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 ENRICHWARMUP ENRICHON/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 (°)–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 RPMnot available

Indicates the engine speed when the starter is engaged.

STARTER CONTROLOFF/ON

Indicates the status of the ignition switch starter signal. On indicates cranking.

STARTER CTRLON/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 RELAYSTOP LAMP SWON/OFF

Indicates the state of the stop lamp switch, it reads ON when the brake pedal is depressed and OFF when released.

STARTER SWITCHSTARTER SWTON/OFF

Indicates the status of the starter motor switch, it reads ON with the starter engaged.

SUB BRAKE SWITCHON/OFF

Indicates the status of the idle stop sub brake switch, it reads ON when idle is stopping.

SVSMSVSOUTSVSP12V/0V

Indicates the voltage applied by the ECU to the SVS terminals.

SWITCH STATEHIGH/LOW

Indicates the position of a specific actuator switch when conducting certain functional tests. A circuit is generally LOW when actuated.

SYS GUARDOFF/ON

Indicates the status of the ETCS system guard.

SYSFAILvariable

Indicates a count of system failures, a count is recorded when a DTC is set.

TAC MTR CMD(%)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 FLTOK/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_GAUGEactual

Indicates the tachometer. Displays the engine rpm.

TACM RELAYON/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 VSVON/OFF

Indicates the status of the tank bypass vacuum switching valve for active test support data.

TANK PRES(V)TANK PRESS (V)0.0 to 5.0 V

Indicates the output signal of the fuel tank pressure sensor as volts. 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 PRESTANK PRS (kPa)(inHg)(mmHg)variable

Indicates the difference between fuel tank pressure, or vacuum, and the outside air pressure.

TANK TEMP (°)–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 LINEvariable

Indicates the target modifier pressure/target pressure control solenoid pressure status.

TARGET ENG SPDvariable

Indicates the desired rpm.

TARGET TH VALVETARGET TH VLV (ETCS)(°)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)variable

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

TAT TERMINALON/OFF

Indicates the DLC tat terminal.

TC/TE1ON/OFF

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

TC-SDLON/OFF or YES/NO

Indicates the status of the transaction control serial data link.

TCC COMMANDON/OFF

Indicates the torque converter clutch (modulated) status.

TCC SOL(%)0 to 100%

Indicates the torque converter clutch control solenoid.

TCC/CC BRAKE SWOPEN/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.

TCS INH)ON/OFF

Indicates the torque reduction inhibit signal (traction control system) status.

TCS-PGM-FION/OFF or YES/NO

Indicates the status of the traction control serial data link.

TCINHLOW/HIGH

Indicates the status of the traction control inhibitor signal.

TEMP_GAUGE-40 to 399°F or -40 to 199°C

Indicates the temperature gauge.

TEN TERMINALTESTON/OFF

Indicates the TEN terminal (data link connector) status.

TGT VLV TMNG(°)ON/OFF

Indicates the target valve timing status.

THIDLL (°)0 to 180°

Indicates the ECM learned throttle position as degrees of throttle opening.

THROTL MTR OPN DUTY(%)0 to 100%

Indicates the ETCS throttle sensor opener position value No. 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(%)0 to 100%

Indicates the ETCS throttle sensor opener position value No. 1. The normal value range is 0 to 40% when idling. When the accelerator pedal is released quickly, the duty cycle increases.

THROTTLE (°)THROTTLE (%)THROTTLE POSTP SENSOR (%)TP (%)TPS (%)TPS1 (%)TPS2 (%)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 POSITION SENSOR (V)TP (V)TPS (ECM)TPS (ETS)TPS (V)MIN. TPS (V)TPS 1 (V)TPS 2 (V)TPS1 (V)TPS2 (V)0 to 5.0 V

Indicates the throttle position (TP) sensor signal voltage, which determines throttle opening, a 1 or 2 in the parameter name indicate 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 SWCLSD/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 (°)0 to 180°

Indicates the status of the throttle valve position (ETCS), which is the relative throttle valve angle controlled by the TACV module.

THRTL CMD VAL(V)0.0 to 4.98 V

Indicates the ETCS commanded throttle position value.

THRTL LEARN VAL(V)0.0 to 5.0 V

Indicates the ETCS throttle valve fully closed learned position value.

THRTL MTR CLOSE (%)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 OPN (%)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 RELAYON/OFF

Indicates the status of the throttle relay.

THRTL REQ POS(V)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)0 to 4.98 V

Indicates the ETCS throttle sensor opener position value No. 1 (AD). The normal value range is 0.6V to 0.9V.

THRTL SSR #1 (V)0 to 4.98 V

Indicates the ETCS throttle sensor opener position value No. 1. The normal value range is 0.6V to 0.9V.

THRTL SSR #2 (V)0 to 4.98 V

Indicates the ETCS throttle sensor opener position value No. 2. The normal value range is 2.26V to 2.6V.

THROTTLE SWON/OFF

Indicates the throttle switch.

TIMETIME ON0 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.

TIMESESactual

Indicates the time since engine start.

TMBVLLOW/HIGH

Indicates the voltage level of the transmission signal (TMB) circuit.

TORQUEvariable

Indicates the net engine torque.

TP (%)TP SENSOR (V)(%)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 AGREETPS 1&2 AGREEYES/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 (°)0 to 180°

Indicates the correlation angle between TP sensor A and TP sensor B.

TP R(%)TP_REL(%)not available

Indicates the relative throttle position.

TP SENSOR-A (V)TP SENSOR-B (V)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 SWITCHON/OFF

Indicates the status of the throttle position switch, it reads ON when the throttle is fully closed.

TP(V)0.0 to 5.0 V

Indicates the throttle position in voltage.

TP_FAULTYES/NO

Indicates a throttle position sensor fault.

TP_MODEnot available

Indicates a throttle position status.

TP1(%)0 to 100%

Indicates the status of throttle position sensor 1.

TP1(V)0.0 to 5.0 V

Indicates the throttle position sensor 1 output voltage.

TP2(%)0 to 100%

Indicates the status of throttle position sensor 2.

TP2(V)0.0 to 5.0 V

Indicates the throttle position sensor 2 output voltage.

TPS1 LRN MIN(V)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)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 CTRLYES/NO

Indicates whether the vehicle has a traction control system (TCS).

TRACTION SIGNALON/OFF

Indicates the status of the traction control system (TCS) and reads ON when TCS is on.

TPCTPCT(V)0.0 to 5.0 V

Indicates the lowest closed throttle voltage.

TPS(%)0 to 100%

Indicates the throttle position.

TPS(V)0.0 to 5.0 V

Indicates the throttle position sensor signal voltage.

TQR/ECTON/OFF

Indicates the torque reduction execution signal.

TRIPYES/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 CountTRIP_CNT0 to 255

Indicates the number of OBD-II drive cycles completed since the last DTC P1000 (monitor readiness) set.

TRIP_SWON/OFF

Indicates the status of the trip reset switch.

TRVL AFTER MILactual distance

Indicates the distance traveled since the malfunction indicator lamp (MIL) was turned on.

TWC TEMP572 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.

VAC CUT BYPASSON/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 PMPON/OFF

Indicates the key off status of the EVAP system pump.

VAF RESET SIGON/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-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 VSVON/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.

VARI INTAKE VSVON/OFF

Indicates the status of the vacuum switching valve (VSV) for intake runner control.

VBAT(V)0 to 16.0 V

Indicates the battery positive voltage.

VEH SPEEDVEHICLE SPEED0 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 VALVEON/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.

VIAS S/VON/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 SOLON/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 STATUSON/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)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 VALVEON/OFF

Indicates the variable resonance induction solenoid valve.

VRIS SOL VLV 1ON/OFF

Indicates the variable resonance induction solenoid valve 1.

VRIS SOL VLV 2ON/OFF

Indicates the variable resonance induction solenoid valve 2.

VRISV1ON/OFF

Indicates the variable resonance induction system number 1.

VSA REQ TH (°)0 to 180°

Indicates the throttle position requested by the VSA module control as degrees

VSS0 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_FAULTYES/NO

Indicates a vehicle speed fault.

VT_ACT1(°)VT ACT2(°)variable

Indicates actual valve timing.

VT_DIFF1(°)VT_DIFF2(°)variable

Indicates the difference between the target and the actual valve timing.

VT_DUTY1(%)0 to 100%

Indicates the camshaft position commanded duty cycle 1 status.

VT_DUTY2(%)0 to 100%

Indicates the camshaft position commanded duty cycle 2 status.

VTC SOL DUTY (%)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 STATUSON/OFF

Indicates the status of the VTC system, it reads ON when the VTC system is active.

VTD AUTOLRN TMRON/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_DISUNTILON/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 ENABLDYES/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 FUELON/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 DISABLON/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 ENABLEON/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 OKYES/NO

Indicates whether a valid vehicle theft deterrent (VTD) password was received.

VTEC INFORMATIONnot 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 SWVTEC PRES SW B1VTEC PRES SW B2VTEC PS SWON/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 SOLVTEC SOL 1VTEC SOL 2VTEC SOL B1VTEC SOL B2ON/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(%)0 to 100%

Indicates the 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(%)0 to 100%

Indicates the 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(°)0°FR to 60°FR

Indicates the 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(°)0°FR to 60°FR

Indicates the 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 CONTROLON/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 EX CHG ANG1(°)0°FR to 60°FR

Indicates the 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 ANG2(°)0°FR to 60°FR

Indicates the 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 HOLD B1(%)0 to 100%

Indicates the 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(%)0 to 100%

Indicates the 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(%)0 to 100%

Indicates the 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(%)0 to 100%

Indicates the 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(%)0 to 100%

Indicates the 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(%)0 to 100%

Indicates the VVT OCV bank 2 intake cam commanded operation duty cycle. 10% to 50% during a requested intrusive operation at idle is considered normal.

WAC_FAULTYES/NO

Indicates a wide open throttle A/C cut-off fault.

WARM-UPS W/O NON-EMISSION FAULTS0 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 FAULTS0 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 SOL0 to 100%

Indicates the drive percentage of the wastegate solenoid valve, which regulates the boost pressure.

WIDE OPEN THROTTLES/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 SWON/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.

ZRDTYON/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.

18.7 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(°)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.

AIRAIR STATNOT 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)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(%)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)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. In these cases clearing the memory may result in inaccurate BARO values.

CATEMP11(°)CATEMP21(°)CATEMP12(°)CATEMP22(°)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 sensor or calculated by the ECM from other sensor signals.

CLR DIST(km)CLR DIST(mi)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(°)–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(°)–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(%)–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(%)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 RPM0 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 RATvariable 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 RAT11EQ RAT12EQ RAT13EQ RAT14EQ RAT21EQ RAT22EQ RAT23EQ RAT24EQ RAT31EQ RAT32EQ RAT41EQ RAT420 to 1.999

Indicates the air/fuel (A/F) ratio as commanded by the ECM for each oxygen sensor (O2S) on vehicles with linear, or wide-ratio, oxygen sensors. For example, EQ RAT11 displays the ratio for bank 1 sensor 1 (upstream O2S). EQ RAT12 is the ratio for bank 1 sensor 2 (downstream O2S). To obtain the actual A/F ratio, multiply the stoichiometric A/F ratio (14.7:1) by the displayed value.

EVAP PCT(%)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)–8192 to 8192 Pa
EVAP_VP(H2O)–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(%)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.

FRP0 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 PRESS0 to 768 kPa or 0 to 111 psi

Indicates the actual pressure in the fuel rail.

FUEL SYS1FUEL SYS2NOT 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 supplying feedback for fuel control)
- OL DRV = Open loop due to driving conditions (rapid accelerations or decelerations)

- OL FLT = Open loop due to a fault in the system
- CL FLT = Closed loop but failure with one or more oxygen sensors (one sensor may be controlling fuel delivery)

During open loop, the PCM ignores the main O2S signal. The PCM uses main O2S feedback to correct fuel injection duration during closed loop. On a cold engine, OL should display until a reliable feedback signal is received from the O2S. On a warm engine running either at idle or at 2500 RPM with no load CL should display.

Power enrichment during hard acceleration or deceleration during fuel cutoff should cause an OL DRV reading. An OL FLT reading indicates the system is operating in open loop due to a detected failure. A CL FLT reading indicates a failure has been detected by at least one O2S, but the system is still capable of maintaining closed loop operation.

IAT(°)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(°)variable

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

INTAKE AIR(°)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(%)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(%)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(%)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(%)–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(%)–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 mixture correction. Numbers below zero indicate the PCM is commanding a lean mixture.

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)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 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.

MILON/OFF

Indicates the PCM command to the malfunction indicator lamp (MIL) on the instrument panel. Readings should correspond to the actual MIL state. If not, suspect a MIL circuit problem.

MIL DIST0 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 activation 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)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)O2S31(V)
O2S32(V)O2S41(V)O2S42(V)0.0 to 1.0**

Indicates the signal voltage for each oxygen sensor (O2S) on the vehicle. For example, O2S11 shows the signal for bank 1 sensor 1 (upstream). O2S12 is the signal 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)-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 STATON/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.

RPM0 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)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(%) -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(%)–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(°)–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(%)–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(%)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(%)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(%)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(%)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(%)–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. When N/A displays, the PCM is not supported.

VEH SPEED(MPH)VEH SPEED(KPH)0 to vehicle max.

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

VPWR(V)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)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 UPS0 to 255

Indicates the number of vehicle warm-up cycles since a DTC set. A valid warm-up cycle occurs when engine coolant temperature (ECT) rises to 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 to 0 when all DTCs are cleared from memory.

18.8 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 REFRIGREADY/NOT DONE/N/A

No description available.

AIRREADY/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.

CATREADY/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.

COMPONENTSREADY/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 SYSREADY/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 SYSREADY/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 SYSREADY/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 CATREADY/NOT DONE/N/A

No description available.

MISFIRERREADY/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 SENSORREADY/NOT DONE/N/A

Indicates and monitors oxygen sensor switching frequency for degradation and circuit operation.

O2 HEATERREADY/NOT DONE/N/A

Indicates and monitors the oxygen sensor heater circuit for proper operation when heated oxygen sensors are used.

18.9 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 LAMPOFF/ON

Indicates the state of the antilock brake system (ABS) indicator lamp as commanded by the instrument panel cluster (IPC).

AIR BAG LAMPOFF/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 LAMPOFF/ON

Indicates the state of the battery indicator/charging system lamp as commanded by the instrument panel cluster (IPC).

BATTERY VOLTS0.00 to 19.0

Indicates the voltage measured at the battery positive voltage circuit of the instrument panel cluster (IPC).

BRAKE LAMPOFF/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.

CHECK GAUGES LAMPOFF/ON

Indicates the state of the cruise control system indicator lamp as commanded by the instrument panel cluster (IPC).

CRUISE CONTROLOFF/ON

Indicates the state of the cruise control system indicator lamp as commanded by the instrument panel cluster (IPC).

DIC FUEL INFO SWITCHOFF/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 SWOFF/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 SWITCHOFF/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 SWITCHOFF/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 TEMP100 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 (%)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 ODOMETER0 to 999999 MI or 0 to 999999 KM

Indicates the displayed odometer value in the instrument panel cluster (IPC).

DISPLAYED OIL PRESSURE0 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.

ENGINE RPM0 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.

GATE or CARGO DOOR AJAROFF/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 switch closes. A closed switch is displayed as ON.

HIGH BEAM LAMPOFF/ON

Indicates the state of the headlamp high beam indicator lamp as commanded by the instrument panel cluster (IPC).

IGN. CYCLES SINCE LAST DTC0 to 50

Indicates 0 to 50. The IPC counts the number of times the ignition is cycled since the current DTC was set.

IGNITION 1 (V)0.00 to 19.0

Indicates the voltage measured at the ignition 1 voltage circuit of the instrument panel cluster (IPC).

LEFT TURN SIGNALOFF/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.

LOW FUEL LAMPOFF/ON

Indicates the state of the low fuel warning indicator lamp as commanded by the instrument panel cluster (IPC).

LOW WASHER FLUIDOPEN/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.

ABS LAMPOFF/ON

Indicates the state of the antilock brake system (ABS) indicator lamp as commanded by the instrument panel cluster (IPC).

MONITORED COOLANT TEMP40 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 (%)0 to 100%

Indicates the instrument panel cluster (IPC) monitored fuel level data as provided by the PCM via serial data communication. This value may differ slightly from the displayed fuel level.

MONITORED OIL PRESSURE0 to 99 psi or 0 to 682 kPa

Indicates the instrument panel cluster (IPC) monitored oil pressure data as provided by the PCM via serial data communication. This value may differ slightly from the displayed oil pressure.

PRNDL DISPLAYPARK, 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 STATEINV, 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 SIGNALOFF/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.

SEAT BELT LAMPOFF/ON

Indicates the state of the seat belt/fasten seat belt indicator lamp as commanded by the instrument panel cluster (IPC).

SECURITY LAMPOFF/ON

Indicates the state of the security system indicator lamp as commanded by the instrument panel cluster (IPC).

SERVICE 4WDOFF/ON

Indicates the state of the serviced 4WD system indicator lamp as commanded by the instrument panel cluster (IPC).

TRIP ODOMETER AMI/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 BMI/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 SWITCHINACTIVE/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 LAMPOFF/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 SPEED0 to 155 mph or 0 to 255 kph

Indicates the vehicle speed sensor. The powertrain control module (PCM) monitors the voltage at the signal circuit of the vehicle speed sensor. The voltage is proportional to the vehicle speed. The PCM computes the vehicle speed. The instrument panel cluster (IPC) monitors the vehicle speed signal circuit from the PCM.

18.10 Powertrain Parameters

This section defines data parameters available from the engine control module or the powertrain control module (PCM). To find the description of a specific parameter, locate the parameter name in the index and then go to the listed page.

ACCS=A/CON/OFF

Indicates the position of the air conditioning cycle switch (ACCS). Reads ON if the A/C switch on the instrument panel is turned 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.

ARPMDESnot 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.

BOO=BRAKE SWON/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.

A/C RELAYON/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

CCSFaultYES/NO

Indicates the presence of a fault in the coast clutch solenoid circuit. It only reads YES when a circuit fault is present.

CoastCISolON/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)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.

ElecPrsCtrl0 to 100 psi

Indicates the PCM commanded transmission electronic control pressure. This is a calculated parameter based on PCM-controlled Pulse-Width output.

EPC (V)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.

IMTV (%)0 to 100%

Indicates the PCM-command status for the intake manifold tuning valve. At 100% the valve should be fully open.

IVSYES/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.

IXREFIXREF/QXREFnot available

Indicates the status of the learned ICMD at idle.

OutShftSp (RPM)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.

PARK/NEU POSParkNeuPosP-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.

ShiftSol1ShiftSol2ShiftSol3ShiftSol4ON/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.

ShiftSol1FaultShiftSol2FaultShiftSol3FaultShiftSol4FaultON/OFF

Indicates whether the PCM detects a fault in the shift solenoid circuits, it reads YES only when a fault is present.

TCC (%)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).

TCCFaultYES/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)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).

TCILFaultYES/NO

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

TCS FUEL-CUTON/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 STANDBYLOW/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.

ThrPosMODEsee below

Indicates the throttle closed position (TP) as calculated by the PCM based on the 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.

TP=TPS (V)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.

TPCT (V)not available

Indicates the most recent throttle position (TP) sensor voltage at closed throttle (throttle position closed throttle).

TR_V0.0 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	ODRIVE	1.5 V
REVERSE	1.5 V	MAN2	0.0 V
NEUTRAL	1.5 V	MAN1	0.0 V
Readings may vary (+ or —) by 0,3V			

TrnCtrlIndLampON/OFF

Indicates the status of the transmission control indicator lamp. It reads ON when “Overdrive Cancel” is requested and an indicator lamp is lit.

TrnCtrlSwON/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)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.

TurbSpds (RPM)0 to 8192

Indicates the speed of the transmission turbine shaft.

WAC=WOT A/CON/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.

18.11 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 LAMPON/OFF

Indicates the transfer case shift control module command status to the 2WD high indicator lamp on the instrument panel.

4WD HIGH LAMPON/OFF

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

4WD LOW ACTVYES/NO

Indicates whether 4WD LOW is the current commanded mode in which the automatic transfer case (ATC) is operating.

4WD LOW LAMPON/OFF

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

ATC SLIP (RPM)SLIPPAGE (RPM)ON/OFF

Indicates whether slip has been detected by the transfer case shift control module.

AUTO 4WD LAMPON/OFF

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

CUR SLIP ADAPTS0 to 65,025

No information is currently available for this parameter.

ENCODER GEARsee 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 VOLTAGE0.0 to 7.5 V

Indicates the feedback voltage measured by the transfer case shift control module at the encoder signal return.

ENCODER SUPPLY VOLTAGE0.0 to 7.5 V

Indicates the voltage supplied to the transfer case shift control module.

F AXLE REQON/OFF

Indicates the state of the front axle switch request from the transfer case shift control module.

F AXLE SW LCKDYES/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)0 to 8192 rpm

Indicates the transfer case shift control module calculated speed of the front or rear propshaft.

IGN CYCLE DTCactual count

Indicates how many ignition cycles have occurred since the last current DTC set.

MODE SW SELECTEDsee 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 VOLTAGE0.0 to 5.0 V

Indicates the feedback signal (return voltage) from the transfer case shift control switch.

MOTOR A (mA)MOTOR B (mA)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.

NEUT LIGHTON/OFF

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

SLIP ADPT DC (%)0 to 100%

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

SOFTWARE IDYES/NO

Indicates whether the current calibration ID number is valid.

SVC 4WD LAMPON/OFF

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

XFER CASE LCKDYES/NO

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

18.12 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 INDICATORON/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 SWITCHON/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) _____ 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) _____ 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 SOLENOID2-3 SOLENOID_____ON/OFF

Indicates the PCM commanded valve state of the 1-2 and 2-3 solenoids. All the shift solenoids are normally closed. This means that no fluid passes through when the solenoid is commanded OFF. When commanded ON, the solenoid opens and allows fluid to flow.

As shown in Table 18-8, the solenoid ON and OFF states match certain gear positions. Check the factory manual for a chart for the specific transmission being serviced.

Table 18-8 1-2 and 2-3 solenoid parameter readings

1-2 SOLENOID	2-3 SOLENOID	GEAR
ON	ON	1st
OFF	ON	2nd
OFF	OFF	3rd
ON	OFF	4th

1-2 SOL CKT STATUS2-3 SOL CKT STATUS3-2 SOL CKT STATUS
TCC DUTY SOL CKT STATUS
TCC ENAB SOL CKT STATUS
OPEN/SHORTED, SHORT to VOLTS, OK, INDE-
TERMINATE

Indicates the status of the solenoid valve driver feedback voltage signal circuit. OPEN/SHORTED will display if the voltage is low when the solenoid is commanded off. SHORT TO VOLTS will display if the voltage is high when the solenoid is commanded on. OK will display if no circuit fault is present. If the control module cannot determine the circuit status or an invalid signal was received, INDETERMINATE will display.

1ST GEARactual

Indicates the gear commanded by the module.

2 INDICATORON/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 SWITCH2ND SELECTEDON/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_CCSON/OFF

Indicates the coast clutch solenoid.

2-4 BRK PRS SWON/OFF

Indicates the 2-4 brake pressure switch.

2-4 BRK SOL(%)0 to 100%

Indicates the 2-4 brake solenoid.

24B(%)0 to 100%

Indicates the 2-4 brake solenoid.

2ND GEARactual

Indicates the gear commanded by the module.

2nd PRESSURE SWITCH2nd PRESSURE SWTON/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 SOLON/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 TIMEON/OFF

Indicates the 3-2 timing solenoid valve.

3-2 TIMING SOLON/OFF

Indicates the 3-2 timing solenoid valve.

3RD GEARactual

Indicates the gear commanded by the module.

3rd PRESSURE SWITCH3rd PRESSURE SWTON/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 DOWNSHIFTYES/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 GEARactual

Indicates the gear commanded by the module.

4th PRESSURE SWITCH4th PRESSURE SWTON/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.

4WD CPWM ON/OFF/FAIL/B+

Indicates the 4WD clutch PWM status.

4WD CPWM STvariable

Indicates the 4WD clutch PWM status.

4WD MODE_LON/OFF

Indicates the 4x4 low mode.

5TH GEARactual

Indicates the gear commanded by the module.

A/C ENABLEDON/OFF

Indicates the air conditioning switch

A/T 1 SWITCH/A/T 1 SWTON/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 SWTON/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 SWTON/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**
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**
not available

Indicates the TCM commanded current applied to clutch pressure control solenoid valve A in amperes.

A/T D SWITCH/A/T D SWTON/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 SWTON/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 SWTON/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 SWTON/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 SWTON/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/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 SWTON/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 SWTON/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 AA/T SHIFT SOL VLV BA/T SHIFT SOL VLV CA/T SHIFT SOL VLV DA/T SHIFT SOL VLV ESHIFT SOL ASHIFT SOL BSHIFT SOL CSHIFT SOL DSHIFT SOL EON/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 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_ACTIVON/OFF

No additional information is available for this parameter.

ACCEL SWITCHON/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/CON/OFF

Indicates the air conditioning status.

ACT VLV TMNG(°)variable

Indicates the actual valve timing.

AFSAAFSBLOW/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 LOW. A HIGH reading means 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 VAP SENSOR2 VAP SENSOR A VOLTAP SENSOR B VOLT0.0 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 (°)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 CRUISEON/OFF

Indicates whether the automatic speed control (cruise) has been activated, it reads ON when cruise control is on.

AT OD CANCELON/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 INDICATORATF SENSORATF TEMP SENSOR (°)FLUID TEMP (°)TRANS FLUID (°)TRANS TEMP (°)TFT (°)–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)0.0 to 5.0 V

Indicates the signal voltage of the automatic transmission fluid (ATF) temperature sensor.

ATF TEMP INDICATORON/OFF

Indicates the status of the automatic transmission fluid (ATF) overheat indicator lamp. It reads ON, and the lamp is lit, only when the ATF exceeds the maximum recommended temperature.

BAROBARO(V)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)0 to 16 V

Indicates the battery voltage.

BLOWR FAN SWON/OFF

Indicates the blower motor.

BOOBrakeOnOffON/OFF

Indicates the brake on and off.

BRAKE SWON/OFF

Indicates the brake switch input status.

CALC TPS(%)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)–16.0 V to 16.0 V

Indicates the case ground.

CCS_FAULTCCSFaultYES/NO

Indicates the coast clutch solenoid status.

CLCH_SOL(%)0 to 100%

Indicates the (PWM) output control command #1.

CoastClSol(mA)not available

Indicates the coast clutch solenoid in milli-amps.

CoastClutchSolON/OFF

Indicates the coast clutch solenoid.

COUNTERSHAFT SPEED (km.h)(MPH)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)0 to vehicle max.

Indicates the rotational speed of the countershaft, which is based on the signal from the counterspeed sensor.

CPP_SWDEPRESSED/RELEASED

Indicates the clutch pedal position switch.

**CURRENT GEAR1ST, 2ND, 3RD, 4TH, or CREEP
GEAR1, 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 INDICATORON/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 SWITCHON/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 SWITCHactual

Indicates the transmission D range switch.

D3 INDICATORON/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 SWITCHON/OFF

Indicates the status of the D3 switch. It reads ON only when the shift selector lever is in the D3 position.

D4 INDICATORD4/D5/D INDICATORD5 INDICATORON/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 SWITCHON/OFF

Indicates the status of the D5 switch. It reads ON only when the shift selector lever is in the D5 position.

DCCSV DC (%)0 to 100.0%
DCCSV SLIP (RPM)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)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)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)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 1DOWNSHIFT REQ 2DOWNSHIFT REQUEST 1DOWNSHIFT REQUEST 2ON/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 SWITCHDOWNSHIFT SWTDWN_SWON/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 CountDRIVECNTDTCDTC_CNT0 to 255

Indicates the valid drive counter.

DRIVE POSITIONON/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_SWON/OFF

Indicates the drive switch.

DWN_SWON/OFF

Indicates the downshift switch.

ECL (%)95 to 105%

Indicates the status of the clutch slip ratio as a percentage. Check after warm up in D4 range at a steady cruise speed.

ECT(V)0.0 to 5.0 V

Indicates the engine coolant temperature voltage.

ECT_TCM0.0 to 5.0 V

Indicates the (ECT) transmission control module.

ElecPrsCtrlEPC0 to 100%

Indicates the electronic pressure control.

EPC(V)0.0 to 5.0 V

Indicates the electronic pressure control voltage.

ENGINE SPEED (RPM)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)0 to engine max.

Indicates engine speed as converted from the crankshaft position (CKP) sensor. The value of each RPM is displayed.

ESTIMAT SPD RATvariable

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 (%)0 to 100%

Indicates the electric control lock-up clutch slip ratio. A 100% reading indicates the lock-up clutch is fully engaged.

FASLOW/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, simultaneously the AFSA or AFSB parameter should read LOW.

FAT TERMINALON/OFF

Indicates the (DLC) fat terminal.

FLG_OTLKYES/NO

Indicates the transmission over-temperature lock-up mode.

FLUID_TEMPFLUID TEMP(V)0.0 to 5.0 V

Indicates the transmission fluid temperature.

FORWARD SWITCH)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.

GEARactual

Indicates the gear commanded by the module.

GEAR_MAXvariable

Indicates the highest gear allowed.

GEAR_RAGEAR RATIO to 100%

Indicates the transmission gear ratio.

GEAR RATIOGR_RATIO0.000 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 LIGHTON/OFF

Indicates the generator warning light.

GEN OUT(V)0 to 18 V

Indicates the generator output voltage.

GEN(%)0 to 100%

Indicates the generator field current control duty signal.

HC PRES SWON/OFF

Indicates the high clutch pressure switch.

HC(%)HC_SOL(%)0 to 100%

Indicates the high clutch solenoid.

HEADLIGHT SWON/OFF

Indicates the headlight switch.

HI CLUTCH(%)0 to 100%

Indicates the high clutch solenoid.

HI PS PRESSUREON/OFF

Indicates the power steering pressure switch.

HIGH GEARYES/NO

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

HOLD LIGHTON/OFF

Indicates the transmission control indicator/hold light.

HOLD SWITCHON/OFF

Indicates the overdrive cancel switch/hold switch.

HOT MODEON/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.

IAC=IDLE AIR(%)0 to 100%

Indicates the idle air control.

IAT=ACT-40 to 399°F or -40 to 199°C

Indicates the intake air temperature.

IAT=ACT(V)0.0 to 5.0 V

Indicates the intake air temperature voltage.

IGN ADVANCE(°)0 to 100%

Indicates the spark advance.

IGN_V0.0 to 16.0 V

Indicates the ignition voltage.

ILM CONTROLON/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.

INDICATORSON/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, the appropriate indicator light blinks as well.

INGEARYES/NO

Indicates the in gear status.

INJ(mS)0.0 to 99.9 mS

Indicates the fuel pulse width.

INPUT RPMactual

Indicates the turbine shaft speed.

K/D SERVO SWON/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 SWKICKDOWN SWON/OFF

Indicates the ECM command for a downshift during acceleration, it reads ON if the ECM has commanded a downshift.

KICK-DOWN SWITCHON/OFF

Indicates the status of an accelerator pedal switch. It reads ON when the pedal is fully depressed to initiate a transmission downshift.

L SWITCHON/OFF

Indicates the transmission L range switch.

LAST SHFT (SEC)0 to 6.38 sec

Indicates the actual shift time of the last upshift.

LEDAON/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.

LEDBON/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.

LEDCON/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 POSP/N, REV, DRIVE, 2ND, 1ST

Indicates the position of the shift selector lever.

LINE PRES (%)LPS (%)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 (%)0 to 100%

Indicates the desired line pressure the ECM is attempting to maintain as a percentage of base line pressure. Indicates target modifier pressure and target pressure of the control solenoid.

LOAD PCT(%)0 to 100%

Indicates the engine load.

LOAD(%)0 to 100%

Indicates the engine load.

LOCKUP B DUTY (%)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 INDICATORON/OFF

Indicates the status of the low/hold indicator lamp on the instrument panel. Reads on when the panel lamp is on.

LOW HOLD SWITCHLOW HOLD SWTON/OFF

Indicates the status of the low/hold switch on. Reads on when the switch is on.

LPS(%)0 to 100%

Indicates the line pressure solenoid.

LPS(A)0.0 to 5.0 A

Indicates the line pressure solenoid.

LRB(%)0 to 100%

There is no additional information available for this parameter.

MAF(V)MAF=MASS AIR(V)0.0 to 5.0 V

Indicates mass air flow.

MAINSHAFT SPEED (km/h)(MPH)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 INDICATORON/OFF

Indicates whether the shift selector lever is operating in the manual mode position, it reads ON when in manual mode.

MEAS_SSC(A)0.0 to 5.0 A

Indicates the measured current shift solenoid C.

MEAS_SSD(A)0.0 to 5.0 A

Indicates the measured current shift solenoid D.

MEAS_SSE(A)0.0 to 5.0 A

Indicates the measured current shift solenoid E.

MEAS_SSF(A)0.0 to 5.0 A

Indicates the measured current shift solenoid F.

MILON/OFF

Indicates the malfunction indicator lamp.

MLN_SWON/OFF

Indicates whether the throttle plate is open.

MNL_SWON/OFF

Indicates the manual range switch.

MTSWAT/MT

Indicates manual trans/auto trans discrimination signal.

N INDICATORON/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 SWITCHON/OFF

Indicates the park/neutral status.

NC(0) RPMNC(2) RPM0 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)ON/OFF

Indicates the neutral switch circuit.

N-SHIFT SOLON/OFF

Indicates the N-Shift solenoid.

O/D OFF INDICATORON/OFF

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

O/D OFF_HOLD SWOD OFF SWON/OFF

Indicates the overdrive cancel switch/hold switch.

**O/D SWO/D SWITCHOVERDRIVE SWON/OFF
OD ENABLEDYES/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 SOLENOIDON/OFF

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

OD CUT #2ON/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 illuminates a panel lamp.

OD INDICATORON/OFF

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

OD OFF LIGHTON/OFF

Indicates the transmission control indicator light.

ODOMETER (km)(miles)actual distance

Indicates the distance driven since the TCM (PCM) was last reset.

OP_SWON/OFF

Indicates the oil pressure switch.

OP_SW_24BON/OFF

Indicates the 2-4 brake pressure switch.

OP_SW_LRBON/OFF

Indicates the oil pressure switch.

OS_SRC0 to vehicle max.

Indicates the output shaft speed.

OSS(RPM)0 to vehicle max.

Indicates the output shaft speed.

OSS_FAULTYES/NO

Indicates the output shaft speed status.

OutShftSp(RPM)0 to vehicle max.

Indicates the output shaft speed.

OUTPUT RPM0 to vehicle max.

Indicates the speed of the transmission output shaft.

OVERRUN CLUTCHON/OFF

Indicates the ECM command status for the overrun clutch solenoid valve. The solenoid valve should be open when the reading is ON.

P INDICATORON/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 SWPWR/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 SWPNP SWITCHPNP_SWPNP SWTON/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)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 ParkNeuPosPARK/NEUT

Indicates the Park/Neutral position.

P/S PRESS SW ON/OFF

Indicates the power steering pressure switch.

PCANot available

Indicates the pressure control solenoid A.

PCA_FAULT YES/NO

Indicates the pressure control solenoid A status.

PCAA(A) 0.0 to 5.0 A

Indicates the pressure control solenoid A (AMP).

PCBNot available

Indicates the pressure control solenoid B.

PCB_FAULT YES/NO

Indicates the pressure control solenoid B status.

PCBA(A) 0.0 to 5.0 A

Indicates the pressure control solenoid B (AMP).

PCFNot available

Indicates the line pressure control.

PCF_FAULT YES/NO

Indicates the line pressure control status.

PCFA(A) 0.0 to 5.0 A

Indicates the line pressure control (AMP).

PCGNot available

Indicates the converter pressure control.

PCG_FAULT YES/NO

Indicates the converter pressure control status.

PCSV DC (%) 0 to 100.0%

Indicates the duty cycle (DC) of the pulse-width-modulated (PWM) signal applied to the pressure control solenoid valve (PCSV). The PCSV regulates hydraulic pressure to the clutches during shifting.

PCS ACT(AMP)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)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(%)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 SWON/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 in the power mode.

PNPON/OFF

Indicates the clutch pedal position switch/neutral switch circuit status.

PULSE GEN-APULSE GEN-B0 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 SWPWR/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 INDICATORON/OFF

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

R SWITCHON/OFF

Indicates the transmission R range switch.

RED TIMING SOLON/OFF

Indicates the reduction timing solenoid.

REV POS SWITCHREV_SWREVERSE SWITCHON/OFF

Indicates the status of the reverse switch. It reads ON only when the shift selector lever is in the R position.

RPMnot available

Indicates the engine speed.

S MODE SWITCHON/OFF

Indicates the status of the mode switch. It reads ON when the switch is on.

S SWITCHON/OFF

Indicates the transmission S range switch.

SELF DIAG LAMPON/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)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)

[Continued on Next Page]

SHIFT AON/OFF

Indicates the state of shift solenoid A.

SHIFT BON/OFF

Indicates the state of shift solenoid B.

SHIFT SOL AON/OFF

Indicates the state of shift solenoid A.

SHIFT SOL BON/OFF

Indicates the state of shift solenoid B.

SHIFT SOL CON/OFF

Indicates the state of shift solenoid C.

ShiftSol1ShiftSol2ShiftSol3ShiftSol4ON/OFF

Indicates the PCM commands for the shift solenoid. Reads ON when the PCM has command.

ShiftSol1FaultShiftSol2FaultYES/NO

Indicates the shift solenoid status.

SHIFT CONTROLvariable

Indicates the shift position that the TCM intends to control the automatic transmission with.

SHIFT LIGHTON/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 LOCKLOW/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 SOLON/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 NUMBERnot available

Indicates changing the speed data number used for internal calculations.

SHIFT SOL ASHIFT SOL BON/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 SOL A	ON	OFF	OFF	ON
SHIFT SOL B	ON	ON	OFF	OFF

SCSOPEN/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_DESnot available

Indicates the desired torque converter slip in rpm.

SLN SOLENOIDON/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 SOLENOIDON/OFF

Indicates the ECM command status for the SLT solenoid, which modulates main line pressure. Reads ON when the solenoid is energized.

SLU SOLENOIDON/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 INDICATORON/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 SWITCHON/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)variable

Indicates the status of the supply voltage to the solenoid valves.

SPARK ADV(°)actual

Indicates the spark advance in degrees.

SPEED RATIO0.00:1 to 8.00:1

Indicates the ratio of engine speed to transmission speed, which the TCM uses to estimate gear ratios.

SS MODE SWITCHSS MODE SWTON/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_SS1ON/OFF

Indicates the state of shift solenoid 1.

SSA_SS1(%)0 to 100%

Indicates the state of shift solenoid 1 percentage.

SSA_SS1_FAULTYES/NO

Indicates the state of shift solenoid 1 status.

SSB_SS2ON/OFF

Indicates the state of shift solenoid 2.

SSB_SS2(%)0 to 100%

Indicates the state of shift solenoid 2 percentage.

SSB_SS2_FAULTYES/NO

Indicates the state of shift solenoid 2 status.

SSC_SS3ON/OFF

Indicates the state of shift solenoid 3.

SSC_SS3(%)0 to 100%

Indicates the state of shift solenoid 3 percentage.

SSD_SS4ON/OFF

Indicates the state of shift solenoid 4.

SSE_SS5ON/OFF

Indicates the state of shift solenoid E/5.

START SIGON/OFF

No additional information is available for this parameter.

T-CASE RATIOvariable

Indicates the ratio of the transfer case, calculated by engine speed, divided by transmission output speed based on transmission commanded gear.

TARG LINE60 to 300 psi

Indicates the target modifier pressure/target pressure control solenoid pressure.

TC_SLIP(RPM)not available

Indicates the torque converter slip actual.

TCC BRAKE SWOPEN/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, the PCM receives a feedback, and, if equipped, the switch vents the cruise control servo to atmosphere.

Reads OPEN when the brake pedal is applied (brake switch open) to disengage the torque converter clutch and cruise control, and CLSD when the brake pedal is released (brake switch closed).

TCC COMMANDTCCCTCC PWM ENABLEDTCC SOLENOIDON/OFF TCC ENABLEDYES/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(%)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 EFFICIENCY0.0 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 ENABLEDTCC ENABLE SOLTCC SOLYES/NO

Indicates the PCM commanded state of the torque converter clutch (TCC) solenoid and reads YES when the TCC solenoid is energized.

TCC GROUNDEDYES/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 most useful to ensure that the ECM is not at fault when the TCC solenoid does not energize.

TCC RELEASEYES/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)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 (%)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(%)0 to 100%

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

TCC_FAULTYES/NO

Indicates a torque converter clutch fault.

TCC_MES(A)0.0 to 5.0 A

Indicates the measured current for the TCC pressure control.

TCCA(V)0.0 to 5.0 V

Indicates the torque converter clutch actual.

TCCC(%)0 to 100%

Indicates the torque converter clutch control solenoid.

TCCFaultYES/NO

Indicates the torque converter clutch fault.

TCCMACT(RPM)actual

Indicates the torque converter slip actual.

TCILON/OFF

Indicates the transmission control indicator light.

TCIL_FAULTTCILFaultYES/NO

Indicates the transmission control indicator light fault.

TCSON/OFF

Indicates the overdrive cancel switch/hold switch status.

TCS ACTIVEYES/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 SWPARK, 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 CON/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, which regulates line pressure, TCC engagement, and shift solenoid operation.

TFT-40 to 399°F or -40 to 199°C

Indicates the transmission fluid temperature.

TFT(V)0.0 to 5.0 V

Indicates the transmission fluid temperature voltage.

TFT_FAULTYES/NO

Indicates a transmission fluid temperature fault.

THROTTLE SWON/OFF

Indicates the throttle switch.

THROTTLE(%)0 to 100%

Indicates the throttle position.

ThrPosMODEPT/WOT/CT

Indicates the throttle position.

TORQ DELIV(Nm)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.

TORQUEactual

Indicates the net engine torque.

TP MODETP(%)0 to 100%

Indicates the throttle position percentage.

TP(V)0.0 to 5.0 V

Indicates the throttle position voltage.

TP_FAULTYES/NO

Indicates a throttle position sensor fault.

TP_PER(%)0 to 100%

No additional information is available for this parameter.

TP=TPS(V)0.0 to 5.0 V

Indicates the throttle position voltage.

TPCT(V)0.0 to 5.0 V

Indicates the lowest closed throttle voltage.

TPS(%)0 to 100%

Indicates the throttle position percentage.

TPS(V)0.0 to 5.0 V

Indicates the throttle position voltage.

TPS/80 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

TRactual

Indicates the transmission range.

**TR SW(A)TR SW(B)TR SW(C)TR SW(P)HI/LO
TR SW A/B/C/PHI/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 SWITCHsee 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. The table below shows switch logic.

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_FAULTYES/NO

Indicates a transmission range fault.

TR_POSactual

Indicates the transmission range.

TRANS CTRL LAMPON/OFF

Indicates the transmission control indicator light.

TRANS SLIP CNT0, 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.

TransRangeTransRange(V)0.0 to 5.0 V

Indicates the transmission range.

TransRange_DTRDON/OFF

Indicates the transmission range switch.

TRIPYES/NO

Indicates the on-board diagnostic trip has completed.

TRIP CouNTTRIP_CNT0 to 255

Indicates the number of on-board diagnostic trips completed.

TRLON/OFF

Indicates the transmission L range switch.

TrnAxleRLRNnot available

No additional information is available for this parameter.

TrnCtrlIndLampON/OFF

Indicates the transmission control warning indicator.

TrnCtrlSwON/OFF

Indicates the transmission range.

TrnFluidTmp(V)0.0 to 5.0 V

Indicates the transmission fluid temperature.

TRRON/OFF

Indicates the transmission R range switch.

TRSON/OFF

Indicates the transmission S range switch.

TS_SRCTSS(RPM)TurbSpdS(RPM)0 to vehicle max.

Indicates the turbine shaft speed.

TSLIPRAT(1000:1)actual

Indicates the transmission slip ratio.

TSS_FAULTYES/NO

Indicates a turbine shaft speed fault.

UP SHIFT SWITCHUP SHIFT SWTON/OFF

Indicates whether the shift selector lever has been moved to initiate an upshift, reads ON if an upshift has been requested.

UP_SWON/OFF

Indicates whether the ECM is allowing an upshift, reads ON when an upshift is allowed.

VBATT(V)0.0 to 16.0 V

Indicates the battery position voltage.

VEH SPEED0 to vehicle max.

Indicates the vehicle speed.

VPoWeR(V)VPWR(V)0.0 to 16.0 V

Indicates the battery positive voltage.

VPWR=BATT(V)0.0 to 16.0 V

Indicates the module supply voltage.

VSS0 to vehicle max.

Indicates the vehicle speed.

VSS (METER)0 to vehicle max.

Indicates the digital input from the VSS analog-to-digital converter in the instrument meter.

WAC=WOT A/CON/OFF

Indicates the wide open throttle air conditioning cut out.

The following Vehicle Communication and Troubleshooter software products are also available for your scan tool.

Vehicle Communication Software (VCS):

- US Domestic
- BMW
- Volkswagen/Audi
- Mercedes

Troubleshooter software:

- US Domestic Driveability Troubleshooter
- Asian Import Driveability Troubleshooter
- US Domestic Transmission Troubleshooter
- Asian Import Transmission Troubleshooter
- ABS Troubleshooter (Asian and US Domestic)

The vehicles listed in the following sections are specific Asian Import models that may have problems communicating with the scan tool.

B.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 & 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.

B.2 Codes & 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 231.

For a detailed explanation, refer to Troubleshooter References TA043 and TA044.

B.3 Ford EEC-V Control System on Mazda

These vehicles use a Ford EEC-V control system, which is identical to the system used on Ford vehicles. Use the US Domestic Vehicle Communication Software and select Ford from the Manufacturer Selection menu to test this system.



To test the terminal voltages:

- Test the terminal voltages using a voltmeter. Figure B-1 maps the data link connector. Refer to Table B-1 for corresponding voltages.

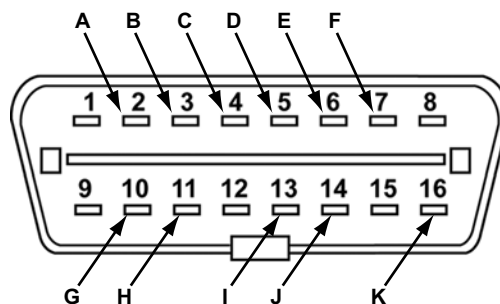


Figure B-1 Data link connector

- A—J1850 BUS +
- B—CAN medium speed +
- C—Case ground
- D—Power ground
- E—CAN high speed +
- F—ISO K-line/KW2000
- G—J1850 BUS -
- H—CAN medium speed -
- I— Module programming signal
- J— CAN high speed -
- K—Battery B +

Table B-1 Test 16-pin DLC Terminal Voltages

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

B.4 No Communication for 1987–90 Nissan

For a communication problem with 1987–90 Nissan models¹, 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.

¹ Except 1987 Sentra and 1990 300ZX.

See “Code Types 07” on page 152 for detailed instructions.

B.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 B-2).

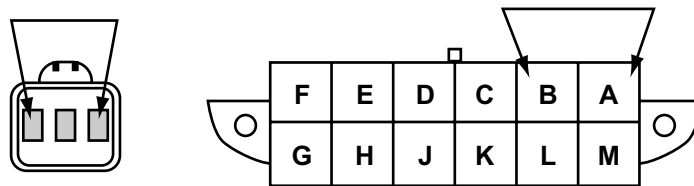


Figure B-2 Jump these pins to flash codes on the CHECK ENGINE lamp

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 B-3.

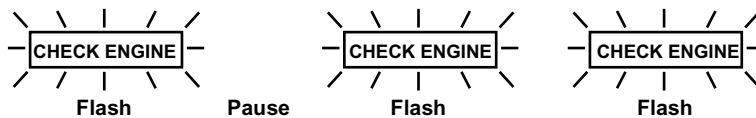


Figure B-3 Code 12 on CHECK ENGINE lamp

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 B-4) if the CHECK ENGINE lamp does not flash code 12, or if it does but the scan tool does not receive data.

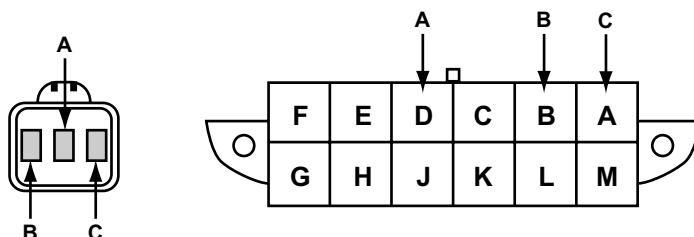


Figure B-4 Isuzu and Isuzu-built Geo ALDL 3-pin and 12-pin connectors

A—CHECK ENGINE lamp/data transmission

B—Test or diagnostic enable

C—Ground



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 B-5 on page 437).
 - Higher readings indicate a high-resistance ALDL ground connection.
 - If the meter reads 5 V, the ALDL ground connection is open.

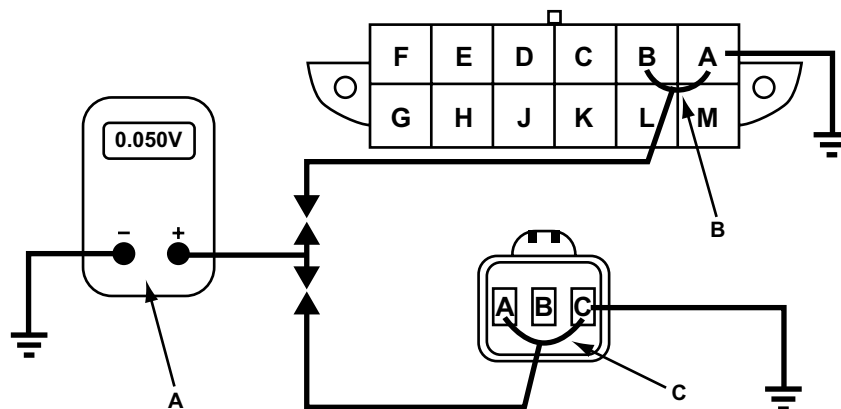


Figure B-5 Ground continuity for the ALDL connector

A—Voltmeter

B—Jump pin B to pin A

C—Jump pin A to pin C



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 goes off with the engine running, meter readings should rise to 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

frame

One complete data package, or transmission cycle, from an electronic control module (ECM) that provides serial data of control system operating parameters.

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

KOEO

Key On, Engine Off

KOER

Key On, Engine Running

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 (MPFI).

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

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