

# ***OBIS Safety and Emissions Analyzer***

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## **Operating Instructions** **Texas**

***Snap-on Diagnostics***

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# Using this Manual

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This manual contains instructions for set-up and use of the vehicle emissions inspection/maintenance (I/M) analyzer. It contains a table of contents to make information easy to find.

## Using I/M Software

This manual assumes that the I/M software is properly installed and operating on a host compatible with the software. The instructions assume that the operator has a basic understanding of personal computer (PC) operation. For PC-related questions refer to the other manuals accompanying the host computer.

### IMPORTANT

**The computer supplied with the analyzer is not equipped with virus protection software. It is strongly recommended that you purchase and install virus protection software on the computer hard drive.**

- ✓ You will be billed for all computer virus service calls.

### IMPORTANT

**The computer supplied with the analyzer has no surge protection or battery backup. It is strongly recommended that you purchase and install a surge protector or universal power supply (UPS) battery backup with surge protection, to avoid damage from power fluctuations and improper shutdowns.**

This manual is designed for use in conjunction with the on-line software HELP built into the analyzer. Press F1 on the keyboard to display HELP messages on the analyzer screen.

## Warranty Service

Repair and service must be performed according to your warranty/service agreement. Refer to the warranty statement, a separate document provided with the analyzer, for exact coverage and details. Call **EquiServ** at 1-800-225-5786 for analyzer repair service.

## Conventions

This section lists the various types of information used in this manual.


## Check Note

A check note provides additional information about the subject in the preceding paragraph.

*Example:*

- ✓ You will be billed for all computer virus service calls.

## Testing Tips

Testing tips provide information that applies to a specific test. Each testing tip is introduced by this icon  for easy identification.

*Example:*

 Read and follow all Safety Messages in this manual.

## Chapter References

Additional information in text is referenced by chapter section and page number.

*Example:*

See [Monitor Screens, page 1-19](#).

## Equipment Damage

The possibility of damage to vehicle or equipment is introduced by a signal word indicating this condition.

*Example:*

**IMPORTANT**

**To prevent hard drive corruption, always power-down the analyzer computer by turning off the main power switch, located on the back of the analyzer, when an analyzer system menu is displayed.**

## Safety Messages

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

**DANGER**

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

**WARNING**

**Indicates a potential hazard which, if not avoided, could result in death or serious injury to the operator or to bystanders.**

**CAUTION**

**Indicates a potential hazard which, if not avoided, may result in minor or moderate injury to the operator or to bystanders.**

The three-part message panel, used with safety messages, uses three different type styles to further define the potential hazard:

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



Some safety messages contain visual symbols with signal words.

*Example:*



Risk of burns.

**Do not remove radiator cap unless engine is cold.**

**Pressurized engine coolant may be hot.**

*Hot engine coolant can cause serious burns.*

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# ***Safety Information***

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For your safety, read this manual thoroughly before operating the Analyzer System.

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

There are many variations in procedures, techniques, tools and parts for servicing vehicles, as well as in the skill of the individual doing the work. Because of the vast number of test applications and variations in the products that can be tested with this instrument, the manufacturer cannot possibly anticipate or provide advice or safety messages to cover every situation. It is the automotive technician's responsibility to be knowledgeable of the system that is to be 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 the equipment or vehicle being tested.

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

Before using the Analyzer System, always refer to and follow the safety messages and applicable test procedures provided by the manufacturer of the equipment or vehicle being tested.

## **Read All Instructions**

Read all instructions and safety messages in this manual. All safety messages in this section contain a signal word, a three-part message, and, in some instances, a symbol/pictorial.

The signal word indicates the level of hazard in a situation.

- **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 bystanders.
- **Caution** indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor injury to the operator or bystanders.

Safety messages in this section 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.

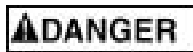
## IMPORTANT SAFETY INSTRUCTIONS



Risk of electric shock.

- **Connect power cord to properly grounded outlet. Do not remove or bypass the grounding pin.**
- **Do not touch ignition coils, coil terminals and spark plugs while operating. Ignition coils, coil terminals and spark plugs emit high voltage.**
- **Use extreme care when working around spark plugs, spark plug wires and coil terminals while engine is running.**
- **Do not use any test lead, pickup or adaptor, other than those intended for use with this product.**

*Electric shock can cause serious injury.*



Risk of poisoning.

- **Use this equipment in locations with mechanical ventilation providing at least four air changes per hour. Engine exhaust contains carbon monoxide gas, a colorless, odorless lethal gas.**
- **Route exhaust outside while testing with engine running.**

*Poisoning can result in death or serious injury.*



Risk of explosion.

- **Wear safety goggles and protective clothing, user and bystander.**
- **Use this equipment in locations with mechanical ventilation providing at least four air changes per hour.**
- **Do not smoke, strike a match, place metal tools on battery or cause a spark in the vicinity of the battery. Battery gases can ignite.**
- **Avoid making accidental connection between battery terminals through tools, jumper leads, etc.**
- **Properly secure calibration gas bottle to prevent damage. Damaged gas bottles can explode.**

*Explosion can cause death or serious injury.*



Risk of fire.

- **Wear safety goggles and protective clothing, user and bystander.**
- **Do not position head directly over or in front of the carburetor or throttle body. Do not pour gasoline down the carburetor or throttle body when cranking or running the engine, when working with fuel delivery systems or any open fuel line. Engine backfire can occur when the air cleaner is out of normal position.**
- **Do not use carburetor sprays or fuel injector cleaning solvents when performing diagnostic testing.**
- **Keep a dry chemical (Class B) fire extinguisher rated for gasoline, chemical and electrical fires in the work area.**

*Fire can cause death or serious injury.*



Risk of fire.

- **Be aware that many systems maintain residual pressure in the line after the engine is turned off.**
- **Wipe up fuel spills immediately.**
- **Turn vehicle off before connecting or disconnecting equipment.**
- **Keep shop rags, towels, paper, oils, fuel, plastics and other combustible materials clear of vehicle exhaust and evacuation hoses.**
- **Keep a dry chemical (Class B) fire extinguisher rated for gasoline, chemical and electrical fires in the work area.**

*Flames can cause serious injury.*



Risk of expelling fuel, oil vapors, hot steam, hot toxic exhaust gases and other debris.

- **Wear safety goggles and protective clothing, user and bystander.**
- **Engine systems can malfunction expelling fuel, oil vapors, hot steam, hot toxic exhaust gases and other debris.**

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



Risk of burns.

**Do not remove radiator cap unless engine is cold. Pressurized engine coolant may be hot.**

*Hot engine coolant can cause serious burns.*



Risk of burns.

- **Do not touch hot exhaust systems, manifolds, engines, radiators, sample probe, etc.**
- **Wear gloves when handling hot engine components, such as PCV and EGR valve.**
- **Wear gloves when handling hot exhaust sample probe.**

*Hot components can cause burns.*



The engine compartment contains electrical connections and hot or moving parts.

- **Do not place test equipment or tools on fenders or other places in the engine compartment.**
- **Keep yourself, test leads, clothing and other objects clear of electrical connections and hot or moving engine parts.**
- **Keep hands, feet, clothing and test equipment away from moving parts.**
- **Barriers are recommended to help identify danger zones in test area.**

*Contact with electrical connections and hot or moving parts can cause injury.*

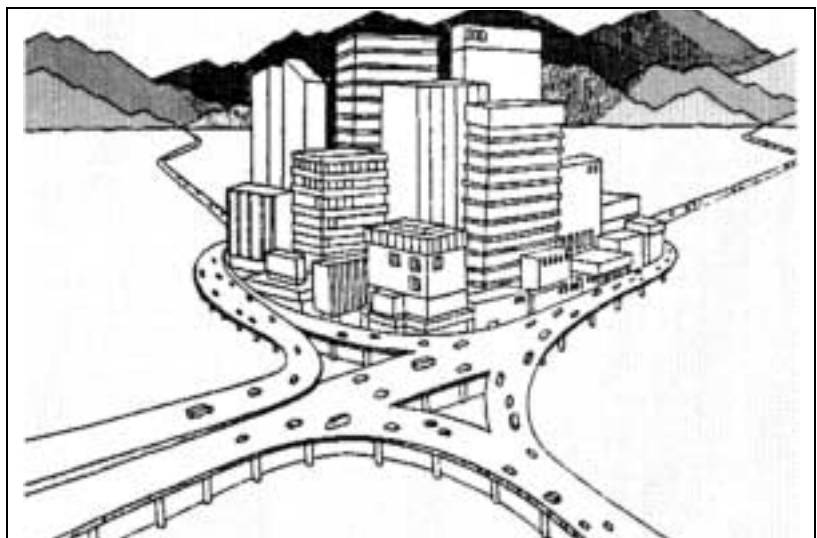
## SAVE THESE INSTRUCTIONS

# *Introduction and Equipment Overview*

## **Clean Air and Vehicle Emissions**

The government recognized vehicle emissions as a source of air pollution when it passed the Air Act. While the Act did not establish vehicle emissions standards, it did authorize the government to contribute to local air pollution control efforts. However, amendments to the Act required that manufacturers equip all cars and light trucks with emissions pollutant controls. Subsequent research produced technologies to develop more effective control methods.

Prior to the Air Act, the effects of automobile emissions on air quality were not well understood. Smog was thought to be a mixture of smoke and fog—the two words that “smog” comes from. Soon, more comprehensive studies showed that over 40% of all air-borne emissions were by-products of automobile exhaust. Smog was found to be the result of a chemical reaction that occurs in sunlight between hydrocarbons (HC) and oxides of nitrogen (NO<sub>2</sub>). Once the government understood the contribution of vehicle emissions to air pollution, it formulated legislation to control it.



*Figure 1-1: Controlling Vehicle Emissions Pollutants Leads to Cleaner Air*

## **Engine Combustion**

Understanding how vehicles produce pollutive emissions requires an understanding of engine combustion. The regulated pollutants carbon monoxide, hydrocarbons, and oxides of nitrogen are by-products of the fuel burning process.

The internal combustion engine combines gasoline fuel (hydrocarbons), air (oxygen), and fire (ignition) in a combustion chamber to produce energy to drive the wheels of a car. Effective control of each component maximizes the power and efficiency of the engine. A carburetor or fuel injector determines the air/fuel mixture; precisely timed spark firing synchronizes piston action; and the amount of compression determines the power of combustion explosion. If all these components worked perfectly, complete combustion would take place. During complete combustion, no excess fuel goes unburned, and all available oxygen burns. However, in the real world many factors create conditions which are unfavorable for complete combustion. Contributing factors include degraded engine and cylinder conditions, impure fuel, the natural impurities in the air, and imprecise combustion timing. Consequently, we must monitor vehicle emissions pollutants in order to limit their contribution to air pollution.

## **Pollutants**

Some by-products of internal combustion engines have all been recognized as hazardous in high concentrations. These pollutants alter the composition of the air we breath, which is usually 78% nitrogen, 20.8% oxygen, and 1% trace elements.

### **Carbon Monoxide (CO)**

A major component of polluted air is carbon monoxide (CO). CO is a colorless, odorless gas which, when concentrated, is toxic. Any fueled engine properly adjusted and in good operating condition produces relatively low CO readings. Excessive CO develops when the combustion chamber is receiving a large volume of fuel and a proportionately small amount of air. By weight, carbon monoxide accounts for about 47% of air pollution produced by vehicle emissions.

### **Oxides of Nitrogen (NO<sub>2</sub>)**

Another pollutant comes in the form of oxides of nitrogen (NO<sub>2</sub>). Oxides of nitrogen consist of nitrogen combined with varying amounts of oxygen. NO<sub>2</sub> is produced by heat and pressure during the combustion process and is a main component in photochemical smog, described earlier.

### **Hydrocarbons (HC)**

Of greater concern today, however, is unburned gasoline which is composed of hydrocarbons (HC). When combustion is incomplete due to a lack of oxygen, insufficient temperatures, or any of a number of other problems, a certain amount of raw fuel remains unburned. Even a tuned engine, in good mechanical and electrical condition, emits some HC. Excessive HC in non-catalytic reactor vehicles is the result of incomplete combustion because of mechanical, electrical, or carburetor defects.



HC consists of carbon and hydrogen atoms in various combinations and, like NO<sub>2</sub>, is a major component in the formation of photochemical smog.

### **Carbon Dioxide (CO<sub>2</sub>)**

Carbon dioxide (CO<sub>2</sub>) is also a by-product of combustion and is non-toxic at low levels (we exhale CO<sub>2</sub> when we breathe). It is the result of one carbon molecule joining with two oxygen molecules in the combustion chamber and is sent out through the exhaust with HC, CO, and O<sub>2</sub>.

### **Controlling Vehicular Emissions Pollutants**

To meet federal standards for vehicle emissions, manufacturers developed various emission controls. Since these controls were developed to quickly respond to Clean Air Act mandates, they were developed within a few years of each other. Manufacturers considered overall vehicle operation as well as individual control systems, which were tailored not only to control specific pollutants but to interact with the other systems as well.

Vehicle emissions controls can be classified into two categories: those that prevent the formation of pollutants (pre-combustion) and those that reduce or control emissions levels (post-combustion). It takes less effort and is less expensive to prevent the production of pollutive emissions than to destroy the pollutants after formation. Therefore, pre-combustion control is by far the most effective and widely used of the two types of emissions control systems.

Excessive emission of HC, CO, and NO<sub>2</sub> have been identified as a probable cause of numerous health problems. In addition, excessive NO<sub>2</sub> contributes extensively to excessive smog production, which causes respiratory problems in much of the general population. Studies show that controlling vehicle emissions is among the most effective methods for improving air quality. Vehicles that emit "clean" emissions improve their fuel economy and vehicle performance as well as the environment.

# Equipment Overview

The equipment consists of the analyzer that contains a PC, a bar code reader, a remote control and a gas cap tester. For more details about each component, see:

- [Analyzer Front, page 1-4](#)
- [Analyzer Back, page 1-7](#)
- [User PC Function, page 1-8](#)
- [Bar Code Scanner, page 1-9](#)
- [Remote Control, page 1-9](#)
- [Gas Cap Tester, page 1-9](#)

## Analyzer Front

Most of the I/M analyzer operating controls are available from the front of the unit. This section describes the items labeled on the analyzer front view shown in [Figure 1-2](#).

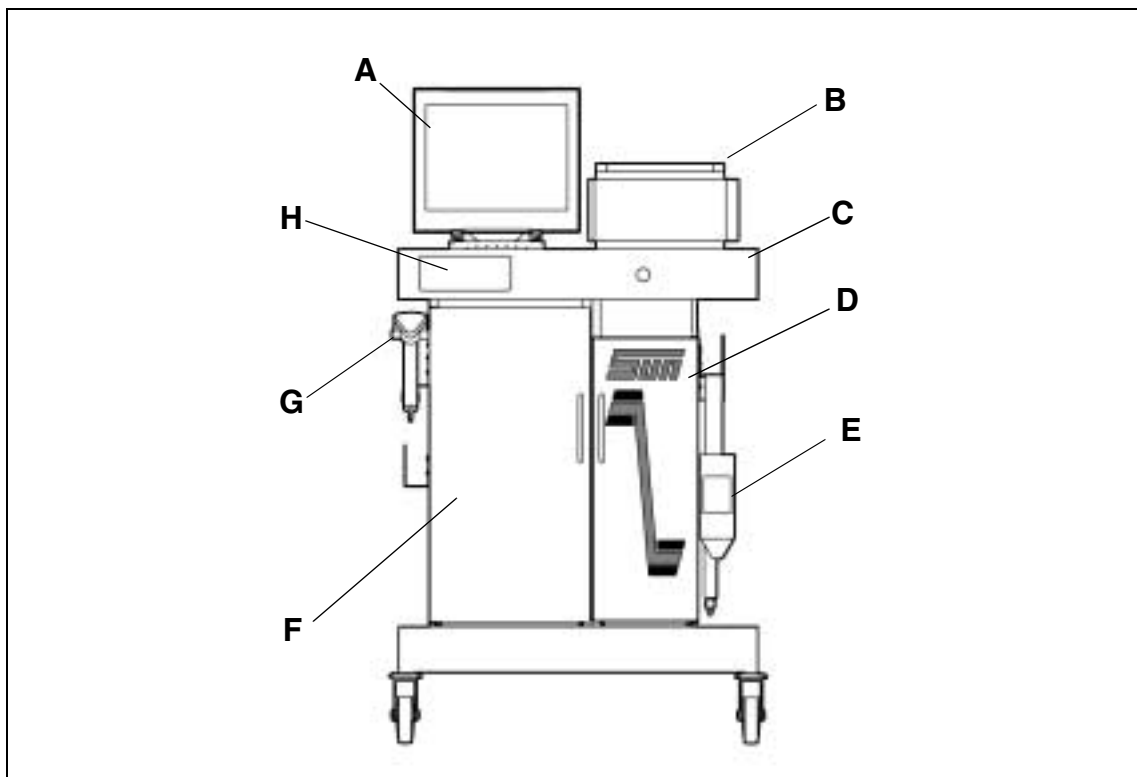


Figure 1-2: Analyzer, Front View

### A—Monitor

#### Specifications and Contrast Controls

The monitor offers a high-resolution color VGA monitor display. Use the contrast controls, located below the monitor screen, to adjust the monitor to shop lighting conditions.

#### Layout, Prompts, HELP Messages

Interaction with the I/M analyzer computer occurs through the monitor. See [Monitor Screens, page 1-19](#).

### **B—Report Printer**

A non-secured printer using 8-1/2" x 11" one-part paper produces the vehicle report, and can also produce a hard copy of test results compiled during tune-up emissions analysis, weekly gas calibration, etc. May also be used to print most monitor screen displays (press the PRINT SCRN key).

Always verify that the report printer is ON and has paper before printing. For additional information about printer operation, refer to the user's manual included with the printer.

### **C—Mouse and Keyboard**

The mouse is located inside a drawer on the front of the analyzer. Use the mouse to select buttons and make selections from drop-down lists for I/M functions on the monitor screen.

The keyboard is located inside a drawer on the front of the analyzer. Use the keyboard to select I/M functions that display on the monitor screen, advance through test sequences, and enter data into on-screen fields.

### **D—Locked Equipment Compartment**

The locked equipment compartment houses the computer. This compartment is locked, but may be opened by the equipment owner to install software on the PC.

- ✓ For PC information, reference the literature package provided with the PC.

### **E—Gas Cap Tester**

Used when performing Gas Cap Tests, as part of the inspection process.

- ✓ A box with adaptors for testing is also provided. See [Figure 1-4](#).

### **F—Storage Cabinet**

This cabinet is for storage of additional portable equipment or other necessary items.

### **G—Bar Code Scanner**

Used for quick data entry of information in bar code form.

### **H—Remote Control**

Used to make menu selections and operate most analyzer functions.

### **Items not shown**

#### **Computer Components**

The following items are located on the computer inside the locked equipment compartment.

##### **DVD-ROM Drive**

Analyzers are equipped with a digital video drive (DVD), which is located near the top of the PC tower.

##### **Floppy Disk Drive**

This disk drive is referred to a drive "A:". Can be used to load program and diagnostic software on the computer.

##### **PC Power/Reset Switch**

This switch is located above the **DELL** logo. Press to clear the monitor and reboot (restart) the computer, if necessary. See [Powering Up the Analyzer, page 1-17](#).

- ✓ Do not use this switch to turn off the PC.

##### **Flip-Up Cover**

One additional USB port and a headphone jack are located under this cover on the lower portion of the PC tower.

##### **Interface Box**

The interface box is located behind the left front door. No user action is required for proper analyzer operation. See [Interface Box, page 8-4](#).

## Analyzer Back

Some analyzer controls, auxiliary assemblies, and connections are located on the back of the unit. This section describes the items labeled on the analyzer rear view, shown in [Figure 1-3](#).

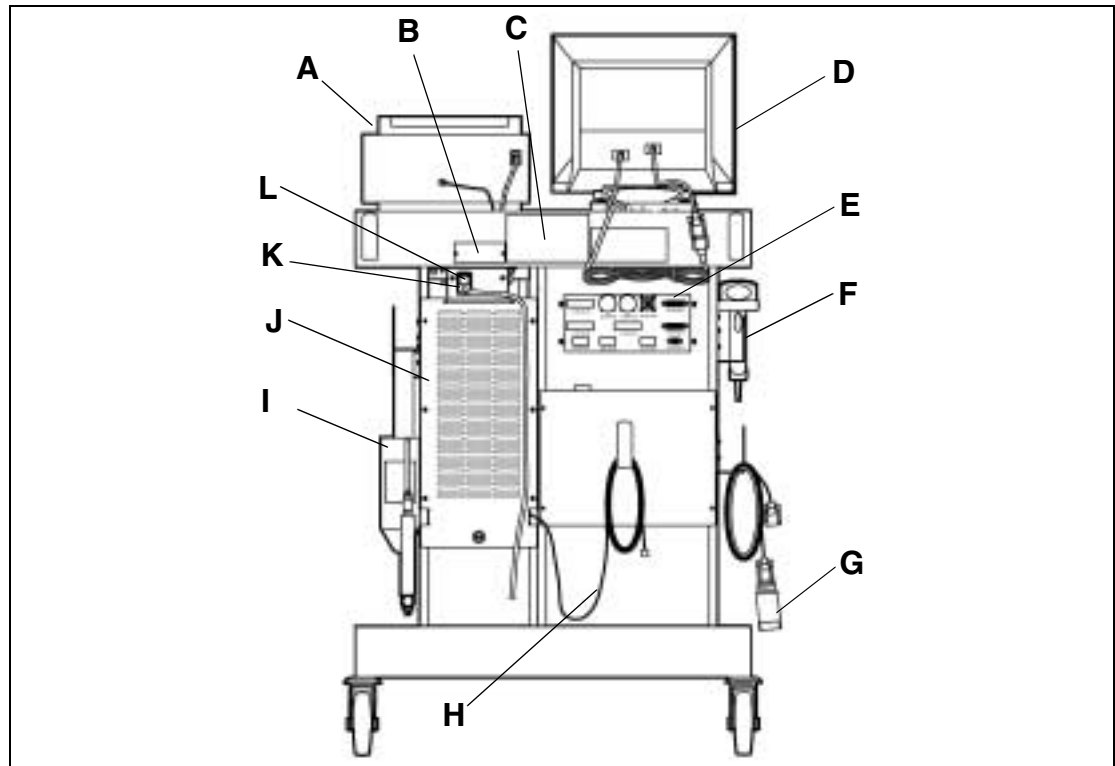


Figure 1-3: Analyzer, Rear View

**A—Report Printer**

See [Analyzer Front, page 1-4](#).

**B—ID Plate**

Contains the following:

- Model number,
- Serial number,
- Voltage requirements, and
- Patent information/listings.

**C—Warning Label**

Contains critical safety messages.

**D—Monitor**

See [Analyzer Front, page 1-4](#).

**E—Connection Panel**

Provides connections for options. See [Connection Panels, page 8-3](#).

**F—Bar Code Scanner**

Used for quick data entry of information in bar code form.

**G—OBD II Interface**

OBD II cable and adaptor.

**H—Telephone Cord**

Accommodates off-site modem communication.

- ✓ Be sure the cord is securely plugged into a telephone wall outlet when in use.

### I—Gas Cap Tester

*Waekon* gas cap tester.

### J—Ventilation Grate / Access Panel

When access panel is removed, rear PC connectors are exposed.

- ✓ Service must open with a special key.

### K—Main Power Switch

The main power switch, located on the right rear of the unit, completely shuts off power to the analyzer. Press the rocker switch to the left or right to turn the analyzer on or off.

### L—Power Cord

Connects analyzer to main power source.

## User PC Function

The analyzer is designed to provide full access to all standard PC capabilities running on *Windows 2000*.

Two modes of operation are possible:

- Inspection Mode
- PC Mode

### Inspection Mode

Use this mode to perform state inspections after a valid authorization access code is entered. The inspection mode is secure. You can neither access nor change the operating program and stored data. The computer is equipped with "logical" security and code encryption, which prevent unauthorized access. Attempting to "crack" the system renders the unit non-operational and you will be charged for any service call required to return the analyzer to service. The state is also notified of the attempt to tamper.

### PC Mode

Use this mode to operate the analyzer like a standard PC with *Windows*.

- ✓ Different access codes are required than for Inspection Mode.

All *Windows 2000* compatible programs can be loaded and run on the PC, including *ShopKey* shop-management and vehicle repair software programs available from your *Snap-on* representative.

The analyzer is equipped with a *DELL* computer that has the following minimum specifications:

- 900 MHz or faster processor
- 128 MB RAM
- 20 GB hard drive
- 56 K modem
- 16x DVD drive
- 3.5" floppy drive
- Spare USB port (on front of PC, behind lower cover)
- Spare RS232 communication port (back of the analyzer)

If you are unfamiliar with PC hardware or **Windows** software, it is strongly recommended that you obtain instructional materials before attempting to use the PC functions.

The analyzer system warranty does not cover the installation, training, technical assistance or repair of any software on the PC side of the analyzer. All software you install or devices you connect to your system are solely your own responsibility.

If a virus infects your computer, it is your own responsibility. We strongly recommend that you purchase and install virus protection software, such as **Norton AntiVirus 2002**.

All service calls necessary as a result of user-installed software, hardware or the occurrence of a virus will be billed to you. Service personnel will return the unit to its original configuration and provide suggestions to prevent additional problems. **EquiServ** does not service or repair items that are not provided by **Snap-on**.

## Bar Code Scanner

The bar code scanner, located on the side of the unit, eliminates certain keyboard entries by entering a complete field of data into the analyzer through a simple scan. The hand-held scanner reads bar codes and symbols in hard-to-reach places (such as labels on engines, hoods, government-provided access cards, and vehicle information documents).

## Remote Control

Use the remote control to operate the analyzer from around the vehicle or when testing requires controlling the analyzer apart from the keyboard.

## Gas Cap Tester

The **Waekon** gas cap tester is used with the analyzer for gas cap testing. See the manual that accompanies the tester for specifications and detailed operation information.

### **Waekon**

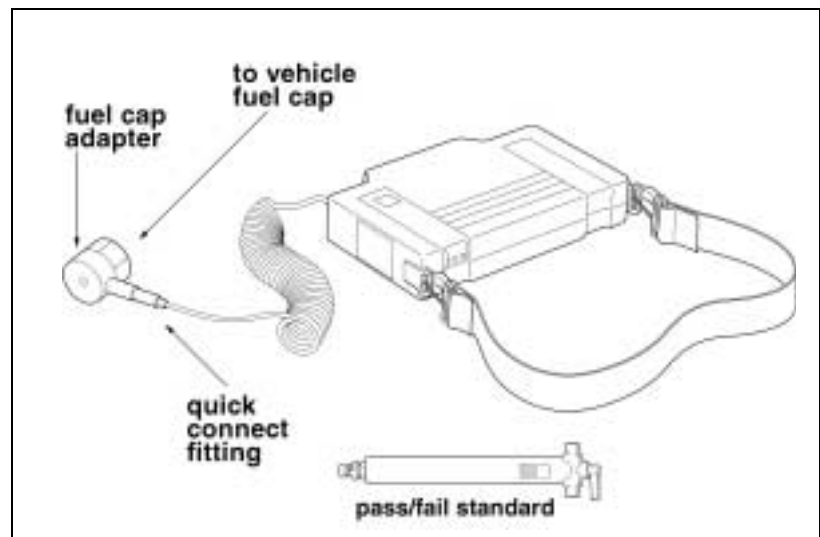


Figure 1-4: **Waekon** Gas Cap Tester

# System Security

The analyzer can detect computer and data storage tampering. The tamper condition is identified by the program and recorded on the hard drive. Only state or service personnel can remove the tamper condition and return the analyzer to operation.

## IMPORTANT

**Attempting to access secured areas will invoke an analyzer lockout.**

- **The analyzer will not perform I/M emission inspections if it is locked out.**
- **Only service personnel can unlock the analyzer, and you will be billed for the service call.**

# Using the Keyboard

This section describes the function of several types of keys on the analyzer keyboard: Data Entry Keys, Tab Key, Enter Key and Movement Control Keys. Also available for remote analyzer operation is the Remote Control Keypad. See [Remote Control, page 1-9](#).

## Function Keys

The software operates with a standard keyboard and keyboard functions for PC/**Windows**.

<b>ESC</b>	Abort a vehicle inspection or backs out of the current menu/function. When ESC is pressed during the inspection, the question DO YOU WANT TO ABORT THE TEST? displays. Select YES to abort the test. Select NO or press ESC a second time to return to the inspection. During inspections, programming returns to the Main Menu.
<b>F1/HELP</b>	Press to display on-screen HELP information. HELP contains additional test instructions or explanations when available.  There are two types of HELP: <b>System-wide HELP</b> provides general information about the currently displayed function i.e., Calibration, Main Menu, etc. <b>Vehicle inspection HELP</b> provides detailed input information about entries that must be completed by the operator.
<b>F2/CLEAR</b>	Press to clear data from a data entry field.
<b>F10/CONTINUE</b>	Press to move forward in a procedure sequence.
<b>F12/STATUS</b>	Display system faults or warnings currently present when STATION LOCKOUT, SYSTEMS FAULT PRESENT or SYSTEM WARNING PRESENT appear in the lower right of the screen.
<b>PRINT SCREEN</b>	This function is available to produce a text-only hard copy of the current screen, except during vehicle emissions testing. — Scroll lock and pause break keys are not applicable.



## **Data Entry Keys**

<b>1 through 9</b>	Enter numbers.
<b>Aa through Zz</b>	Enter letters.
<b>Punctuation</b>	Enter punctuation or symbols.
<b>BACKSPACE</b>	Delete a previous entry.
<b>CAPS LOCK</b>	Enter capital letters. All letters are capitals until CAPS LOCK is pressed a second time.
<b>ENTER</b>	Confirm an action and store information in memory.
<b>SHIFT</b>	Invoke a key's second character or function.
<b>SPACE BAR</b>	Add a space character. — The CTRL and ALT keys are not applicable
<b>Delete</b>	Clear all contents in a data entry field

## **Calculator and Movement Control Keys**

**Calculator Keys** Calculator keys are numbered keys that are arranged as if on a calculator and perform the same function when NUM LOCK is pressed.

### **Movement Control Keys**

<b>TAB</b>	Move the cursor to the next field in the screen. Store information from the previous field into memory.
<b>SHIFT + TAB</b>	Move the cursor to the previous field in the screen. Store information from the field just exited into memory.
<b>PAGE UP</b>	Return to a previous page.
<b>PAGE DOWN</b>	Advance to the next page.
<b>DELETE</b>	Delete current characters.
<b>Down-Arrow</b>	Reveal drop-down menu, then move down in the list
<b>Up-Arrow</b>	Move up in a list

# Using the Remote Control Keypad

Use the remote control keypad as a keyboard when providing computer input from a remote location.

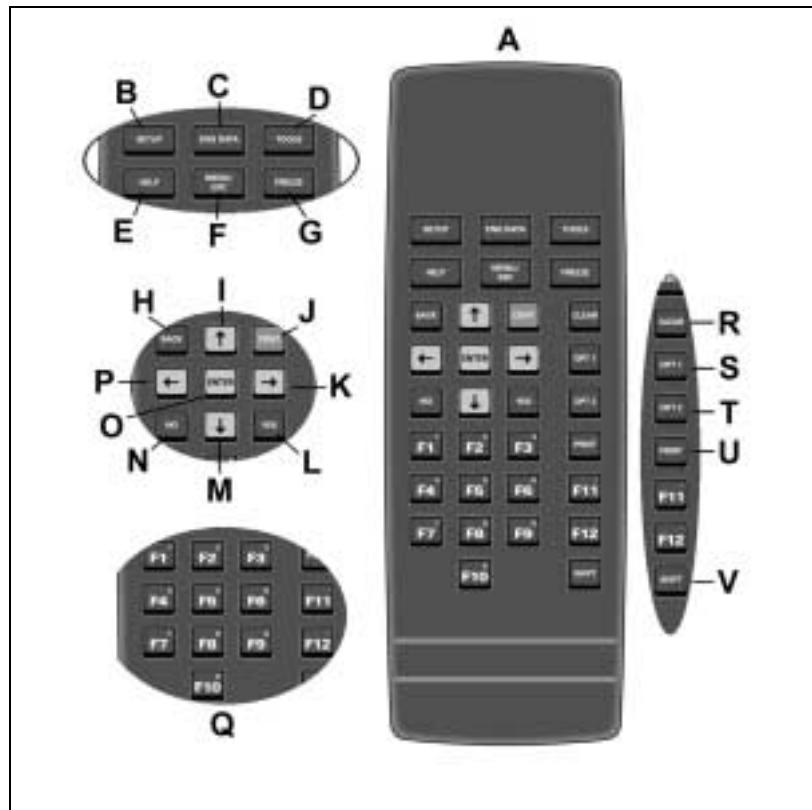


Figure 1-5: Remote Control Keypad

- |                                |  |
|--------------------------------|--|
| <b>A – Remote Control Unit</b> | Use the keys on this unit, to access, navigate, or exit the I/M software from a remote location. |
| <b>B – Setup</b>               | Not used for I/M testing.  |
| <b>C – Eng Data</b>            | Not used for I/M testing.  |
| <b>D – Tools</b>               | Not used for I/M testing.  |
| <b>E – HELP</b>                | Not used for I/M testing.  |
| <b>F – Menu/ESC</b>            | Press to return to the previous menu or to abort a test.   |
| <b>G – Freeze</b>              | Not used for I/M testing.  |
| <b>H – Back</b>                | Not used for I/M testing.  |
| <b>I – Up Arrow</b>            | Press to move cursor toward top of screen.   |
| <b>J – CONT</b>                | Not used for I/M testing.  |
| <b>K – Right Arrow</b>         | Press to move cursor toward right side of screen.  |
| <b>L – Yes</b>                 | Not used for I/M testing.  |
| <b>M – Down Arrow</b>          | Press to move cursor toward bottom of screen.  |
| <b>N – NO</b>                  | Not used for I/M testing.  |

<b>O – Enter</b>	Press to complete data entry.
<b>P – Left Arrow</b>	Press to move cursor toward left side of screen.
<b>Q – Function/Numeric Keys</b>	Press these keys to select various functions. Hold the Shift key while pressing to enter numeric data. F1/HELP to display on-screen HELP information. F2/CLEAR to clear data from a data entry field. F10/CONTINUE to move forward in a procedure sequence. F12/SYSTEM FAULTS to display system faults
<b>R – Clear</b>	Not used for I/M testing.
<b>S – Opt 1</b>	This key is reserved for future use.
<b>T – Opt 2</b>	This key is reserved for future use.
<b>U – Print</b>	Press to print display screen or I/M test results.
<b>V – Shift</b>	Press and hold the Shift key while pressing the numeric keys to enter numeric data. This numeric data is printed on the numeric keys in the top right corner.

# General Vehicle Inspection

The inspection process, prompts, and screen procedures are determined by State regulations. You must know and understand your State regulations to properly use the analyzer software.

## Accessing and Aborting Tests

### Entering Access Codes



Figure 1-6: Inspector Logon Prompt Screen

Access to certain menu items, including an Emissions Inspection Test, requires two codes:

- Inspector access code, and
- Inspector PIN number.

### **IMPORTANT**

**The bar code scanner must be used to scan access codes from badges. Manual entry is not allowed.**

If the technician license or station license have expired, the analyzer does not allow access to the emissions inspection function.

### Aborting an Inspection



Figure 1-7: "Would you like to abort?" Prompt Screen

This section describes the procedure for aborting an inspection. If entry into the inspection functions is attempted while certain faults exist, the program aborts. Press F12 STATUS to view a list of faults.

- ✓ Warnings that do not affect vehicle inspection may be present during testing. These warnings concern conditions that should be addressed, but that do not affect testing.
- 1. Press ESC at any time to abort a test and return to the Main Menu. The analyzer displays a prompt to verify the abort. See [Figure 1-7](#). Select:
  - NO or press ESC a second time to return to the place in the test from which the abort was attempted.
  - YES to abort the test.
- ✓ After selecting YES, an Abort Code may be required indicating the reason the test was ended. In this case, the analyzer displays a list of Abort Codes. Highlight the correct code and press Enter.

### Using the Bar Code Scanner

The analyzer is equipped with a bar code scanner that is used to simplify the entry of frequently used information, including:

- Vehicle Identification Numbers (VINs),
- Vehicle sticker information, and
- Other bar coded information.



Figure 1-8: Example 1-D and 2-D Bar Codes

[Figure 1-8](#) shows a typical bar code symbol. By arranging the bars and spaces contained in a bar code in a certain order, it is possible to represent, or "encode" letters, words, and numbers.

Bar codes contain a blank area on their left and right sides. This blank area is called a "quiet zone" and it tells the scanner where the bar code begins and ends. It is important to include these blank areas when running the scanner over the bar code.

### Scanning Technique

#### Test the Scanner

Aim the scanner away from you and press the trigger. When you press the trigger, the scanning beam is energized for approximately 3.5 seconds (default).

#### Scan

1. Make sure the symbol you want to scan is within the proper scanning range.
2. Aim and press the trigger.
  - The scan beam and red SCAN LED light for about 3.5 seconds, or until a successful "read" or decode is achieved.
3. The scanner has read the symbol successfully when:
  - You hear a "beep," and
  - The green DECODE LED lights. This LED stays green until the next trigger pull, or until power is removed from the scanner.

Before attempting a scan, make sure the bar code is of good quality and that the bar code scanner's scanning window is clean. Dirt and specks can cause inaccurate scans, as can wrinkled or smudged bar codes.

### Scanning Tips

#### Hold the Scanner at an Angle

Do not hold the scanner directly over the bar code. In this position, light can bounce back into the scanner's exit window and prevent a successful "read" or decode.

#### Scan the Entire Symbol

- Your scan beam must cross every bar and space on the symbol.
- The larger the symbol, the farther away you should hold the scanner.
- Hold the scanner closer for symbols with bars that are close together.
- A short high-tone "beep" indicates a good decode.

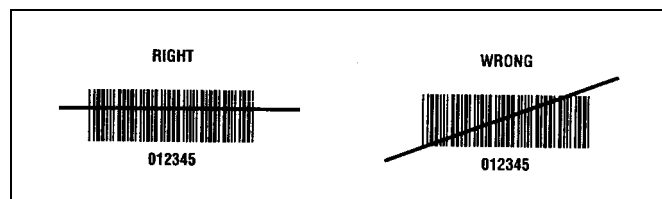


Figure 1-9: Right and Wrong Ways to Scan a Bar Code

### Storing the Scanner

When not in use, store the scanner in the small holster on the side of the analyzer.

# Software Overview

The analyzer software leads the operator step-by-step through test functions. All analyzer functions display on the monitor and are controlled by the keyboard and the mouse. A remote control is available for use with the **OBIS** program. The basic operation of the analyzer is menu-driven. See [Main Menu, page 1-22](#).

Relevant information displays concisely using the full capacity of the primary screen, specific HELP screens, and operator prompts. See:

- [Powering Up the Analyzer, page 1-17](#)
- [Inspection Mode, page 1-17](#)
  - [Access, page 1-17](#)
  - [Exit, page 1-18](#)
- [PC Mode, page 1-18](#)
  - [Access, page 1-18](#)
- [System Security, page 1-18](#)
- [Monitor Screens, page 1-19](#)
  - [Menus, page 1-19](#)
  - [Prompts, page 1-20](#)
  - [Data Entry Screens, page 1-20](#)
  - [HELP Screens, page 1-21](#)
- [Main Menu, page 1-22](#)
- [Software Flowchart, page 1-24](#)

## Powering Up the Analyzer

1. Turn ON the main power switch located on the back of the analyzer.
  - The **Windows** Password Access Screen displays.
- ✓ The telephone cord must be connected at all times to the appropriate telephone connection at your site, using the phone cable provided with the analyzer.
2. Enter the required operating mode.
  - Inspection, for emissions testing, or
  - PC, for normal PC use without emissions testing.

## Inspection Mode

### Access

1. Power up the analyzer.
2. Type "obis" in the **Windows** User Name field and select OK.
  - The system launches the **OBIS** inspection software.
- ✓ No password is required.

### System Faults or Warnings in the **OBIS** Inspection Program

The System Status Screen lists any fault(s) detected during power-up system checks. These faults display in the lower right section of the screen.

### Exit



1. Select the End button on the bottom of the Inspection screen and follow the prompts.
2. To completely shut down the system, select "Shut down" from the **Windows** drop down menu.
3. When the monitor screen is blank, turn OFF the main power switch located on the back of the analyzer.

## PC Mode

Use the analyzer in a normal PC and function as normal PC-compatible system. The user must exit the *OBD II* software to enter PC mode. To place the analyzer into PC Mode:

1. Go the Main Menu.
2. Select End Shutdown/PC Option.  
✓ See [PC Mode, page 6-19](#).

### Access

1. Power up the analyzer.
  2. Type "PC" in the **Windows** User Name field and select OK.
    - The system launches the **Windows** PC software without emissions testing.
- ✓ No password is required.

## System Security

The analyzer can detect tampering. The tamper condition is identified by the program and recorded on the hard drive. Only State or service personnel can remove the tamper condition and return the analyzer to operation.

### IMPORTANT

- **Never attempt to modify I/M test data.**
- **Never attempt to access the I/M operating program.**
- **Never open the PC case.**
- **Always power down properly.**



## Monitor Screens

The information needed to operate the analyzer appears on the monitor display screens. There are several different types of screens:

- Menus
- Prompts
- Data entry screens

### Menus

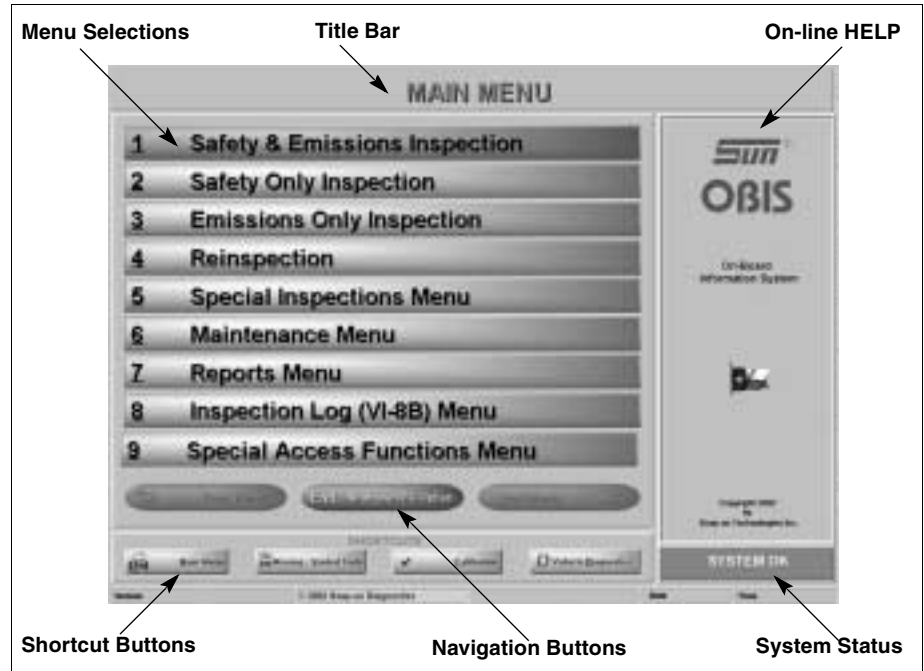


Figure 1-10: Example Analyzer Menu Screen

Menu screens are divided into the major areas, described in this section. See [Figure 1-10](#).

#### Menu Selections

Use to select a function.

#### Title Bar

Contains the menu name, test name or current function.

#### On-line HELP Area

On-line HELP for the current screen function displays in the top right-hand portion of the screen.

#### System Status Area

The current status of the system—including any current error messages—displays in the bottom right-hand portion of the screen.

#### Navigation Buttons

The Previous and Next buttons to navigate through screens as well as the End button used to exit the analyzer program and operate in PC mode are in the bottom of the screen.

#### Shortcut Buttons

These buttons are "quick clicks" to four commonly used functions:

- Main Menu,
- Missing or Voided Certificates,
- Calibration, and
- Vehicle Diagnostics.

### Prompts



Figure 1-11: Example Prompt Screen

Prompt screens require an answer to a question or to confirm an action. See [Figure 1-11](#).

- Select the buttons to respond or press Enter to execute the active button.

### Data Entry Screens

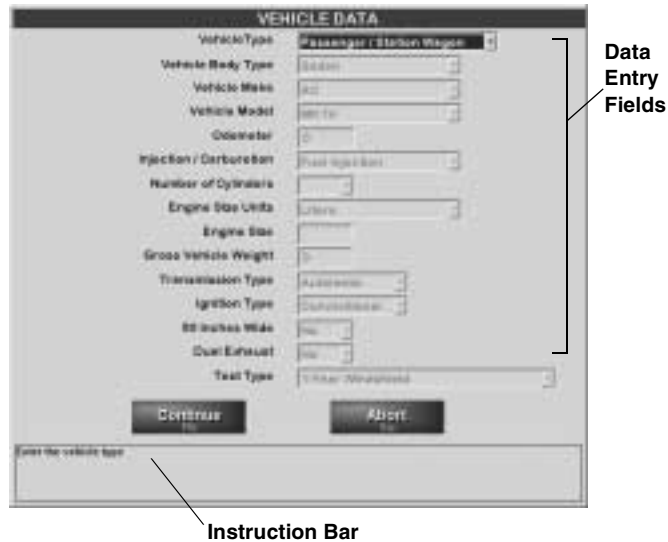


Figure 1-12: Example Data Entry Screen

Data entry screens require information to be entered into fields. See [Figure 1-12](#).

- To move forward in a procedure sequence, select CONTINUE with the mouse or press F10 on the keyboard.
- To abort a procedure, select Abort or press ESC on the keyboard.

### HELP Screens

When additional instructions or explanations of test functions are available, the HELP key is highlighted.



Figure 1-13: Example HELP Screen

There are two types of HELP.

- **System-wide HELP** provides general messages based on the major function currently in use, such as Calibration or Main Menu. See [Figure 1-13](#).
- **Emissions Test HELP** provides detailed information for most data entry inputs required by the operator. See [Safety and Emissions Inspection, page 2-1](#).

## Main Menu



Figure 1-14: Main Menu

Select an inspection type or menu to be accessed from the analyzer Main Menu. See [Figure 1-14](#).

### 1 Safety and Emissions Inspection

- Use to perform the full test the first time on vehicles that require both a safety and emissions inspection.

✓ The word "emissions" is used in this manual to refer to an *OBD II* Test. The State refers to *OBD II* testing as "emissions" testing.

### 2 Safety Only Inspection

- Use when inspecting only the safety-related components of the vehicle.

### 3 Emissions Only Inspection

- Use when inspecting only the emissions-related components of the vehicle.

### 4 Reinspection

- Use to retest vehicles that have previously failed at your station.

### 5 Special Inspections Menu

- Use to access:
  - 1 Training Mode
  - 2 VI-30A Only
  - 3 Test on Resale

### 6 Maintenance Menu

- Use to access:
  - 1 Analyzer Maintenance Menu
  - 2 Communications Diagnostic Menu
  - 3 Request Lockout Status
  - 4 Vehicle Diagnostic Menu
  - 5 Communications Refresh
  - 6 Missing and Voided Certificates
  - 7 Certificate Correction and Replacement

## **7 Reports Menu**

- Use to access:
  - 1 Reprint Vehicle Inspection Report
  - 2 Recall Aborted Inspections
  - 3 Technical Bulletins and Announcements

## **8 Inspection Log**

- Use to access:
  - 1 Last Week's Report
  - 2 Other Week's Report
  - 3 Search by Inspector's # and Date

## **9 Special Access Functions Menu**

- Use to access:
  - 1 Service Menu (for service personnel only)
  - 2 Manager's Menu
  - 3 Audit Menu (for state auditors only)

# Software Flowchart

## OBIS EMISSIONS ANALYZER MENU

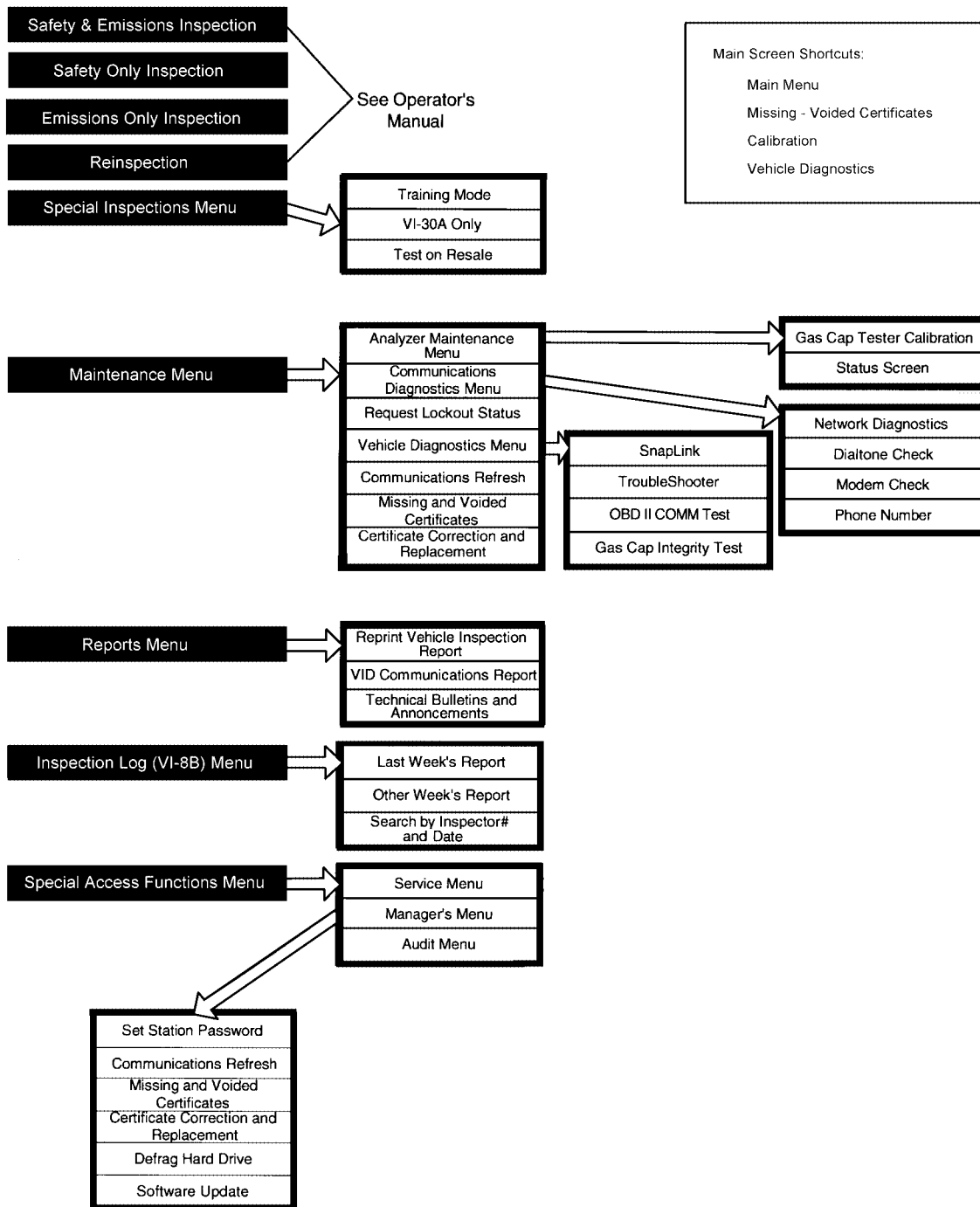


Figure 1-15: Software Flowchart

# *Safety and Emissions Inspection*

This chapter contains information about the inspection process using the Safety and Emissions Inspection Menu. This inspection includes:

- *Selecting the Test, page 2-1*
- *Vehicle Data Entry, page 2-2*
- *Safety Inspection, page 2-8*
- *OBD II Testing, page 2-10*
- *Gas Cap Test, page 2-16*
- *Emission Inspection Fee, page 2-19*
- *Certificate Number, page 2-20*
- *Out-of-State Verification Form (VI-30A), page 2-21*
- *Vehicle Inspection Report, page 2-22*
- *Vehicle Repair Form (VRF), page 2-25*

## **Selecting the Test**

1. Select Safety and Emissions Inspection from the Main Menu.
2. Scan access card with the bar code scanner.
  - The Access Code field fills.
3. Enter PIN Number and select CONTINUE.

# Vehicle Data Entry

The screenshot shows a window titled "VEHICLE IDENTIFICATION". It contains several fields with dropdown menus: "Insurance Expiration Date" (set to 07/15/2002), "Fuel Type" (set to Gasoline), "Vehicle Model Year", "License Plate Type" (set to Texas Plate), "License Plate Number", "TxDOT Number", and "VIN Number". At the bottom, there are "Continue" and "Abort" buttons. A footer note reads: "Enter insurance expiration date. Uncheck if owner has no insurance."

Figure 2-1: Vehicle Identification Screen

4. Enter the Insurance Expiration Date and press Tab.
  - Select the date from the drop-down window, *or*
  - Use the keyboard to enter the date in MMDDYYYY format. See [Figure 2-2](#).

If no insurance date is available, uncheck the box in the Insurance Expiration Date field.

- Removing the ✓ indicates that there is no date.

This screenshot shows the same "VEHICLE IDENTIFICATION" window, but with a date picker calendar open over the "Insurance Expiration Date" field. The calendar is for June 2002. An arrow points to the "uncheck (✓) for 'NONE'" checkbox, and another arrow points to the "drop-down calendar" itself. The "Continue" and "Abort" buttons are visible at the bottom.

Figure 2-2: **Windows** Date Properties



## *Safety and Emissions Inspection*

---

5. Select the Fuel Type and press Tab.

✓ If the vehicle is dual fueled, the following message displays:

**YOU HAVE INDICATED THAT THIS VEHICLE IS DUAL FUELED.  
PLEASE CONFIRM THAT THE VEHICLE IS OPERATING ON  
GASOLINE FOR  
THE TEST.**

— Select YES or press Enter.

✓ If the vehicle is diesel fueled, the following message displays:

**YOU HAVE INDICATED THAT THIS VEHICLE IS DIESEL  
FUELED. PLEASE  
CONFIRM THIS ENTRY BY PRESSING YES.**

**IF YOU CONFIRM THAT THE VEHICLE IS DIESEL FUELED,  
THE TEST WILL END.**

**DIESEL FUELED VEHICLES ARE NOT REQUIRED TO BE  
TESTED.**

— Select YES or press Enter and the test ends.

6. Select the Vehicle Model Year and press Tab. A two-digit entry fills in the four-digit year.

*Example:*

— "99" fills 1999

— "01" fills 2001.

✓ No *OBD II* tests are required for vehicles older than model year 1996 or for vehicles less than two years old.

7. Scan the bar code that contains the License Plate Type, License Plate Number, and TXDOT Number from the Vehicle Inspection Report or press Tab to CONTINUE if no previous Vehicle Inspection Report is available.

8. Select the License Plate Type of the vehicle and press Tab.  
— If "No Plate" or "Other" is selected, the analyzer skips the license plate number.

9. Enter the License Plate Number of the vehicle, if applicable, and press Tab.

10. If prompted, type or scan the number on the TXDOT Registration certificate of the vehicle.

— If typed, select OK or press Enter.

— Reenter TXDOT number to verify.

✓ The entry must be 10 characters containing eight (8) numbers and two (2) letters.

*Example:*

— 12345678AA

11. Enter the VIN using the alphanumeric keys or scan the vehicle VIN tag with the barcode scanner.

If keyboard entry is used, a screen with the following message displays:

**Please re-enter VIN for verification**

- Select OK or press Enter. Reenter VIN number to verify.

If an incorrect entry is made, an INVALID message displays requesting that the entry be rechecked.

12. Review the entries in each field and make any necessary corrections. Select CONTINUE.

The analyzer contacts the host system automatically and data about the vehicle is exchanged. The following message is displayed at the bottom left of the screen:

**Contacting VID – Please Wait...**

Connection progress displays at the top of the screen.

13. Select CONTINUE.



The screenshot shows a 'VEHICLE CONFIRMATION' screen with the following fields and values:

Field	Value
Vehicle Model Year	1998
Vehicle Type	Passenger Car
Vehicle Body Type	Sedan
Vehicle Make	FORD
Vehicle Model	F3R
License Plate Type	Texas Plate
License Plate Number	11111
VIN Number	111

Below the fields is the question: "Is this the correct vehicle?" with two buttons: "Yes" and "No".

Figure 2-3: Vehicle Confirmation Screen

14. After contacting the host computer, information for a matching VIN on record at the VID is retrieved and displays an information review screen. See [Figure 2-3](#).
  - If the vehicle information is correct, select YES.

If no VIN match is on record, the Vehicle Data Screen displays and data must be entered.

- Testing can continue but additional data entry is required if:
  - Contact cannot be made with the host computer at the VID,
  - Retrieved information is incorrect, or
  - No vehicle is found on the host computer

The screenshot shows a software interface titled "VEHICLE DATA". It contains the following fields and controls:

- VehicleType: Passenger / Station Wagon (dropdown)
- Vehicle Body Type: Sedan (dropdown)
- Vehicle Make: A.C. (dropdown)
- Vehicle Model: 2011 V (dropdown)
- Odometer: 1 (text input)
- Injection / Carburetion: Fuel Injection (dropdown)
- Number of Cylinders: 4 (dropdown)
- Engine Size Units: Liters (dropdown)
- Engine Size: 2 (text input)
- Gross Vehicle Weight: 2 (text input)
- Transmission Type: Automatic (dropdown)
- Igniter Type: Conventional (dropdown)
- 80 inches Wide: No (dropdown)
- Dual Exhaust: No (dropdown)
- Test Type: 1 Year Inspection (dropdown)

At the bottom, there are "Continue" and "Abort" buttons. A text prompt "Enter the vehicle type" is visible at the bottom left of the screen area.

Figure 2-4: Vehicle Data Screen

15. When the cursor is in the Vehicle Type field, select the Vehicle Type from the drop-down list and press Tab.
  - ✓ Information entered in the Vehicle Type field determines the fields and information that display in subsequent fields and screens. See [Figure 2-4](#).
    - Variables may include vehicle weight, width, drive axle and test type.
  - ✓ For each field on this screen, a prompt displays at the bottom left of the screen.

*Example:*

    - The "Vehicle Type" field prompt reads: "Enter the vehicle type."
16. Select the Vehicle Body Type from the drop-down list and press Tab. Options depend on the Vehicle Type selected.
  - ✓ No body type displays for a motor home or bus.
17. Press Tab to accept the Vehicle Make retrieved from the VID.
  - If the Vehicle Make is incorrect, select the correct Vehicle Make from the drop-down list and press Tab.
    - For quick access a vehicle make, press the first letter of the name.
  - If the vehicle is not on the list, select "OTHER" from the alphabetically sorted list.
- ✓ The data entered for the vehicle make and model are very important and can affect the test outcome. Always be careful when making entries in these fields.

18. Press Enter to accept the Vehicle Model retrieved from the VID.
  - If the Vehicle Model is incorrect, select the Vehicle Model from the drop-down list and press Tab.
  - If the vehicle is not on the list, select "OTHER" from the alphabetically sorted list.
  - ✓ The analyzer contains a look-up list of various vehicle makes and models. This list may not contain "newer" vehicles.
19. Enter the Odometer Reading and press Tab.
  - ✓ Do not enter tenths of miles.
20. Enter the Injection/Carburetion type and press Tab.
21. Enter the Number of cylinders and press Tab.
  - ✓ Use "R" at the end of the drop-down list for rotary engines.
22. Enter the Engine Size Units and press Tab. Options are:
  - Liters
  - Cubic Inches
  - Cubic Centimeters
23. Enter the Engine Size. Press Tab. This may be a decimal value.
  - If no decimal point is entered, the number is interpreted as a whole number.

Enter size based on units selected.

*Example:*

  - Liters and 6.0 = 6.0 liters.
  - ✓ 40 CID or 655 CC or smaller are exempt from testing.
  - ✓ Fields and information that displays in subsequent fields and screens varies based on the data entered in the Vehicle Identification Screen. See [Figure 2-1](#).
    - Variations may include vehicle weight, width, drive axle and test type.
24. Enter the Gross Vehicle Weight (GVW) and press Enter.
  - ✓ GVW must be no less than 1,700 lbs and no greater than 85,000 lbs.
25. Enter the Transmission Type and press Enter.
26. Enter the Ignition Type and press Enter.
27. Select the correct response in the 80" Inches Wide field, if applicable, and press Tab.
28. Select the applicable response in the Dual Exhaust field and press Tab.
29. Select Test Type and press Enter.
30. Review the entries in each field and make any necessary corrections. Select CONTINUE.

VEHICLE DATA CONFIRMATION	
Insurance Expiration Date	5/14/2002
Fuel Type	Gasoline
Vehicle Model Year	1996
License Plate Type	Texas Plate
License Plate Number	55555
TxDOT Number	55555555AA
VIN Number	JT28V19H5F0359253
Vehicle Type	Passenger / Station Wagon
Vehicle Body Type	Sedan
Vehicle Make	CHEVROLET
Vehicle Model	CAMARO
Odometer	25000
Injection / Carburetion	Fuel Injection
Number of Cylinders	6
Engine Size Units	Liters
Engine Size	3.2
Gross Vehicle Weight	3000
Transmission Type	Automatic
Ignition Type	Distributorless
80" inches Wide	No
Dual Exhaust	Yes
Test Type	1-Year Windshield

Figure 2-5: Vehicle Data Confirmation

31. A summary screen, showing the data from the Vehicle Identification Screen and the Vehicle Data Screen displays. See [Figure 2-5](#).
  - If the vehicle information is correct, select ACCEPT.

# Safety Inspection

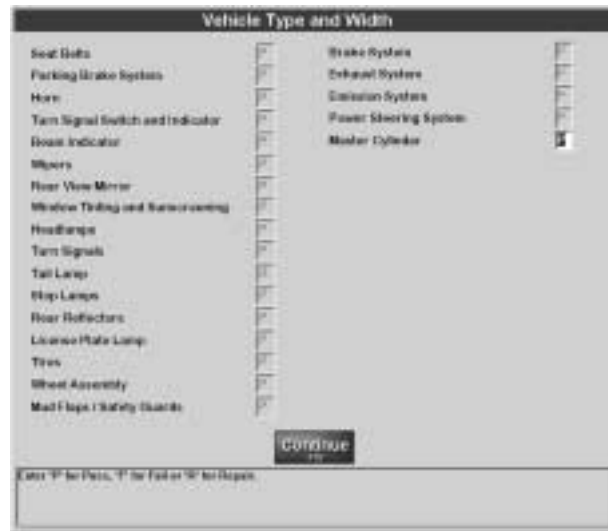


Figure 2-6: Safety Inspection Screen

A Safety Inspection must be performed as part of the Safety and Emissions inspection. See [Figure 2-6](#).

## Procedure

1. Respond to each of the items listed with a P, F, or R and press Tab for the next field.
  - P for each item that passes inspection.
  - F for each item that fails inspection.
  - R for each entry you repaired.

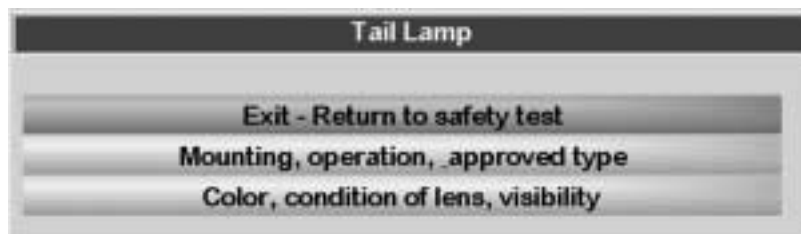


Figure 2-7: Example Reason for Failure Screen

- ✓ Each item requires an entry and Tab must be pressed after each item.
- ✓ If F or R is entered for any of the items, a screen displays where a reason for the failure or repair can be selected, or you can return to the Safety Test Screen. [Figure 2-7](#) requests the reason for a failed tail lamp.

## Safety and Emissions Inspection

---

- ✓ Depending on the vehicle type being tested, the safety items list changes. Enter data carefully.
  - ✓ If, during the inspection, you need assistance with an item shown, move to that field and press F1, HELP. The information that displays is from the State Safety Inspection Manual. Review the instructions and press F1 a second time to exit the HELP Screen and return to the previous screen.
2. When the Safety Inspection is complete, verify that all entries are correct and select CONTINUE.



Repair Cost

Enter Amount \$

Continue

Enter the total cost for the safety-related repairs including cents.  
Do not include the safety inspection fee in the total.

Figure 2-8: Safety Repair Cost Screen

3. If prompted, enter the Safety Repair Cost for any items repaired during the Safety Inspection and select CONTINUE.
- Include decimal point and cents.
  - Do not include cost of the Safety Inspection Test.
- ✓ This screen displays only when an "R" is entered for an item(s) in the Safety Inspection.



Figure 2-9: Safety Inspection Fee Screen

4. When prompted, enter the Safety Inspection Fee and select CONTINUE.
  - Include decimal point and cents.
  - Do not include repair costs.

The vehicle is ready for *OBD II* testing.

## OBD II Testing

This test is performed as the Emissions Test on 1996 and newer vehicles. A vehicle must pass this test to get a pass report. The analyzer compares vehicle make, model, and model year in matching records with the vehicle being inspected. *OBD II* readiness codes, failure codes, and MIL status are automatically retrieved through a standard interface and vehicle connector to the analyzer.

- ✓ Visually inspect the MIL/check engine light on all 1996 and newer passenger cars and light-duty trucks.
- ✓ The vehicle year determines which vehicles require *OBD II* Testing.
- ✓ Some vehicles that require *OBD II* testing may **not** be testable. The "problem" vehicles must then go to an ASM station for an ASM Test. **Abort the inspection** if communications problems occur.



## Procedure



*Figure 2-10: Prepare the Vehicle for OBD II Test*

1. After the vehicle is identified and the Safety Inspection is complete, *OBD II* hook-up information displays. See [Figure 2-10](#). Follow the screen prompts.
  - ✓ To locate the *OBD II* connector in the vehicle, see [Appendix A:OBD II Connections, page A-1](#).
    - Be sure the vehicle ignition key is in the OFF/LOCK position.
    - Locate the *OBD II* diagnostic link connector (DLC) on the vehicle.
    - Attach the analyzer *OBD II* port to the vehicle connector.
    - Leave the car off, with connector attached, until instructed to turn the key on.

Select CONTINUE.

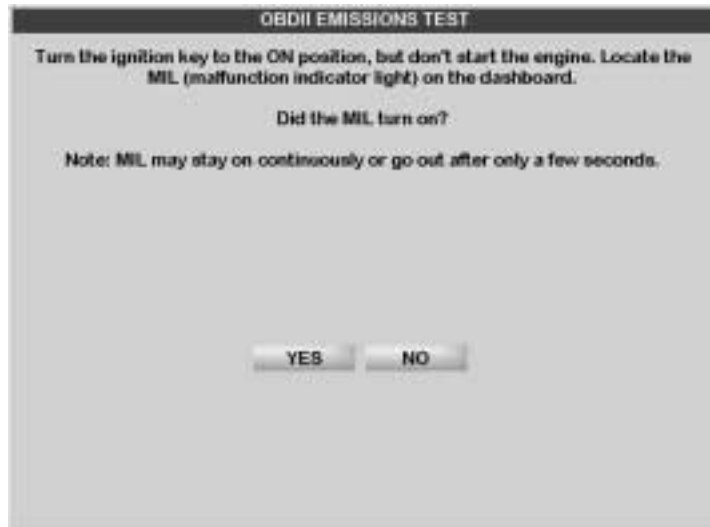


Figure 2-11: MIL Light Illuminated?

2. Locate the MIL light and observe carefully. See [The Malfunction Indicator Lamp, page 9-8](#).
3. Turn the key on and check the light. Did the MIL turn on? Select YES or NO.
  - ✓ This step checks if the bulb is functional. Be sure to watch the MIL continuously, as it may stay on continuously or go out after a few seconds.



Figure 2-12: MIL Engine Idle

4. Start the engine and allow to idle for at least 20 seconds. Select CONTINUE when ready to proceed. The system counts down an idle period. See [Figure 2-12](#).
  - ✓ Always start the engine. False failures may occur if the engine is not started.
5. Answer the question, "Did the MIL turn off?"
  - ✓ A MIL that stays on with the engine running may indicate an OBD II problem.

After the MIL lamp question, the software attempts to establish communication with the vehicle and the following message displays:

**COMMUNICATING...  
PLEASE WAIT**

6. As *OBD II* data is collected, a number of messages display quickly.
  - If the data transmission to the analyzer is successful, the first screen of the Gas Cap Test displays. See [Gas Cap Test, page 2-16](#).



Figure 2-13: *OBD II* Test Complete

- Turn the key off, remove the *OBD II* lead from the vehicle connector and continue with the Gas Cap Test.

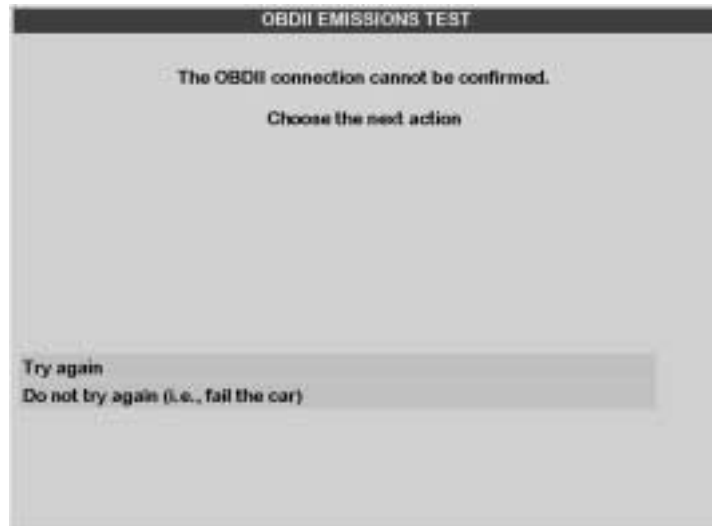


Figure 2-14: No Connection Confirmed Screen

7. If there is no communication, the Connection Not Confirmed Screen displays. See [Figure 2-14](#).
  - Stop the engine, unplug the *OBD II* connector, hook-up again and restart the vehicle.
  - Allow the vehicle to idle.

Press Enter. The analyzer again attempts to communicate.

- ✓ There is no limit to the number of times communication can be attempted.
- ✓ If **Do not try again is selected**, a screen with options for the next action displays. See [Figure 2-15](#).

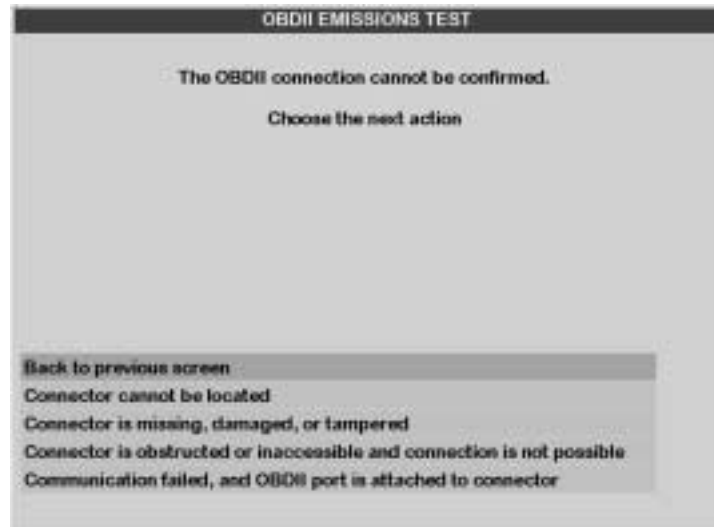


Figure 2-15: No Connection

8. When no connection or communication occurs with the vehicle, a screen displays with choices for the next action. Select the appropriate response. See [Figure 2-15](#).
  - If the abort reason is "No Communication" but a connection could be made, select the correct reason.
- ✓ Vehicles that do **not** communicate must be sent for an ASM Test.
9. Turn off the engine, if still running, and select CONTINUE.



Figure 2-16: Enter Abort Reason

10. A screen displays requesting an abort reason displays. Select a reason and select CONTINUE. See [Figure 2-16](#).

# Gas Cap Test

The Gas Cap Test is performed on all vehicles, except diesel-fueled vehicles.

## Procedure

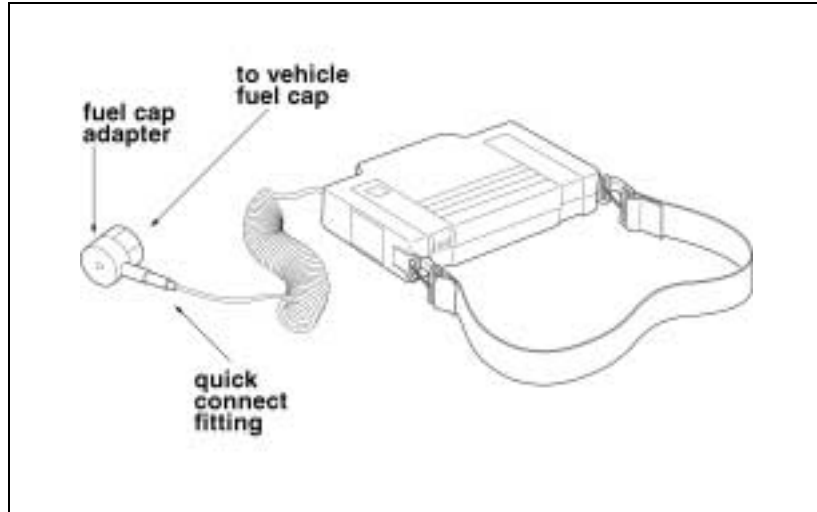


Figure 2-17: *Waekon* Tester

1. Retrieve and open the gas cap tester kit. Select the proper adapter for the cap by using the selection guide included with the cap tester kit. Install appropriate adapter on tester, if required.
2. Install the gas cap onto the gas cap tester.



Figure 2-18: Gas Cap Missing Screen

3. A screen displays asking if the gas cap is missing. See [Figure 2-18](#).
  - Press Enter if the gas cap is missing, or
  - Select NO if the gas cap is present.

If the cap is missing, the test fails.

- ✓ It is suggested that if the gas cap is missing, a new cap is installed prior to testing.



Figure 2-19: Gas Cap Test Start Screen

4. A screen displays asking if the gas cap is testable. See [Figure 2-19](#).
  - Press Enter if the gas cap is not testable, or
  - Select NO if the gas cap is testable.

If the cap is not testable, the test fails.



Figure 2-20: Begin the Gas Cap Test

5. Follow the analyzer prompts and instructions for the automated gas cap test. When prompted, press the Pressurize/Test button once and release.
  - The yellow LED blinks and the small pump on the tester builds up pressure.

Screen prompts display testing information:

**Initializing Gas Cap Tester**

**Ready to Test**

**Gas Cap Test in Progress**

**Test Completed - Passed (or Failed)**

**Is there a Second Gas Cap to Test?**

6. The next screen asks if there is a second gas cap to be tested.
  - If there is a second testable gas cap, select YES and repeat the Gas Cap Test.
7. At the end of the Gas Cap Test, the analyzer displays the test results:
  - Test Completed - Passed**
  - OR**
  - Test Completed - Failed**
8. After completing the Gas Cap Test, re-install the gas cap on the vehicle.
  - Store the tester in its designated location until the next test. The electronics of the unit shut down in approximately one minute and remain inactive until moved.



# Emission Inspection Fee

Figure 2-21: Emissions Inspection Fee

After the Gas Cap Test is completed, the Emissions Inspection Screen displays.

1. Enter the fee for the Emission Test only and press Tab. Include both dollars and cents.
  - ✓ Be sure to enter the decimal point.
2. Answer the Pre-tuned question with YES or NO from the drop-down list. Select CONTINUE.

# Certificate Number



Figure 2-22: Enter Sticker/Decal Number

If the vehicle has passed, a screen displays requesting the number of the next sticker. See [Figure 2-22](#).

- ✓ Different stickers are used for different tests. Be sure to select the correct sticker type.
- ✓ If the sticker number is out of sequence from the previous sticker, you need to account for the missing certificate **before additional vehicles can be tested**. See [Figure 2-22](#).
  - The analyzer verifies that a valid certificate number is entered.

The analyzer contacts the host system automatically and sends test results. The following message is displayed at the bottom left of the screen:

**Contacting VID – Please Wait...**

3. When prompted, select CONTINUE.

The necessary reports print for the tests conducted.

# Out-of-State Verification Form (VI-30A)



Figure 2-23: Out-of-State Verification Form Screen

To issue an Out-of-State Verification (VI-30A) Form, answer “YES” when prompted on the next screen. Enter the assigned number for the form, may be up to seven characters. See [Figure 2-23](#).

- ✓ The VI-30A form is a pre-printed form is a pre-printed, numbered form and does not affect the test outcome. It is a manual form only.

# Vehicle Inspection Report

When all procedures are completed, the analyzer prints out an inspection report for both the Safety and Emission Tests just performed.



TEXAS VEHICLE INSPECTION REPORT Safety and Emissions Inspection			
<p style="text-align: center;"><b>Vehicle Identification</b></p> <p>Test Date: 7/19/02                      Test Time: 11:04                      Test Type: Initial                      Test: OBD II                      Version Number: 0261                      License Number: 12345                      Vehicle ID Number: 1234567                      Vehicle Make: ACURA                      Vehicle Model: 3.2TL                      Vehicle Year: 1998                      Vehicle Type: PASSENGER CAR OR STATION WAGON                      Engine Size: 3,400                      Cylinders/Ignition: 6 CONVENTIONAL                      Transmission: AUTOMATIC                      Vehicle Weight: 3200                      Fuel Type: GASOLINE                      Odometer: 12345</p>		<p style="text-align: center;"><b>Station Identification</b></p> <p>Station Name: SNAPON DIAGNOSTICS CLINIC                      Station Number: 1P98982                      Station Address: 123 SNAP-ON ST.                      Station Zip Code: 543310000                      Inspector First Name: ONBOARD                      Inspector Last Name: DIAGNOSTICS                      Analyzer Number: SO100000</p> <p>Safety Inspection Fee: \$ 21.99                      Safety Repair Costs: \$ 0.00                      Emissions Test Fee: \$ 21.00                      Emissions Repair Costs: \$ 0.00                      Total Inspection Cost: \$ 42.99</p>	
<b>Emissions Test Results</b>			
MIL Cmnd Status: Off	Misfire: Completed	Heated Cat: Completed	O2 Sens: Completed
MIL Visual:	Fuel Sys: Completed	Evap: Completed	O2 Sens Htr: Completed
Engine On: Pass	Comp Cmpnt: Completed	2nd Sys: Completed	EGR Sys: Completed
Engine Off: Pass	Catalyst: Completed	Air Cond: Not Completed	
DLC: Pass			
Gas Cap Integrity: Pass		Emissions: Pass	Safety Items: Pass
<b>Overall Result: Pass</b>			
Certificate Number: C01234567			VI30A: 1234567
<p><small>Vehicles that fail the emissions test must be repaired and pass a retest before a safety certificate can be issued. Some newer vehicles that fail the test may be covered by manufacturers' warranties. Consult your owner's manual or your dealer for details.</small></p>			
I certify that I have properly performed the emissions test according to applicable rules and regulations.			
LICENSE: 			
VIN: 		_____ Certified Inspector's Signature	

Figure 2-24: Vehicle Inspection Report

## Procedure

Two copies of the Vehicle Inspection Report (VIR) print, whether the vehicle passes or fails.

1. If the vehicle passes, the Inspector must sign the Inspection Report Form on the Inspector Signature line.
2. After the Vehicle Inspection Report print, a screen displays asking if another copy is needed. If the answer is:
  - NO, the analyzer returns to the Main Menu.
  - YES, an additional copy is printed on the analyzer's report printer.



Figure 2-25: VID Contact Progress Status

3. Inspection information is transmitted to the VID. See [Figure 2-25](#). If the vehicle passes, turn off the engine and select CONTINUE.



Figure 2-26: Rejection Reason

4. If the vehicle Fails, a screen displays asking the reason for the specific rejection. Type the reason for vehicle failure in the dialogue box and select CONTINUE.
  - A Vehicle Inspection Rejection Report prints automatically. See [Vehicle Inspection Rejection Receipt, page 2-24](#)

# Vehicle Inspection Rejection Receipt

VEHICLE INSPECTION REJECTION RECEIPT		
Date: 07/18/2002	Vehicle Make: BUICK	Model Year: 1992
Vehicle License # _____	Inspection Station#: 1P99992	
Inspection Station Name: SNAPON DIAGNOSTICS CLINIC		
<b>REJECTED FOR DEFECTIVE</b>		
GAS CAP INTEGRITY - Integrity Failure		
PARKING BRAKE SYSTEM- DOES NOT HOLD VEHICLE		
EXPLAIN REJECTION FULLY: _____		
gas cap		
_____		
_____		
_____		
Certified Inspector Making Inspection: _____		
If defects indicated above are corrected and the vehicle is returned to the original inspection station within 15 days, (excluding the date of the rejection) the vehicle will be reinspected once with no additional fee. THIS IS NOT A PERMIT TO DRIVE A DEFECTIVE VEHICLE OR TO DRIVE A VEHICLE WITHOUT A CURRENT VALID INSPECTION CERTIFICATE.		
Fee Paid		\$ 12.00

Figure 2-27: Vehicle Inspection Rejection Receipt

A Vehicle Inspection Rejection Receipt prints automatically if the vehicle fails any part of the inspection. See [Figure 2-27](#).

After the Vehicle Inspection Rejection Receipt prints, a screen displays asking if an additional copy of the Vehicle Inspection Rejection Receipt is required. Answer:

- YES and press Enter to print another copy, or
- NO and press Enter to CONTINUE.

# Vehicle Repair Form (VRF)

**TEXAS DEPARTMENT OF PUBLIC SAFETY**  
**VEHICLE REPAIR FORM (VRF)**

The Vehicle Repair Form is an official record of the Texas Department of Public Safety. A false entry herein, or of this form or an entry herein constitutes an offense.

Applicant's Name \_\_\_\_\_  
 Address \_\_\_\_\_

CHEV \_\_\_\_\_ CAMARO \_\_\_\_\_ 1997 \_\_\_\_\_ Vehicle Make  
 A1234567 \_\_\_\_\_ 12345 \_\_\_\_\_ 021032 \_\_\_\_\_ VIN

**FACILITY MAKING REPAIRS**

Name \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_

Choose one:  
 Recognized Emissions Repair Facility of Texas (RERF) \_\_\_\_\_ RERTT # \_\_\_\_\_  
 Non Recognized Facility ( ) Self \_\_\_\_\_

**PERSON MAKING REPAIRS**

NAME \_\_\_\_\_ DL# \_\_\_\_\_

Choose one:  
 Recognized Emissions Repair Technician of Texas (RERTT) \_\_\_\_\_ RERTT # \_\_\_\_\_  
 Non Recognized Technician ( ) Self \_\_\_\_\_

Before any repairs were performed, was the vehicle in proper control of the air/fuel ratio?  YES  NO  
 If no, what were the repairs needed to achieve proper control of the air/fuel ratio?

REPAIRS	COST		
	Diagnosis	Parts	Labor
<b>Total Expenditures</b>	\$	\$	\$
<b>Grand Total (Diagnosis + Parts + Labor)</b>	\$		

What were any recommended repairs which were NOT performed at the direction of the motorist?  
 \_\_\_\_\_

AFTER all repairs were performed, was the vehicle in proper control of the air/fue. ratio?  YES  NO  
 For 1996-and-newer OBD II vehicles only: Were all System Readiness Test (SRCT) indicators cleared on this vehicle?  YES  NO

I certify that I repaired the vehicle identified herein.

Signature of person making repairs \_\_\_\_\_ Date \_\_\_\_\_

\*If the vehicle FAILS the retest, this form must be presented if you choose to apply for a waiver.  
 \*Labor and Diagnostic repair costs may only apply to the Minimum Expenditure Waiver if completed by a Recognized Emission Repair Technician of Texas

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Figure 2-28: Vehicle Repair Form (VRF)

If repairs were performed, a Vehicle Repair Form (VRF), [Figure 2-28](#), prints.

- ✓ The information that displays on the Vehicle Repair Form (VRF) is determined by cost entries during both Safety and Emissions Tests.





# Safety Only Inspection

This chapter contains procedures for performing the Safety Only Inspection. Included are:

- [Selecting the Test, page 3-1](#)
- [Vehicle Data Entry, page 3-1](#)
- [Safety Inspection, page 3-1](#)
- [Gas Cap Test, page 3-2](#)
- [Safety Only Inspection Fee, page 3-2](#)
- [Certificate Number, page 3-2](#)
- [Out-of-State Verification Form \(VI-30A\), page 3-3](#)
- [Vehicle Inspection Report, page 3-3](#)
- [Vehicle Inspection Rejection Receipt, page 3-3](#)
- [Vehicle Repair Form, page 3-3](#)

## Selecting the Test

1. Select Safety Only Inspection from the Main Menu.
2. Scan access card with the bar code scanner.
  - The Access Code field fills.
3. Enter PIN Number and select CONTINUE.

## Vehicle Data Entry

See [Vehicle Data Entry, page 2-2](#).

- ✓ The Fuel Type field is listed last for the Safety Only inspection.

## Safety Inspection

See [Safety Inspection, page 2-8](#).

## Gas Cap Test

The Gas Cap Test is performed on all vehicles, except diesel-fueled vehicles. See [Gas Cap Test, page 2-16](#).

## Safety Only Inspection Fee

1. When the Safety Inspection is complete, verify that all entries are correct and select Continue.
2. If prompted, enter the Safety Repair Cost for any items repaired during the safety inspection (including the decimal point and cents) and select Continue.
  - ✓ This screen displays only if an "R" was entered for any item(s).
  - ✓ Do not include cost of the Safety Inspection itself.
3. When prompted, enter the Safety Inspection Fee (including the decimal point and cents) and select Continue.
  - ✓ Do not include cost of the repairs.

## Certificate Number



Figure 3-1: Enter Sticker/Decal Number Screen

When a vehicle passes the Safety Only Inspection, the number of the next sticker in the sticker pack must be entered. See [Figure 3-1](#).

- ✓ Different stickers are used for different tests. Be sure to select the correct sticker type.
- ✓ If the number is out of sequence from the previous sticker, you need to account for the missing certificate on the screen in **before additional vehicles can be tested**.
- ✓ All sticker numbers begin with one alphabetic character followed by eight numeric characters. There are two sticker types:
  - Valid for one year: Begins with G, H, I, J, K, L, or M.
  - Valid for two years: Begins with P.

## Procedure

1. If a new pack of certificates is being used, select “C.”
2. If the number entered was wrong, select “R” and enter the correct number.
3. If a “U” is selected, a number of questions are asked to account for the missing certificate. Answer each question and press Enter after each entry.
  - ✓ If the question is not answered here, you must select Missing or Voided Certificates from the Maintenance Menu and account for the lost certificate(s), before the next test.
  - ✓ See [Missing and Voided Certificates, page 6-4](#).

## Out-of-State Verification Form (VI-30A)

See [Out-of-State Verification Form \(VI-30A\), page 2-21](#).

## Vehicle Inspection Report

See [Vehicle Inspection Report, page 2-22](#).

## Vehicle Inspection Rejection Receipt

See [Vehicle Inspection Rejection Receipt, page 2-24](#).

## Vehicle Repair Form

If repairs were performed, a Vehicle Repair Form prints. See [Vehicle Repair Form \(VRF\), page 2-25](#).



# *Emissions Only Inspection*

4

This chapter contains procedures for performing the Emissions Only Inspection. Included are:

- [Selecting the Test, page 4-1](#)
- [Vehicle Data Entry, page 4-1](#)
- [OBD II Testing, page 4-1](#)
- [Gas Cap Test, page 4-2](#)
- [Emission Inspection Cost, page 4-2](#)
- [Certificate Number, page 4-2](#)
- [Out-of-State Verification Form \(VI-30A\), page 4-2](#)
- [Vehicle Inspection Report, page 4-2](#)
- [Vehicle Inspection Rejection Receipt, page 4-2](#)
- [Vehicle Repair Form \(VRF\), page 4-2](#)

The Emissions Only Inspection is most often used to test a vehicle that has failed a remote sensing test or when the customer simply requests an Emission Test.

- ✓ The Emissions Only Inspection performs a complete test without requesting any safety information on the vehicle.

## **Selecting the Test**

1. Select Emissions Only Inspection from the Main Menu.
2. Scan access card with the bar code scanner.
  - The Access Code field fills.
3. Enter PIN Number and select CONTINUE.

## **Vehicle Data Entry**

See [Vehicle Data Entry, page 2-2](#).

## **OBD II Testing**

See [OBD II Testing, page 2-10](#).

## **Gas Cap Test**

The Gas Cap Test is performed on all vehicles, except diesel-fueled vehicles. See [Gas Cap Test, page 2-16](#).

## **Emission Inspection Cost**

See [Emission Inspection Fee, page 2-19](#).

## **Certificate Number**

See [Certificate Number, page 2-20](#).

## **Out-of-State Verification Form (VI-30A)**

See [Out-of-State Verification Form \(VI-30A\), page 2-21](#).

## **Vehicle Inspection Report**

See [Vehicle Inspection Report, page 2-22](#).

## **Vehicle Inspection Rejection Receipt**

See [Vehicle Inspection Rejection Receipt, page 4-2](#).

## **Vehicle Repair Form (VRF)**

If repairs were performed, a Vehicle Repair Form prints. See [Vehicle Repair Form \(VRF\), page 2-25](#).

# Reinspection

This chapter contains information and procedures for Reinspection that include:

- *Start Reinspection, page 5-2*
  - *Vehicle Data Entry, page 5-2*
- *Safety Reinspection, page 5-4*
  - *Safety Repair Cost, page 5-4*
  - *Safety Inspection Fee, page 5-4*
- *OBD II (Emissions) Test, page 5-4*
  - *Emissions Reinspection Repairs, page 5-6*
  - *Emission Inspection Fee, page 5-8*
- *Gas Cap Test, page 5-8*
- *Certificate Number, page 5-8*
- *Out-of-State Verification Form (VI-30A), page 5-8*
- *Vehicle Inspection Report, page 5-8*
- *Vehicle Inspection Rejection Receipt, page 5-8*
- *Vehicle Repair Form, page 5-8*

Reinspect vehicles that have failed previous inspection attempts by selecting Reinspection from the Main Menu. Using this function allows recalls and displays previous inspections, if available.

The analyzer searches internal records and contacts the VID computer to see if information already exists on the vehicle to be reinspected. In addition, the analyzer automatically determines if the reinspection is free or if there is a charge for the reinspection.

## **IMPORTANT**

**Because regulations vary, elements of the reinspection may not be the same in every case. The time that has elapsed between the initial failed test and the reinspection also affects the reinspection procedure. Following are general guidelines for Reinspection. In all cases, be sure to follow the prompts on the analyzer screen.**

# Start Reinspection

If a Reinspection is required:

1. Select Reinspection from the Main Menu.
2. Scan access card with the bar code scanner.
  - The Access Code field fills.
3. Enter PIN Number and click Continue.

## Vehicle Data Entry

1. Scan the bar code on the Vehicle Inspection Report (VIR) from the previous test.

The screenshot shows a software interface titled "VEHICLE IDENTIFICATION". It contains several input fields: "Safety Only?" with a dropdown menu, "License Plate Type" with a dropdown menu, "License Plate Number" with a text input field, "ToDOT Number" with a text input field, and "VIN Number" with a text input field. At the bottom of the form are two buttons: "Continue" and "Abort". Below the buttons is a small line of text: "NOTE: If the previous inspection was SMCT, ONLY utilize 2001 W".

Figure 5-1: Vehicle Identification Screen

The Vehicle Identification Screen displays. See [Figure 5-1](#).

- If it is not possible to scan the information, press Enter and use the keyboard to enter the information. The analyzer makes an internal record noting whether the numbers were scanned or entered from the keyboard.
- ✓ If the License Plate Type, License Plate Number and VIN Number are unknown, leave the fields blank and continue.
  - After the requested information is entered, the analyzer:
    - Searches internal records and calls the host computer to locate previous information for the vehicle,
    - Recalls the closest match and displays information indicating which test record is being used for the current test.
- ✓ The more information entered, the faster the search.



- ✓ If the reinspection involves an emissions test, the analyzer contacts the VID, and it displays all applicable Technical Bulletins and Announcements. The analyzer automatically prints one copy of any announcement.
  - If no match is found in the host computer (for an emissions test), or if the reinspection is a Safety Only inspection (i.e. VID not contacted), the analyzer displays a list of current VINs and License Plate Numbers stored in its own database.



Figure 5-2: Reinspection Vehicle Confirmation Screen

2. Review the summary screen to verify that the information is correct. See [Figure 5-2](#). Select:
  - YES to CONTINUE, or
  - NO to make corrections.
- ✓ Only items that failed initial testing are re-tested without a fee.
  - Inspections performed within the last 16 days are eligible for free reinspection.
  - Inspections performed more than 16 days ago are not eligible for free reinspection.
3. Update the odometer reading and select CONTINUE.
4. The Vehicle Data Confirmation Screen displays. Select:
  - YES, to CONTINUE.
  - NO, to display a screen with the reason the vehicle is not eligible for a free reinspection. Select the Test Type from the list that displays and press Enter to perform an initial inspection.
- ✓ If a vehicle is not eligible for free reinspection, the test is considered an initial inspection and a fee is charged.
5. Follow the on-screen instructions to reinspect previously failed items.

6. The test sequence for Reinspection matches the initial testing sequence detailed in [Safety and Emissions Inspection, page 2-1](#). The difference, in most cases, is that only previously failed items are reinspected.
  - ✓ The items to be reinspected vary depending on the amount of time elapsed since the last inspection. The analyzer presents only required tests and questions.

## Safety Reinspection

If the vehicle had a Safety Only Inspection previously, the system conducts a Safety Only Inspection. See [Safety Only Inspection, page 3-1](#).

- ✓ Only items that failed initially are retested.
1. After the reinspection is complete, a screen displays for you to enter the cost of any safety-related repairs made during the inspection, such as replacement of a burned out bulb.
    - ✓ Do not include the Safety Inspection Fee in the total.
  2. Enter the amount of the Safety Inspection Fee.

## Safety Repair Cost

If a Safety Inspection is performed and repairs are made, the analyzer prompts for the safety repair cost.

1. If prompted, enter the Safety Repair Cost for any items repaired during the Safety Inspection and select CONTINUE.
    - Include decimal point and cents.
    - Do not include cost of the Safety Inspection Test.
- ✓ This screen displays only when an "R" is entered for an item(s) in the Safety Inspection.

## Safety Inspection Fee

When prompted, enter the Safety Inspection Fee and select CONTINUE.

- Include decimal point and cents.
- Do not include repair costs.

## OBD II (Emissions) Test

The Reinspection may require an OBD II Emissions Test. Perform an OBD II Test only if the:

- Reinspection is on the same day (Day 1) as the initial inspection or before the sixteenth day following the day of the initial inspection (Day 17).

AND

- Vehicle failed the emissions test during the initial inspection.

OR

## ***Reinspection***

---

- Reinspection is on or after the 16th day following the day of the initial inspection (Day 17).

## Emissions Reinspection Repairs

On an Emissions Reinspection, the inspector is prompted to provide repair information prior to conducting the reinspection.

1. Select the repaired items using your inspection station records, receipts from other repair facilities, parts receipts provided by the motorist and answers to questions given by the motorist.

A list of the categories containing specific repair items follows. Each category has repair items within it.

- A. Fuel Supply
- B. Evaporative (EVAP) Emissions Control System
- C. Fuel Metering (Carbureted / Fuel Injected)
- D. Idle Speed (Carbureted / Fuel Injected)
- E. Air Supply
- F. Ignition System
- G. Electrical / Electronic
- H. Emissions Systems
- I. Engine Mechanical
- J. Engine Exhaust
- K. Engine Cooling
- L. Vehicle Fluids
- M. Transmission / Final Drive
- N. Miscellaneous

- ✓ You may print a complete Numeric Repair Chart containing a list of the specific repair items with their 1- or 2-digit numeric codes from the analyzer. See [Figure 5-3](#).

NUMERIC REPAIR CHART	
<b>A. Fuel Supply</b>	
1. Pump	
2. Tank	
3. Lines / Hoses / Filters	
4. Fuel Pressure Control	
5. Fuel Distribution (if applicable)	
<b>B. Evaporative (EVAP) Emissions Control System</b>	
6. Canister	
7. Vent Lines / Hoses / Purge Hoses	
8. Fuel Cap	
9. Purge Valves / Solenoids / etc.	
10. Mechanical Control System (include vacuum) (EVAP)	
11. Electrolic Control System (EVAP)	
<b>C. Fuel Metering (Carubreted / Fuel Injected)</b>	
12. Mechanical Control System (include vacuum) (FM)	
13. Electronic Control System (FM)	
14. Injectors	
15. Throttle Body	
16. Carburetor - Internal	
17. Carburetor - External	
18. Idle Mixture Control	
19. Cold Start System/Choke	
20. Metering Device (if applicable)	

Figure 5-3: Numeric Repair Chart, Sample

2. Select the system category that was replaced or repaired.
  - ✓ If repairs were done to more than one category (i.e., Fuel System and Ignition/Electrical System), select the category that represents the largest percentage of the total repair cost.

Figure 5-4: Emission-Related Repair Costs Screen

3. Enter the total cost of repairs performed since the last inspection and press Enter. See [Figure 5-4](#).
4. Select who performed the emissions repair on the vehicle and press Enter:
  - 1 Recognized Emissions Repair Technician
  - 2 Other Repair Technician (Non-Recognized)
  - 3 Motorist (Self-Repair)
  - ✓ If two or more non-recognized repair facilities performed repairs on the vehicle, just select Other Repair Technician (Non-Recognized). If two or more Recognized Emissions Repair Technicians performed repairs on this vehicle, select Recognized Emissions Repair Technician.
  - ✓ Provide as much of the requested repair information as possible. An abnormally high amount of incomplete repair information entries may result in an audit of your inspection station.
5. Highlight the correct answer to the question about repairs being done at your station and select CONTINUE. If you answer:
  - YES  
Repair costs are added to the overall inspection costs and display on the VIR.
  - NO  
Repair costs are not added to the overall inspection costs and no repair-associated costs display on VIR.
  - ✓ The system calculates the overall cost of emissions repairs to print on the VIR.

6. Review the information that displays on the next screen.  
Select:
  - YES and select CONTINUE, if correct  
or
  - NO to make corrections.

## **Emission Inspection Fee**

See [Emission Inspection Fee, page 2-19](#).

## **Gas Cap Test**

The Gas Cap Test is performed on all vehicles, except diesel-fueled vehicles. See [Gas Cap Test, page 2-16](#).

## **Certificate Number**

See:

- Safety and Emissions, [Certificate Number, page 2-20](#), and
- Safety, [Certificate Number, page 3-2](#).

## **Out-of-State Verification Form (VI-30A)**

See [Out-of-State Verification Form \(VI-30A\), page 2-21](#).

## **Vehicle Inspection Report**

See [Vehicle Inspection Report, page 2-22](#).

## **Vehicle Inspection Rejection Receipt**

See [Vehicle Inspection Rejection Receipt, page 2-24](#).

## **Vehicle Repair Form**

If repairs were performed, a Vehicle Repair Form prints. See [Vehicle Repair Form \(VRF\), page 2-25](#).

# Other Functions

This chapter contains information about multiple analyzer functions not covered in other chapters, including:

- *Reprint Vehicle Inspection Report, page 6-1*
- *Training Mode, page 6-3*
- *Audit Menu Functions, page 6-4*
- *Missing and Voided Certificates, page 6-4*
- *Certificate Correction/Replacement, page 6-6*
- *Technical Bulletins/Announcements, page 6-8*
- *Communications Refresh, page 6-9*
- *Request Lockout Status, page 6-11*
- *Communications Diagnostics, page 6-11*
- *Troubleshooting Communication Problems, page 6-14*
- *Inspection Log (VI-8B), page 6-15*
- *VI-30A Only, page 6-16*
- *PC Mode, page 6-19*
- *SnapLink, page 6-19*
- *Software Update, page 6-19*

## Reprint Vehicle Inspection Report

Use the Reprint Vehicle Inspection Report function to reprint a Vehicle Inspection Report. No test is performed—the analyzer simply prints another copy of the results of the vehicle's last inspection test.

- ✓ This function searches test records stored on the analyzer or can call the VID.



Date	VIN	License	Year	Make	Model
07/18/02 13:38	1234567		1992	BUICK	CENTURY

Continue Abort

Select one of the previous inspection records and hit CONTINUE.

Figure 6-1: Reprint Inspection Report Screen

1. Select Reprint Vehicle Inspection Report from the Main Menu, Reports Menu.
2. Scan access card with the bar code scanner.
  - The Access Code field fills.
3. Enter PIN Number and click Continue.
4. Select the option to search the analyzer or call the VID.
  - Local Search searches the analyzer
  - Texas Information Search searches the VID

When requested, enter the following vehicle information for the test results to reprint:

- License Plate
- or
- VIN

5. When a match is found, the analyzer displays the vehicle information and asks you to select Test.
  - Highlight Vehicle and press F10. The analyzer reprints the corresponding Vehicle Inspection Report.

If no matches are found, you are notified.

- ✓ Some data is not reprinted because it is unavailable or state regulations prohibit reprinting.



# Training Mode

Use the Training Mode function located in the Main Menu, Special Inspections Menu, to run complete practice inspections without the need for an access code or a vehicle.

- ✓ Training Tests do not cause the analyzer to contact the host computer, nor do they result in issuing a valid inspection certificate. They are only intended to help you become familiar with the analyzer and its testing procedures.



Figure 6-2: Training Test Type Screen

1. Select Training Mode from Main Menu, Special Inspections Menu. The Training Menu displays, with the tests available. See [Figure 6-2](#).
2. Select a test type. The inspection sequence proceeds for the type of inspection selected. Detailed instructions for the test types are provided in [Safety and Emissions Inspection, page 2-1](#).
  - ✓ Some minor modifications may be made to the sequence due to the absence of an actual vehicle. These modifications are addressed in this procedure.
3. No certificate number is requested because certificates cannot be issued using the Training Mode.
  - ✓ When performing training Emissions Tests, a live vehicle must be used.

## Audit Menu Functions

The Audit Menu function in the Main Menu, Special Access Functions Menu, is for special state audit functions that can only be performed by the government auditor. A special access code is required.

- ✓ Do not attempt to access this area or a lockout could occur.

## Missing and Voiced Certificates

Missing and Voiced Certificates

Inspection Certificate Type: 1 YEAR WINDSHIELD (SAFETY & EMISSIONS) ▼

Previous Certificate Numbers: [ ] [ ]

Certificate Condition: MISSING ▼

How Many Certificates: MORE THAN ONE ▼

Certificate / Decal Number(s): [ ] (beginning)  
[ ] (ending)

Continue Abort

Indicate the type of Inspection Certificate(s)

Figure 6-3: Enter Certificate Number

1. When a vehicle passes an inspection, you are prompted to enter the next certificate number. After the certificate number is entered, the analyzer checks to see if it is the next certificate in the sequence. If it is not, you are asked why the number is out of sequence. Options are:
    - R = Re-enter Certificate Number
    - C = Entered Certificate is Correct
    - U = Unaccounted for
      - If you indicate “U,” Unaccounted for, additional questions are asked about the missing certificate.
- ✓ If the requested information is not entered, you are locked out from further testing.

## Procedure



Figure 6-4: Missing and Voided Certificates Selection

To account for a missing or voided certificate at a later time:

1. Select Missing and Voided Certificates from the Main Menu, Maintenance Menu. Then select See [Certificate Correction/Replacement, page 6-6](#).
2. Scan access card with the bar code scanner.
  - The Access Code field fills.
3. Enter PIN Number and select Continue.

Figure 6-5: Missing and Voided Certificates Information Screen

4. Choose the type of certificate being accounted for and Select CONTINUE. See [Figure 6-5](#).
5. Identify if the certificate is “Missing” or has been “Voided.”

6. Identify if one or more than one certificate is “Missing” or “Voided”, as requested.
7. The next prompt that displays depends on the answer to the question in Step 5. If the answer is:
  - One, enter the single certificate number that is a problem.
  - More Than One, enter the beginning number and ending number of the problem certificates.

*Example:*

Certificates 123 and 124 have been voided. The beginning certificate number in this case is 123, and the ending certificate number is 124. The next usable certificate is 125.

# Certificate Correction/Replacement

Use Certificate Correction/Replacement for stickers issued incorrectly or stickers that must be replaced.

Vehicles tested more than 180 days prior to the current date can not be found when you search for their data.

- ✓ As a general rule, records older than 180 days (six months) are purged from the analyzer database.

The Certificate Corrections/Replacement function does not contact the host computer so you can only locate sticker information for vehicles tested at your station.

## Procedure

1. Select Maintenance from the Main Menu, Certificate Replacement.
2. Scan access card with the bar code scanner.
  - The Access Code field fills.
3. Enter PIN Number and select Continue.
4. When a valid access code is entered, a list of search options displays.
  - Enter the information requested.
  - Enter the search information and press Enter.

The analyzer searches all stored records for vehicles that have passed inspection, using the criteria entered.

Certificate Correction and Replacement

Certificate / Decal Number: 001234567

Certificate / Decal Type: 1 YEAR WINDSHIELD (SAFETY & EMISSIONS)

VIN Number: 123456

License Plate Number: 12345

Continue Abort

Valid search criteria consists of:  
1. Certificate Number and Certificate Type, and/or 2. VIN Number, and/or  
3. License Plate Number

Figure 6-6: Certificate Search Options Screen

5. If a matching record is found, you are prompted to enter the **replacement** certificate number.
6. Type in the replacement certificate number and select CONTINUE.

# Technical Bulletins/Announcements

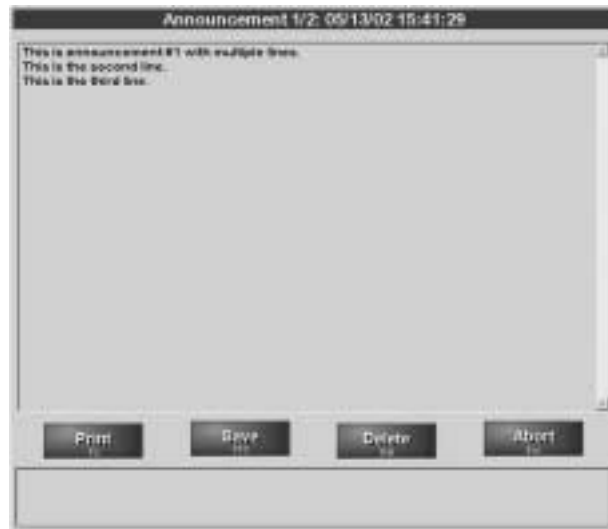


Figure 6-7: Technical Bulletins/Announcements Screen

From time to time, the State may transmit information to the analyzer. This information displays in a number of locations and is stored by the analyzer for 180 days (six months). Announcements may be general in nature, or be directed to a specific inspector.

Technical Bulletins/Announcements allows you to review, print, or delete announcements received by the analyzer. When the Texas Data Link Host (host computer) is contacted, the information it sends to the analyzer may be viewed and printed immediately.

After viewing the announcement, be sure to save it for future reference, or it is deleted. To view saved information in the future:

1. Select Technical Bulletins/Announcements from Main Menu, Reports Menu.
  - The newest announcement displays. Follow the instructions on the screen to print or delete the announcement.
2. To view older announcements, follow the instructions on the screen to page up or page down for other announcements.

---

# Communications Refresh

Use Communications Refresh to update various analyzer operational items. When selected, Communications Refresh updates inspector numbers, lockout status, station information, hours of operation, expiration date of the station license and similar items.

1. Select Communications Refresh from Main Menu, Maintenance Menu.
2. Scan access card with the bar code scanner.
  - The Access Code field fills.
3. Enter PIN Number and select Continue.



Figure 6-8: Communications Refresh Screen

4. The analyzer displays the station information currently in memory. See [Figure 6-8](#).
  - Use F10 or select OK to move from screen to screen.
5. The analyzer contacts the host computer and receives updated information, if available. This may take a few moments.



Figure 6-9: Updated Station Data Screen

— The updated Station Data Screen displays. See [Figure 6-9](#).

6. Select OK.



Figure 6-10: Updated Station Inspector Editor

— The updated Station Inspector Editor Screen displays. See [Figure 6-10](#).



# Request Lockout Status

Use the Request Lockout Status to have the host computer update the analyzer with current status of lockout conditions stored on the VID.

## Procedure

1. Select Maintenance Menu, Request Lockout Status.
2. If the analyzer is locked out, contact the **MCI** Help Desk to have the problem corrected or to discuss the problem.

# Communications Diagnostics

Use the Communications Diagnostics to test the analyzer phone line, modem, and ability to communicate with the host system. This function helps identify the cause of the communication problem if problems occur when calling the host system.

Tests available from the Communications Diagnostics are:

- [Network Diagnostics, page 6-12](#),
- [Dialtone Check, page 6-12](#),
- [Modem Check, page 6-12](#),
- [Phone Number, page 6-13](#), and
- [Print Communications Log, page 6-13](#).

- ✓ Refer to [Troubleshooting Communication Problems, page 6-14](#) for common error messages and solutions.



Figure 6-11: Communications Diagnostics Menu

Select Communications Diagnostics from Main Menu, Maintenance Menu.

- The Communications Diagnostics Screen displays. See [Figure 6-11](#).

## Network Diagnostics

Network Diagnostics is the easiest and most comprehensive test to run. This test checks the phone line, modem, and overall communications.

### Procedure

1. Select Network Diagnostics from the Communications Diagnostics Menu. See [Figure 6-11](#).
  - The analyzer attempts to contact the host computer. Messages display if a problem is found.
2. If the test passes, the analyzer is functional and a problem exists somewhere else.
  - ✓ For additional information refer to [Troubleshooting Communication Problems, page 6-14](#).

## Dialtone Check

The Dialtone Check verifies that there is a phone connection between the analyzer and the telephone wall jack.

### Procedure

1. Select Dialtone Check from the Communications Diagnostics Menu. See [Figure 6-11](#).
2. If a message displays indicating that no dialtone is detected, plug a standard telephone into the wall jack used by the analyzer and attempt to make a call.
3. If you can call out successfully using the telephone, call **EquiServ** to repair the analyzer.
  - Do not contact the telephone company, as the telephone line is fine.
  - If you cannot place a call, contact the phone company, as the analyzer is fine.

## Modem Check

The Modem Check tests the analyzer's modem, a device that allows data to be sent back and forth between the analyzer and the host computer using telephone lines.

### Procedure

1. Select Communications Diagnostics Menu, Modem Check. See [Figure 6-11](#).
  - If the message "Passed" displays, the modem is OK.
2. If the Modem Check fails, call **EquiServ** to repair the analyzer.

## Phone Number

Use the Phone Number function to change the telephone number that is dialed to reach the host computer, if needed.

### Procedure

1. Select Communications Diagnostics Menu, Phone Number. See [Figure 6-11](#).
  2. Verify that the VID phone number is correct.
  3. If the VID phone number is not correct, type in the correct number, with no spaces or hyphens. Be sure to include a "1" at the start of the number if necessary. Press Enter.
- ✓ Only **MCI** has this number. Contact **MCI**, not **EquiServ**.

## Print Communications Log

Use the Print Communications Log feature to view an on-screen record of all communications between the analyzer and the host computer that occurred in the last 14 days. The analyzer offers the option to select a particular communications event for printing.

- ✓ There is no useful user information here. Select this function only when advised by the Communication Help Desk.

## Troubleshooting Communication Problems

If you experience communication problems, you can perform the following diagnostics using the “Network Diagnostics” function. This is the most comprehensive test and provides the most information rapidly. Following is a list of error messages that may occur and possible corrective actions.

### **FAILED AUTOMATIC NUMBER IDENTIFICATION (ANI) CHECK**

- Call *MCI* Help Desk and verify the analyzer phone number is correct.

### **INVALID STATION NUMBER**

- Call *MCI* Help Desk and verify your Station Number is correct.

### **INVALID ANALYZER NUMBER**

- Call *MCI* Help Desk and verify analyzer ID number is correct. The analyzer number can be observed in the STATUS PAGE.

### **INVALID SOFTWARE NUMBER**

- Check software version.

### **INVALID VID PHONE NUMBER**

- Check the host phone number and ensure it is correct.

### **INVALID PORT ADDRESS**

#### **PORT IRQ**

#### **PORT SET-UP ERROR**

- Notify *EquiServ*.

### **CONNECTION ERROR**

- Will be followed by an additional error message.

### **NO DIAL TONE**

- Check the phone line to the analyzer, using a telephone for testing. If OK, perform Modem Check.

### **LINE BUSY**

- Try again, then check phone number, or call *MCI* help desk.

### **NO ANSWER**

- Try again, then check phone number, or call *MCI* help desk.

### **VOICE ANSWERED**

- Check that *MCI* phone number is correct in the analyzer.

### **SECURITY LOGON FAILURE**

- Call *MCI* Help Desk.

# Inspection Log (VI-8B)



Figure 6-12: VI-8B Report Print Screen

Use the Inspection Log Menu function on the Main Menu to print various state-required reports. When selected, the report options available are listed. See [Figure 6-12](#).

Choose from the following report options:

- Last Week's Report
  - For the most current report, and
  - To clear a report lockout.
- Other Week's Report
  - To print a previous week's report.
- Search by Inspector # and Date
  - To produce a custom report using criteria you set.

# VI-30A Only

Use this function for out-of-state vehicle owners who want to register their vehicle in Texas.

- A vehicle owner must have the VI-30A to register a vehicle in Texas.
- A vehicle owner **MUST** already have a inspection sticker before a VI-30A can be issued.
- ✓ Any shop must be able to issue a VI-30A to a vehicle owner who has completed and passed an inspection but did not receive a VI-30A form at that time.

To register an out-of-state vehicle in Texas, the vehicle must, at least, complete and pass a Safety Inspection.

- ✓ When a complete test is performed on an out-of-state vehicle, the shop owner asks if the customer wants a VI-30A. If so, the shop owner completes the form and inputs the number at the end of the test. It is then printed on the VIR.

VEHICLE IDENTIFICATION

Vehicle Model Year

License Plate Type

License Plate Number

TaDOT Number

VIN Number

Enter the vehicle model year

Figure 6-13: Form VI-30A Only Screen

1. Complete the form manually.
  - Complete and number the issued form by hand.
  - No form will be printed because the form is completed manually.
2. Select the VI-30A Only from the Special Inspections Menu.
3. Enter the Vehicle Model Year and press Enter.

4. Select the License Plate Type of the vehicle and press Tab.
5. Enter the License Number of the vehicle and press Tab.
6. Enter the number on the TXDOT Registration certificate on the vehicle. Reenter to verify.
  - ✓ Must be 10 characters of 8 numbers and 2 letters.
7. Enter the VIN using the alphanumeric keys or bar code scanner. Press Tab after each response.
  - ✓ If an incorrect entry is made, an INVALID message displays requesting that the entry be rechecked. Confirm that the data entered is correct and press Enter.
8. When the cursor is in the Vehicle Type field, select the Vehicle Type and press Tab.
9. Press Tab to accept the Vehicle Make retrieved from the VID.
  - If the Vehicle Make is incorrect, select the Vehicle Make from the drop-down list. Press Tab to Continue.
  - ✓ If the vehicle is not on the list, select Other from the end of the list.
10. Press Tab to accept the Vehicle Model retrieved from the VID.
  - If the Vehicle Model is incorrect, select the Vehicle Model from the drop-down list. Press Tab.
  - ✓ The analyzer contains a lookup table for various vehicle makes and models. This list may not apply to newer vehicles.
    - To access the list, type the first few letters of the make or model or press Enter. Use the arrow keys to move through the list that displays. Either select the model from the list or type in the model name.
11. Enter the Odometer Reading and press Enter.
  - ✓ Do not enter tenths of miles.
12. Enter test type.

The screenshot shows a form titled "VEHICLE DATA". It contains the following fields and values:

- Vehicle Type: Passenger / Station Wagon
- Vehicle Body Type: Sedan
- Vehicle Make: ACURA
- Vehicle Model: 2.3CL
- Odometer: (empty)
- Test Type: 1 Year Windshield (Safety & Emission)

At the bottom of the form are two buttons: "Confirm" and "Abort". Below the buttons is a text box with the placeholder "Enter the vehicle type".

Figure 6-14: VI-30A Information Confirmation

13. Confirm that the vehicle information entered is correct. See [Figure 6-14](#). If the vehicle information is correct select YES and press Enter.
14. Enter sticker number.
15. Enter VI-30A number.
16. Enter cost.

The screenshot shows a confirmation screen titled "VEHICLE DATA CONFIRMATION". It displays the following information:

Vehicle Model Year	1998
License Plate Type	Texas Plate
License Plate Number	1234
TxDOT Number	12345678JJ
VIN Number	123456
Vehicle Type	Passenger / Station Wagon
Vehicle Body Type	Sedan
Vehicle Make	GEO
Vehicle Model	SWIFT
Odometer	123456
Test Type	1 Year Windshield (Safety & Emission)

At the bottom of the screen are two buttons: "ACCEPT" and "EDIT".

Figure 6-15: Form VI-30A Only Confirmation Screen

- Vehicle information is transmitted to VID and is printed on the VIR.



## PC Mode

The analyzer can be switched to normal PC-compatible mode and function as a normal PC-compatible system. All protected emissions data and devices are inaccessible when in this mode. To place the analyzer in PC Mode:

1. Exit the **OBIS** program.
2. When the Password Access Screen appears, enter "PC" as the user name.
  - ✓ No password is needed.
3. The standard **Windows** desktop appears.
  - The machine runs any software that does not exceed the available hardware capability.

The analyzer is equipped with a **DELL** computer that has the following minimum specifications:

- 900 MHz or faster processor
  - 128 MB RAM
  - 20 GB hard drive
  - 56 K modem
  - 16x DVD drive
  - 3.5" floppy drive
  - Spare USB port (on front of PC, behind lower cover)
  - Spare RS232 communication port (back of the analyzer)
4. To return to the **OBIS** operation mode, shut down **Windows**. Select the "State" icon, then shut down.
  5. Select Log Off PC from the Shut Down window.
    - ✓ If you select Shut Down from the drop-down menu the PC turns off completely.

## SnapLink

Select the **SnapLink** feature for a screen that allows you to connect a **Snap-on** scanner to the PC.

- ✓ The scanner must be a **Snap-on** scanner.
- ✓ Follow the instructions in the **SnapLink** manual for operation of the software.

## Software Update

The Software Update function is used, when required, to download changes and updates the **OBIS** software.

## OBD II Comm Test

Use to perform of **OBD II** Tests and diagnose vehicle emissions problems.



# Equipment Calibrations

This chapter contains information about equipment calibration functions on the Analyzer Maintenance Menu. Included is:

- [Analyzer Maintenance Menu, page 7-1](#)
  - [Gas Cap Tester Calibration, page 7-2](#)
  - [Status Screen, page 7-3](#)

## Analyzer Maintenance Menu

The Analyzer Maintenance Menu has two functions:

- Gas Cap Tester Calibration
- Status Screen



Figure 7-1: Analyzer Maintenance Menu

To access the Analyzer Maintenance Menu:

1. Select Main Menu, Maintenance, and then Analyzer Maintenance.
  - The Analyzer Maintenance Menu displays. See [Figure 7-1](#).
2. Follow the procedures detailed in this section for each of the actions listed on the Analyzer Maintenance Menu Screen.

## Gas Cap Tester Calibration

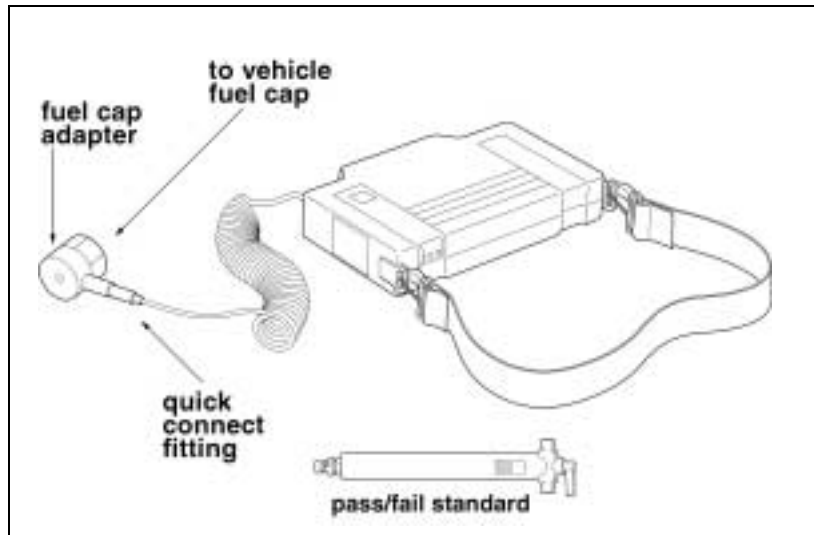


Figure 7-2: Waekon Gas Cap Tester

Conduct the testing using the same method as with conventional gas cap testing except use the calibration tool.

1. Install the pass/fail standard device into the quick coupler on the end of the hose and place the lever on top toward the green side.
  2. Follow the instructions on the screen and when prompted press the pressurize/test button once and release.
    - The yellow LED blinks and the small pump in the tester builds up pressure.
  3. When the yellow LED is on steady press and release the pressure/test button again.
    - All LEDs flash to show the test is in progress.
  4. After the green pass cal is checked switch the lever on top of the calibration fixture to the red fail side and repeat steps 2 and 3.
- ✓ For additional information on calibration see the **Waekon** manual which came with the tester.
  - ✓ A gas cap calibration failure will prevent emissions testing.

## Status Screen



Figure 7-3: Status Screen

To access the Status Screen, select Main Menu, Maintenance Menu, Analyzer Maintenance. See [Figure 7-3](#).

The Status Screen provides general analyzer system information including:

- Station Number
- Analyzer Number
- Remaining Space
- Last Service Date
- Current Date and Time
- Software Version Number



Figure 7-4: Station/Analyzer Lockout Screen

Select View Lockouts to display the Station/Analyzer Lockout Screen with lockout status information and dates. See [Figure 7-4](#).

- ✓ To perform emissions testing all status readings must be clear.



# General Maintenance

This chapter addresses several maintenance-related subjects, including:

- [General Routine Maintenance, page 8-1](#),
- [Printer Operation and Maintenance, page 8-2](#),
- [Maintaining the Bar Code Scanner, page 8-2](#),
- [Connection Panels, page 8-3](#), and
- [Accessories and Options, page 8-5](#).

An operator should perform the analyzer maintenance and service procedures in this section on a regular or as-needed basis. All other service must be performed by an authorized service representative.

## General Routine Maintenance

### Weekly

Clean the monitor screen with glass cleaner, inspect all cables and replace if damaged.

### Every 60 to 90 Days

Lubricate the cabinet casters with a light viscosity machine oil every 60 to 90 days.

### Periodically

- Clean the test leads and power cord periodically with waterless hand cleaner and wipe dry.
- The analyzer has a painted stain-resistant finish. Clean the painted and plated surfaces with spray cleaner. Wipe down the cabinet periodically with a damp cloth.

# Printer Operation and Maintenance

For information regarding printer operation and maintenance, refer to the user manual provided with the printer.

**IMPORTANT**

**Do not change any of the default printer settings. Doing so may result in improperly printed inspection reports.**

## Maintaining the Bar Code Scanner

The bar code scanner requires minimum care. Although specific maintenance is not required, the following periodic checks help to keep the scanner in optimum condition.

### Cleaning the Scanning Window

#### Why

The bar code scanner uses an optical system protected by a window at the scanning end. It is important to keep this window clean, because if it becomes dirty, scratched, or smudged, the optics behind the window do not work properly.

#### When

The scanning window must be kept clean to assure that the unit scans successfully on the first attempt. The scanning window should be cleaned anytime scanning performance begins to degrade or when the window is visibly dirty.

#### How

If the scanning window becomes dirty, clean it by wiping a soft cloth or facial tissue dampened with water or a mild detergent and water solution.

If you use a detergent solution for cleaning, follow with a rinse step so no residues are left on the window.

- ✓ Use the same method to clean the scanner body.
- ✓ Do not submerge the scanner in water, as it is not water-tight. Do not use abrasive wipes or materials to clean the scanning window. Never use solvents such as alcohol or acetone on the scanning window, as they can damage the window finish.

### Checking the Scanner Case

Check the scanner case periodically for signs of damage. A damaged case can lead to movement of the internal components, which can cause malfunctions.



# Connection Panels

## Analyzer Back Panel

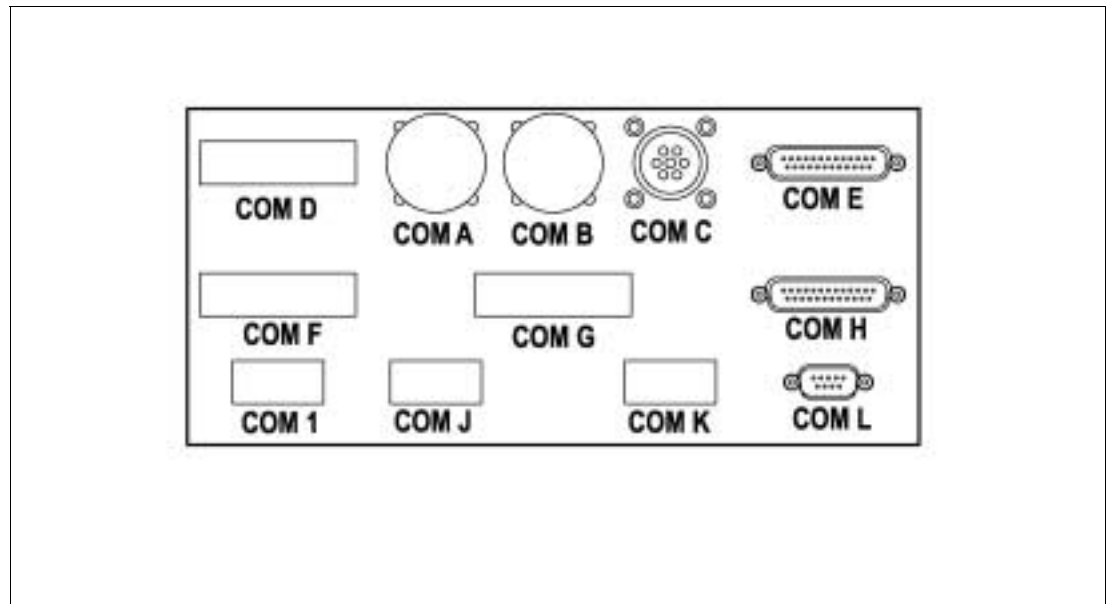


Figure 8-1: Connection Panel, Back of Analyzer

- ✓ Ports used depend on state requirements and optional equipment added to the analyzer. Some options may not be available for specific analyzer systems.

### Ports and Connections

COM A	Not used
COM B	Not used
COM C (CPC Connector)	Gas cap tester
COM D	Not used
COM E (DB-25 Connector)	<b>Snap-Link</b> Cable
COM F	Not used
COM G	Not used
COM H (DB-25 Connector)	Bar code scanner
COM I (DB-9 Connector)	Spare, Comm One Serial
COM J	Not used
COM K	Not used
COM L (DB-9 Connector)	<i>OBD II</i> cable

## Interface Box

The interface box is located behind the left front door of the analyzer.

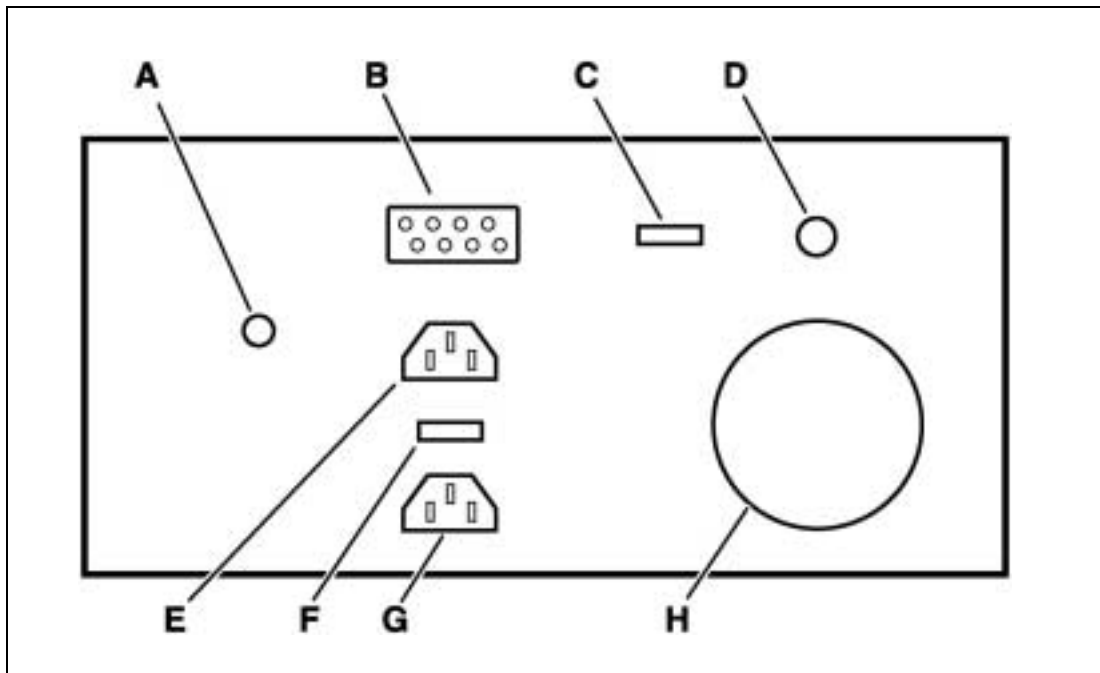


Figure 8-2: Connection Panel, Front of Analyzer

### Buttons, Connectors and Components

<b>A– Power Button</b>	Always on, powers interface box only — Do not turn off (covered).
<b>B– Security Switch Connector</b>	Not used, allows security switches to be added, if necessary
<b>C– USB to Computer Connector</b>	Connects interface box to PC. – Never unplug while PC is on.
<b>D– Remote Control Sensor Connector</b>	The remote control sensor, located in the keyboard drawer, is connected to the interface box with this connector.
<b>E– Power Cord Connector</b>	115V power into interface box.
<b>F– Voltage Selection Switch</b>	Preset to 115V.
<b>G– Spare 115V Outlet</b>	115V power outlet, not used — Do not plug any device into this outlet
<b>H– Cooling Fan</b>	Interface box power supply cooling fan. — Do not block this fan.

# Accessories and Options

## Standard Accessories

Part Number	Item
7009E9321-30 .....	Remote control
EAE0032L50A .....	<i>OBD II</i> adaptor
6-028228 .....	<i>OBD II</i> interface cable
EEEH100B .....	Bar code scanner
EAA0145C20A.....	<b>Waekon</b> gas cap tester
EAW0166L03A .....	Gas cap tester communication cable
EESP304A .....	<b>Snap-Link</b> package
ZEEEA134A .....	Operator's manual

## Options

Contact your **Snap-on** Sales Representative for complete details and information.



# OBD II

## OBD II Overview

To meet *OBD II* requirements, most 1996 and newer vehicles are equipped with two testing modes:

- Generic *OBD II*, and
- Enhanced *OBD II*.

This manual provides information on the Generic *OBD II* mode only.

## Key Terms

Refer to the following list of terms and descriptions when using the *OBD II* information in this manual.

<b><i>Baud Rate</i></b>	The speed a controller transfers and receives data, measured in bits per second (bps).
<b><i>Closed Loop</i></b>	A state in which the engine controller controls and adjusts the air/fuel mixture based on input from the upstream oxygen sensor. The oxygen sensor must reach approximately 600°F before the engine runs in closed loop.
<b><i>Comprehensive Components</i></b>	Any component, other than a major monitor (i.e. fuel trim, catalyst, evaporative system, exhaust gas recirculation (EGR), secondary air (AIR), oxygen sensor(s) (O <sub>2</sub> S), oxygen sensor heater (HO <sub>2</sub> S), misfire, that has any effect on vehicle emissions.
<b><i>Conflict (or Disablement)</i></b>	Condition that interferes with proper execution of a specific monitor.
<b><i>Diagnostic Executive or Management System</i></b>	Powertrain control module (PCM) software responsible for performing testing of powertrain components and systems, recording testing results, and controlling the illumination of the lamps.
<b><i>Diagnostic Link Connector or Data Link Connector (DLC)</i></b>	Connector where diagnostic scan tools interface with the vehicle's on-board computer. Under On-Board Diagnostics, second generation ( <i>OBD II</i> ), the DLC is a standardized 16-cavity connector and has a standardized location.

<b>Diagnostic Trouble Codes (DTC)</b>	Codes associated with engine controller fault messages identifying emission control components that are malfunctioning and that can be retrieved using a diagnostic scan tool.
<b>Drive Cycle</b>	Series of operating conditions that can operate all of the <i>OBD II</i> monitors during a single driving event.
<b>Enabling Conditions or Criteria</b>	Exact engine operating conditions required for a diagnostic test to run.
<b>Federal Test Procedure (FTP)</b>	A transient-speed mass emissions test conducted on a loaded dynamometer. This is the test which, by law, car manufacturers use to certify that new vehicles are in compliance for hydrocarbon, carbon monoxide, and oxides of nitrogen emissions and must be passed before that model may be sold in the United States.
<b>Fuel Trim or Metering</b>	An engine control module (ECM) function that controls and adjusts the fuel delivery during closed-loop operation to bring the air/fuel mix to as close to the optimum ratio or (stoichiometry) as possible.
<b>Functionality</b>	Associated with comprehensive component testing in which outputs from the engine controller are verified by monitoring specific input signals from other components for expected change.
<b>Good Trip</b>	Trip counters in which various monitors pass testing under predetermined conditions. The fulfillment of specific test parameters during a drive cycle. Good trips are counted for MIL extinguishing and DTC erasure.
<b>Heated Oxygen Sensor (HO<sub>2</sub>S)</b>	Oxygen sensor that is heated electrically as well as by engine exhaust so that it warms to normal operating temperature more quickly.
<b>International Organization for Standardization (ISO)</b>	Worldwide federation of national standards bodies from some 130 countries, one from each country. <i>ISO's</i> work results in international agreements that are published as international standards.
<b>ISO 9141</b>	<i>ISO</i> recommended data communication network protocol or standard
<b>In Use Deterioration (IUD)</b>	IUD is the effect of time and use on vehicle performance and emission systems.
<b>Malfunction</b>	Inability of an emissions-related component or system to remain within design specifications. Malfunction also refers to the deterioration of any of the components or systems to a degree that would likely cause the emissions of an average vehicle to exceed the emissions standards by 1.5% times.

<b><i>Maturing Code (or Pending Code)</i></b>	With certain DTC the PCM sets a temporary code that indicates a monitor has failed at least one time. The MIL remains off unless the problem occurs a specific number of times. Then the temporary code matured into a hard code and the PCM turned on the MIL.
<b><i>Open Loop</i></b>	State in which the air/fuel mixture is being controlled by the engine computer according to a standard program and essentially ignores the oxygen sensor signal. Normally encountered during the first few minutes of operation after a cold start.
<b><i>Powertrain Control Module</i></b>	On-board control module that monitors engine functions or both engine and transmission/transaxle functions.
<b><i>PCM Power Down</i></b>	PCM power down is done by removing ignition voltage from the PCM for at least 10 seconds, typically by turning the ignition switch to the LOCK position. On some newer vehicles with electronic transmission gear selector indicators, the PCM stays powered up in the ignition key off position. A power down event allows the PCM to update certain memories and to complete DTC trips.
<b><i>Pending Conditions</i></b>	The PCM may delay running a monitor if an unresolved malfunction has occurred in a related system. The pending conditions are used to prevent a monitor from failing incorrectly.
<b><i>Rationality</i></b>	Term associated with comprehensive component testing in which signal inputs from various components are compared to verify that conditions agree.
<b><i>Readiness Status</i></b>	After a vehicle is repaired or if the battery or PCM has been disconnected, the Readiness Status for each non-continuous diagnostic monitor must be reset. This means that the vehicle must be operated through a complete drive cycle.
<b><i>Society of Automotive Engineers (SAE)</i></b>	Professional organization of automotive engineers and designers that establishes standards and conducts testing for many automotive-related functions within the automotive industry.
<b><i>Short Term Adaptive</i></b>	The short-term compensation made by the engine controller to vary injector pulse width. Based on oxygen sensor inputs, the PCM changes injector pulse width by a percentage to maintain minimal emissions output.
<b><i>Stoichiometric</i></b>	Term most often used to describe the ideal air/fuel mixture entering the intake. The point at which the production of emissions is at a minimum and catalyst conversion of emissions is most efficient. The stoichiometric air/fuel ratio is 14.7 to 1 measured in parts by weight.

<b>Task Manager</b>	PCM software designed to manage, regulate and perform various monitor testing.
<b>Trip</b>	A key cycle (key ON, run, key OFF/power down) where the enable criteria for a particular diagnostic are met and the diagnostic test runs.
<b>Warm-up Cycle</b>	A warm-up cycle is achieved when the engine coolant temperature rises at least 40°F (22.2°C) above engine start-up and achieves a minimum temperature of 160°F (71.1°C).

## OBD II and What it Means

“OBD” stands for “onboard diagnostics.” *OBD II* is a system developed by the *Society of Automotive Engineers (SAE)* to standardize automotive electronic diagnosis so technicians could use the same tools and analyzers to test any make and model without special adapters. *SAE* established guidelines that include:

- A universal diagnostic test connector, called the data link connector or DLC, with dedicated pin assignments.
- A standardized location for the DLC, visible under the driver’s side dash.
- A standardized list of diagnostic trouble codes (DTC’s) used by all manufacturers.
- The ability of the vehicle system to record a snapshot of operating conditions when a fault occurs that effect vehicle emissions.
- A glossary of standard terms, acronyms, and definitions used in system components.

In addition, *SAE* publishes a standard communications protocol for establishing hardware, software, and circuit parameters of *OBD II* systems. Unfortunately, vehicle manufacturers have different interpretations of the standard communications 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 of *SAE*’s recommendations legal requirements that car makers were required to phase in over a three-year period.

- Beginning in 1994, vehicles with a new engine management computer—about 10% of each manufacturers fleet— were supposed to comply with *OBD II* standards.
- For 1995, *OBD II* systems were to appear on about 40% of the new vehicles sold.
  - Some of the 1994–1995 *OBD II* systems were not fully compliant, so the government granted waivers to give manufacturers time to fine-tune their systems.
- Beginning with the 1996 model year, all new vehicles sold in the U.S.A must be fully *OBD II* compliant.



# OBD System Testing

For most emission control systems and components, *OBD II* requires that malfunctions are identified before a problem becomes serious enough to cause vehicle emissions to exceed Federal Test Procedure (FTP) standards by more than 50%.

Instead of monitoring emissions directly, the *OBD II* system looks for emission problems by monitoring virtually every component and system that can increase emissions.

*OBD II* monitoring includes systems and components that cannot be checked during conventional tailpipe I/M testing such as cold start emissions reduction devices and evaporative systems.

## Diagnostic Fault Testing

In contrast, the *OBD II* system does not measure emissions but uses monitors and/or complex statistical methods to predict when the emissions exceed limits.

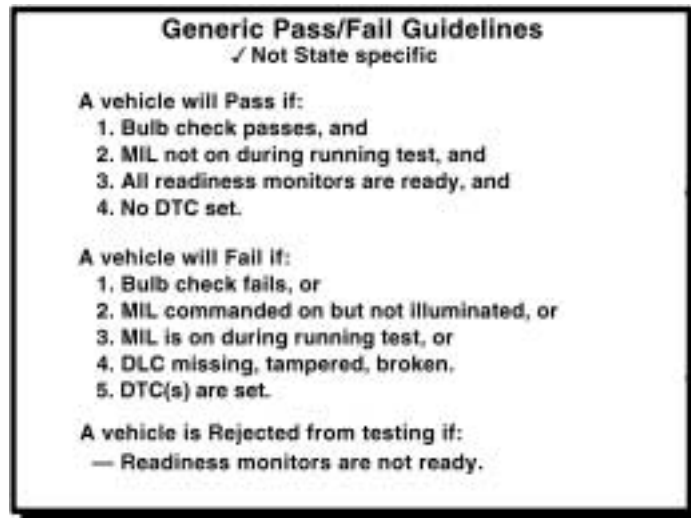


Figure 9-1: Pass/Fail Requirements

Limits are usually 150% of the certification standard that applies to the vehicle.

Additionally, the rule requires monitoring specific components for faults **even if faults do not cause emissions to increase 150%**.

When emission and/or component malfunction is detected, the MIL must illuminate and a fault code must be stored that indicates the likely area of malfunction.

## Drive Cycles

To predict if emission limits are exceeded or components are faulty, the PCM must test and/or monitor components for proper operation. Sometimes these component tests are complex and require the vehicle be operated in certain driving modes or conditions to complete.

- Drive Cycle
  - Requires an engine startup and shut down.
- Warm-Up Cycle
  - Requires engine operation that ensures the coolant temperature rises to a minimum of 40°F from engine startup and reaches a minimum of 160°F.
- A **Trip** means vehicle operation (following an engine-off period) of duration and driving mode such that all components and systems are monitored at least once by the diagnostic system. This is subject to the limitation that the trip monitoring conditions must all be encountered at least once during the first engine start portion of the applicable FTP cycle.

While there have been efforts to develop a “generic” drive cycle, this does not currently seem possible due to significant design differences between manufacturers.

## Component Monitoring

When fuel level is low, manufacturers are allowed to disable monitoring systems affected by running out of fuel (e.g., misfire detection). However, these component monitoring systems can only be disabled if the fuel level is below 15% of nominal tank capacity.

### Misfire Monitoring

The diagnostic system must monitor and report engine misfire and identify the specific cylinder experiencing the misfire. If more than one cylinder is misfiring, a separate code must indicate that multiple cylinders are misfiring.

Manufacturers must phase in expanded misfire monitoring conditions beginning with the late 1997 model year based on the following schedule.

- Equal or exceed 50% for MY 1997 through MY 1999;
- Equal or exceed 75% for MY 2000;
- Equal or exceed 90% for MY 2001; and
- 100% implementation for MY 2002.

## Evaporative System Monitoring

The diagnostic system must be able to verify air flow from the evaporative system.

The diagnostic system also monitors the evaporative system for loss of hydrocarbon vapor in the atmosphere by performing a pressure or vacuum check of the complete system. Implementation of this requirement is mandatory only for MY 1996 or later vehicles.

Beginning with MY 2000, manufacturers must phase in diagnostic strategies to detect system leaks greater than or equal in magnitude to a leak caused by a 0.020 diameter orifice.

## Secondary Air System Monitor

The diagnostic system must be able to indicate secondary air delivery system malfunction when the flow rate falls below a point when the vehicle would exceed 1.5 times any of the applicable FTP emission records.

## Air Conditioning Refrigerant Monitoring

If the vehicle uses a refrigerant that could harm the stratospheric ozone layer or are reactive in forming atmospheric ozone, the diagnostic system must monitor for loss of the refrigerant.

## Fuel System Monitoring

Manufacturers must continuously monitor the fuel system such that a vehicle's emissions would not exceed 1.5 times any the applicable Federal Test Procedure (FTP) standards.

## Oxygen Sensor Monitoring

The diagnostic system must monitor the output voltage, response rate, and any other parameter which can affect emissions of all primary (fuel control) oxygen sensors for malfunction. It must also monitor the all secondary oxygen sensors (fuel trim control or monitoring device) for proper output voltage and response rate.

## Exhaust Gas Recirculation System Monitoring

The EGR system must be monitored for both low and high flow rate malfunctions.

## Positive Crankcase Ventilation (PCV) System Monitoring

Beginning with the MY 2002, manufacturers must phase-in diagnostic strategies to monitor the PCV system for system integrity. The following phase-in schedule applies:

- Equal or exceed 30% for MY 2002;
- Equal or exceed 60% for MY 2003; and
- 100% implementation for MY 2004.

## Thermostat Monitoring

Beginning with the MY 2000, manufacturers must phase-in diagnostic strategies to monitor the thermostat for proper operation. The following phase-in schedule applies:

- Equal or exceed 30% for MY 2000;
- Equal or exceed 60% for MY 2001; and
- 100% implementation for MY 2002.

## Comprehensive Component Monitoring

The diagnostic system must monitor any electronic powertrain component/system not otherwise described above which either provides input to (directly or indirectly), or receives commands from the on-board computer and which:

- Can affect emissions during any reasonable in-use driving condition, or;
- Is used as part of the diagnostic strategy for any other monitored system or component.

## The Malfunction Indicator Lamp

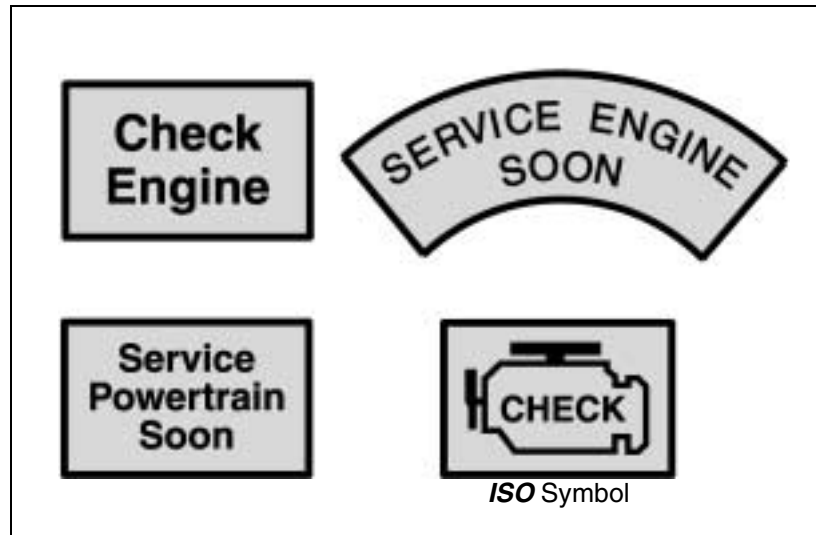


Figure 9-2: Malfunction Indicator Lamps

All 1996 and subsequent model-year passenger car, light-duty trucks, and medium-duty vehicles must be equipped with a malfunction indicator lamp (MIL) located on the instrument panel that informs the vehicle operator of a malfunction of a powertrain component which affects emissions and provides input to, or receive output from, the on-board computer(s) or of the malfunction of the computer(s) itself.

The MIL must illuminate in the engine-run key position before engine cranking to indicate that the MIL is functional. The MIL must display one of the following phrases:

**CHECK ENGINE**  
**SERVICE ENGINE SOON**  
**SERVICE POWERTRAIN SOON**

Alternatively, the *ISO* engine symbol shown in [Figure 9-2](#) may be substituted.

- ✓ The MIL must blink during misfire conditions.

## Extinguishing the MIL

For misfire or fuel system malfunctions, the MIL may be extinguished if the fault does not recur when monitored during three subsequent sequential driving cycles with conditions similar to those under which the malfunction was first determined.

For all other faults, the MIL may be extinguished after three subsequent sequential driving cycles during which the monitor functions and the fault does not reoccur.

The diagnostic system may erase a fault code after 40 warm-up cycles if the fault has not re-registered except as noted above.

## Readiness Codes

Readiness codes are used to indicate if the system has run all monitors available. If all monitors have been run and no faults were found then the assumption is made that the vehicle is “clean.”

## The Data Link Connector (DLC)

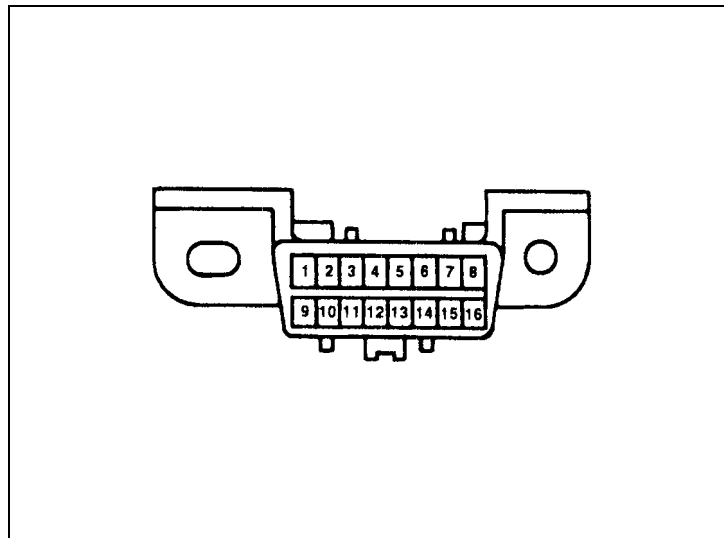


Figure 9-3: DLC Configuration and Pin Assignments

The DLC is a 16-pin connector. The female half is on the vehicle, and the male end is on the analyzer data cable adapter. Pins are arranged in two rows of eight, numbered one to eight and nine to sixteen. See [Figure 9-3](#).

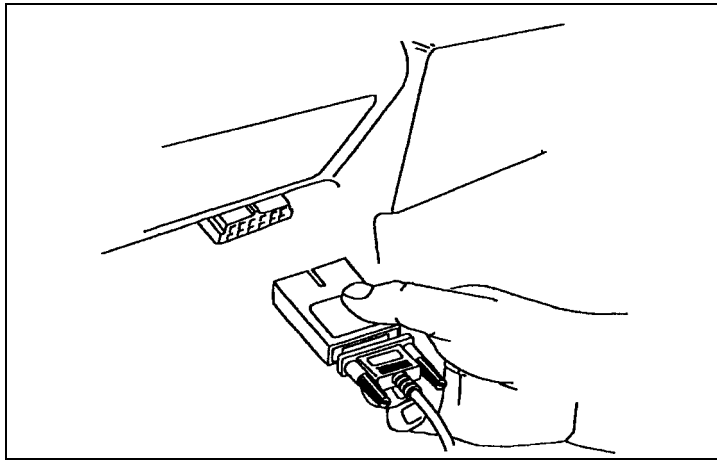


Figure 9-4: Connect to the DLC While Sitting in Driver's Seat

Seven of the 16-pin positions have mandatory assignments, while vehicle manufacturers can use the remaining nine pins at their discretion. The connector is D-shaped and keyed so the two halves mate only one way. You should be able to connect to the DLC while sitting in the driver's seat as illustrated in [Figure 9-4](#). The DLC cannot be hidden behind panels and must be accessible without the use of tools. Although out of the normal line of sight, the DLC should be clearly visible to a technician when crouching.

This was the way it was supposed to be done! Information on locating the DLC is in [Appendix A: OBD II Connections](#) of this manual. The numerous locations of the DLC can be located by vehicle type. Updates to this information are available from many after-market suppliers including:

Aftermarket Research Institute, Inc.  
P.O. Box 648  
Southeastern, PA 19399

The DLC is designed for analyzer access only. You cannot jumper any of the terminals to display codes on the instrument cluster warning lamp or malfunction indicator lamp (MIL). The MIL only alerts the driver and the technician that a code has been set.

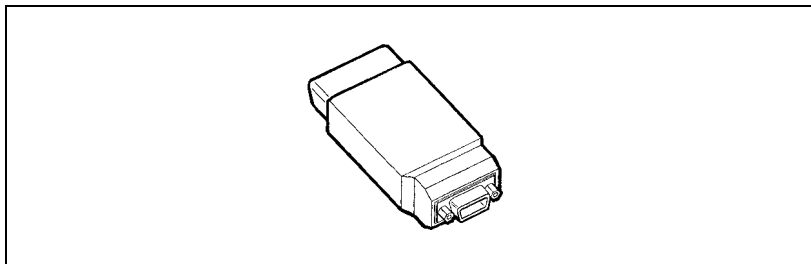


Figure 9-5: OBD II Test Adapter

The 16-pin *OBD II* adapter shown in [Figure 9-5](#) connects the analyzer to the DLC. The adapter attaches to the end of the analyzer data cable and is held in place by captive screws.

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# Powertrain Control Module (PCM)

The Powertrain Control Module (PCM) in *OBD II* vehicles monitors the function and operating efficiency of various emission-related circuits and components. When a monitored circuit or component is not operating properly, a diagnostic trouble code (DTC) is set.

## ***OBD II* Drive Cycles/Readiness Monitors**

Each monitor requires that a certain sequence of events occur before monitoring their assign circuit. This is referred to as a drive cycle. The events required to activate each monitor vary, depending on the circuit and components.

When a Readiness Monitor parameter reads READY, the required sequence of events has completed and the monitor is ready to report problems and set Diagnostic Trouble Codes (DTC). When a Readiness Monitor reads NOT DONE, the required sequence of events has not completed and the monitor is therefore not ready to report the vehicles problems or set DTC. When a readiness monitor reads N/A, the vehicle is not equipped for that monitor. The paragraphs that follow give a brief description of each monitor.

## ***OBD II* Monitors**

### **Misfire Monitor (MISFIRE)**

Monitors engine misfire and designates by DTC the specific cylinder in which a misfire occurs. Misfire is a lack of combustion due to an absence of spark, poor fuel metering, poor compression, or any other cause. Typically, inputs from the Engine Coolant (ECT), Mass Air Flow (MAF), and Crankshaft Position (CKP) sensors are required to enable the monitor.

### **Comprehensive Component Monitor (COMPONENTS)**

Determines 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. The monitor is enabled shortly after the engine is started. However, some individual components may not be available for monitoring.

### **Secondary Air System Monitor (AIR)**

Monitors the function of the secondary air system, and test the ability of the air system to inject air into the exhaust. This monitor relies on the O<sub>2</sub> sensor feedback to determine the presence of air flow. Inputs from the ECT, Intake Air Temperature (IAT), and CKP sensor, and the O<sub>2</sub> sensor monitor are required to enable the AIR monitor.

### **Oxygen Sensor Monitors (O<sub>2</sub> SENSOR & O<sub>2</sub> HEATER)**

Monitors the O<sub>2</sub> sensor switching frequency for degradation, and the heater circuit for proper operation (when equipped).

### **Exhaust Gas Recirculation System Monitor (EGR SYS)**

Tests the integrity and flow characteristics of the EGR system. This monitor is enabled during EGR system operation, after certain base engine and operating conditions are satisfied. Inputs from the ECT, IAT, Throttle Position (TP) and CKP sensors are required to enable the EGR monitor.

### **Fuel System Monitor (FUEL SYS)**

Monitors the adaptive fuel control system and determines when a learned value exceeds a specified threshold. Inputs from the ECT, IAT, and MAF or Manifold Absolute Pressure (MAP) sensors are required to enable this monitor.

### **Catalyst Efficiency Monitor (CAT)**

Determines 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 Vehicle Speed Sensor (VSS) inputs. When this monitor is READY, it relies mainly on inputs from the oxygen sensors.

### **Evaporative Emission System Monitor (EVAP SYS)**

Checks the function of EVAP components and the ability to flow fuel vapor (hydrocarbons) to the engine. The sequence-of-events required to enable this monitor vary, depending on the Evaporative Emissions (EVAP) system components.

### **Heated Catalyst Monitor**

No description available.

### **A/C Refrigerant Monitor**

No description available.

## **Future OBD II**

- Vehicles with electrical systems greater than 12V in the future, such as 42V, will probably use a different *OBD II* connector because of system voltage.
- In the next couple of years another communication protocol called Controlled Area Network (CAN) will begin to appear on vehicles.



# Powertrain System Diagnostic Trouble Codes

Following are the recommended industry common trouble codes for the Powertrain Control System. These include systems that might be integrated into an electronic control module and used to control engine functions such as fuel, spark, idle speed, and vehicle speed (cruise control) as well transmission control. The fact that a code is recommended as a common industry code does not imply that it is a required code (legislated), an emission related code, or that it indicates a fault that causes the malfunction indicator light to illuminate. Refer to *DTC Naming Guidelines for Signals from Components*, page 9-15.

## Standardized Fault Code Format

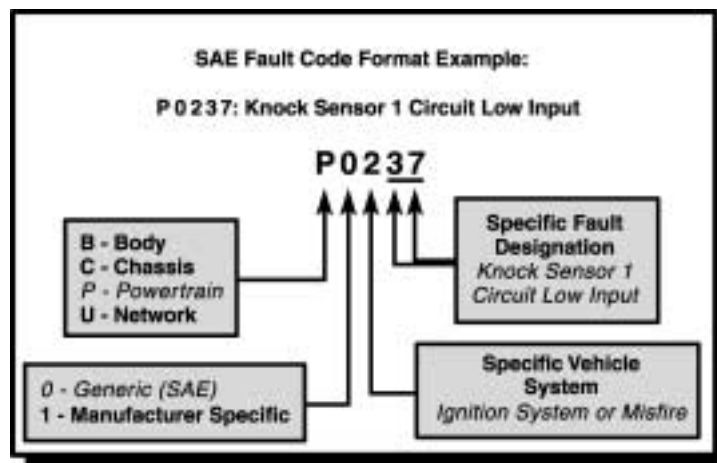


Figure 9-6: SAE Fault Code Format Example

## Codes Only—OBD II Diagnostic Trouble Codes

Diagnostic trouble codes (DTC) are reported in a five-character alphanumeric format.

### First Character

The first character is a letter that defines the system where a code was set. Four letters are currently assigned:

- P—Powertrain
- B—Body
- C—Chassis
- U—Undefined

### Second Character

The second character is:

- 0—SAE defined (generic) code
- 1—Manufacturer-defined (enhanced) code
- 2—With “B” or “C”, reserved for manufacturers
- 3—With “B” or “C”, reserved for SAE

- ✓ The meaning of 2 or 3 varies according to the system character (P, B, C, or U). See *First Character*, page 9-13.

**Third Character**

The third CDTC character indicates the system where the fault occurred:

- 1—fuel or air metering problem
- 2—fuel or air metering problem
- 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—transmission control problem

**Final Characters**

The final characters in the DTC reveal the conditions that triggered the code. Different sensors, actuators and circuits are assigned blocks of numbers.

- The lowest number in the block indicates a general malfunction. This is the generic DTC.
- Higher numbers in the block—called enhanced codes—provide more specific information, such as low or high voltage, slow response, or an out-of-range signal.

Both the Federal Clean Air Act and California *OBD* legislation require uniformity among manufacture’s fault code numeric format and messages associated with these codes. This format is defined in *SAE J2012*.

The diagnostic trouble code (DTC) consists of the alpha-numeric designators followed by three digits:

<b>P0</b>	<b>P3 Powertrain related codes</b>
P0	Powertrain codes controlled by <i>SAE</i>
P1	Powertrain codes controlled by the manufacturer
P2	Powertrain codes controlled by <i>SAE</i>
P3	Powertrain codes controlled by manufacturer (P3000–P3399)
P3	Powertrain codes controlled by <i>SAE</i> (P3400–3999)
B0	B3 Body related codes
B0	Body codes controlled by <i>SAE</i>
B1	Body codes controlled by the manufacturer
B2	Body codes controlled by the manufacturer
B3	Body codes reserved
C0	C3 Chassis related codes
C0	Body codes controlled by <i>SAE</i>
C1	Body codes controlled by the manufacturer
C2	Body codes controlled by the manufacturer
C3	Body codes reserved
U0	U3 Network related codes
U0	Network codes controlled by <i>SAE</i>
U1	Network codes controlled by the manufacturer
U2	Network codes controlled by the manufacturer
U3	Network codes reserved

## DTC Naming Guidelines for Signals from Components

<b>Component/System SAE J1930</b>	<b>Acronym SAE J1930</b>	<b>Modifier<sup>(1)</sup></b>	<b>Noun Name</b>	<b>Parameter<sup>(1)</sup></b>
Air Conditioning	A/C	Clutch Status	N/A	Voltage
Air Conditioning	A/C	Clutch	Relay	
Crankshaft Position	CKP		Sensor	
Distributor Ignition*	DI		Low resolution	
Distributor Ignition	DI		High resolution	
Engine Coolant	ECT		Sensor	Voltage
Engine Speed	RPM		Input	
Evaporative Emissions	EVAP	Canister Purge	Valve	
Evaporative Emissions	EVAP	Purge	Solenoid	
Exhaust Gas Recirculation	EGR		Solenoid	
Fan Control	FC		Relay 1	
Fan Control	FC		Relay 2	
Heated Oxygen Sensor	HO2S		In acronym	
Heated Oxygen Sensor	HO2S		In acronym Heater	Voltage
Heated Oxygen Sensor	HO2S			
Heated Oxygen Sensor	HO2S			
Idle Air Control	IAC		Valve	Voltage
Idle Air Control	IAC		Valve	
Ignition Control	IC		N/A	Voltage
Ignition Control	IC		N/A	Voltage
Injector	N/A			
Intake Air Temperature	IAT			Voltage
Knock Sensor	KS		In acronym	
Knock Sensor	KS		Module	
Malfunction Indicator Lamp	MIL		in acronym	
Manifold Absolute Pressure	MAP		Sensor	Voltage
Mass Air Flow	MAF		Sensor	Frequency
Mass Air Flow	MAF		Sensor	
Secondary Air Injection	AIR		Solenoid	
Temperature			Sensor	Voltage
Throttle Position	TP		Sensor	Voltage
Throttle Position	TP		Sensor	
Torque Converter Clutch	TCC		Solenoid	Stuck on
Vehicle Speed Sensor	VSS		In acronym	
Vehicle Speed Sensor *	VSS		In acronym	

\* Intermittent

<sup>1</sup>. If used.

- ✓ Service Information uses Component/System **SAE J1930** or Acronym **SAE J1930**, Modifier(1), Noun Name, Parameter(1).

# Communication Problems

Some *OBD II* equipped vehicles have problems communicating with the analyzer. A PCM may fail to communicate with the analyzer. If a problem exists with the wiring or other circuit parts on the vehicle, the analyzer may not be able to communicate with the PCM. The vehicle's failure to perform a test also can be a symptom for diagnosing a driveability problem.

## Check Analyzer Operation

If the analyzer works properly on other vehicles then the problem is probably in the vehicle, not the analyzer.

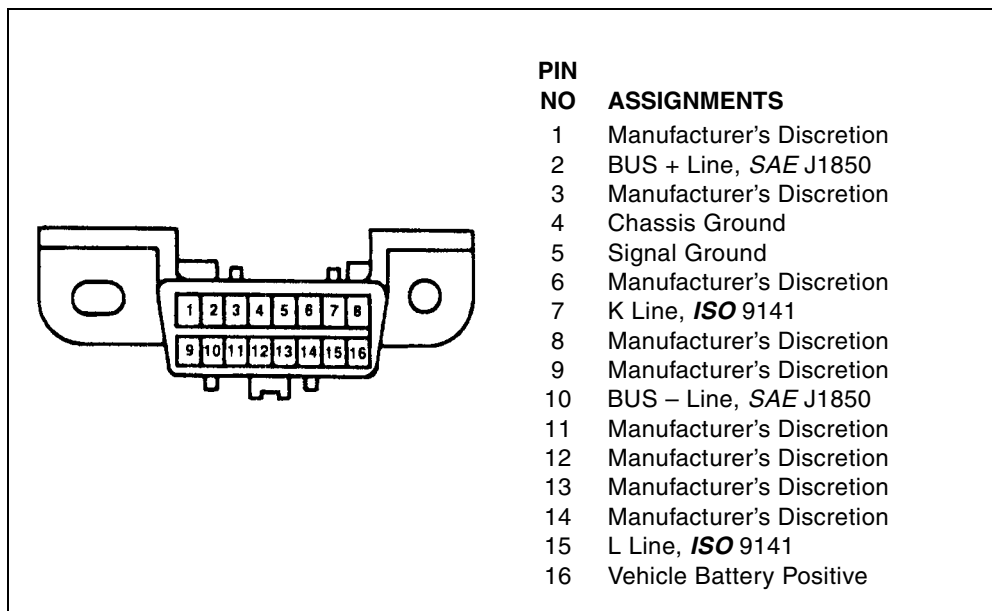


Figure 9-7: 16-pin DLC Connector Pinout

## Testing the Diagnostic Connector —16-pin DLC

Unfortunately, vehicle manufacturers have different interpretations of *OBD II* requirements. This makes it difficult to define a specific approach to DLC problem diagnosis. In [Figure 9-1](#) you can see that:

- Some manufacturers use the *SAE J1850* BUS+ line but not the BUS-, while others use the *ISO 9141* K LINE, but not the L LINE.
- Ford has used the 3 lines, the *J1850* lines for powertrain tests, and the *ISO 9141* line for the non-powertrain tests (ABS and GEM).
- There have also been cars with no ground at pin 4.
- In addition, a pin location that is stuffed, doesn't necessarily mean that it is stuffed based on the *OBD II* requirements.

Use the [Ground Test, page 9-17](#) and [Battery Voltage Test, page 9-17](#) at the diagnostic center to help determine the reason the vehicle does not perform the diagnostic tests. Use a high-impedance digital voltmeter.

## Ground Test

This test measures the voltage drop across the ground side of the diagnostic connector. An ideal system ground should have a voltage drop of 0.1 volt or less.

1. Connect the voltmeter positive (+) lead to the ground terminal in the diagnostic connector.
  2. Connect the negative (-) lead directly to the battery negative (-) terminal.
- ✓ Do not connect the voltmeter negative lead to an engine or chassis ground

To check for an open circuit at the diagnostic connector ground terminal connect the voltmeter positive (+) lead to the battery positive and the negative lead to the connector ground terminal. You should read battery voltage. If the meter reads zero, the ground terminal is open.

## Battery Voltage Test

This tests the battery voltage supply to the computer.

1. Connect the voltmeter positive (+) lead to the battery voltage terminal at the diagnostic connector.
2. Connect the negative (-) lead to the battery ground terminal. You should read battery voltage.



# Appendix A: OBD II Connections

A

The location of the *OBD II* (On-Board Diagnostics) connection on a vehicle depends on make, model, and year. Following the diagram is a list of connector locations with reference to the grid.

- ✓ Use the *SAE* Standardized Link to connect to the vehicle's on-board diagnostics port in order to interrogate and retrieve fault codes.

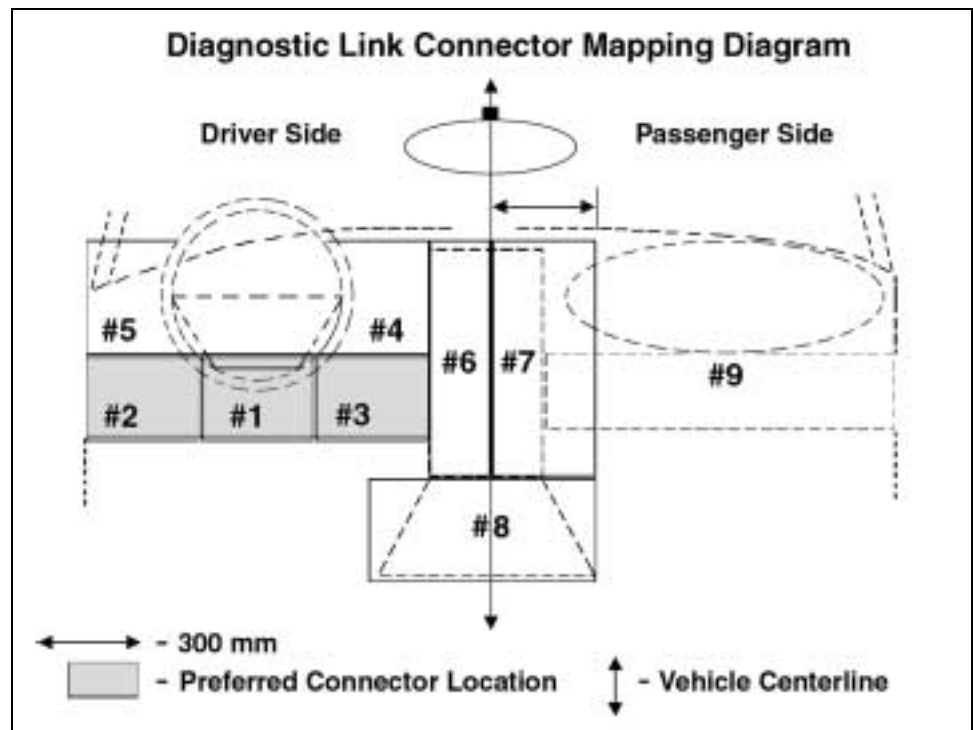


Figure A-1: Map of *OBD II* Tachometer Connector Locations

- ✓ This information is for reference only and may not be current for all states.

# OBD II Connections Table

## 2001

Manufacturer	Year	Model	Location (See Figure A-1)	Cover	Comments
Acura	2001	2.5 TL, 3.2 TL	9	No	next to seat heater switch; below radio
Acura	2001	3.2 CL, 3.2 TL	8	No	above shifter
Acura	2001	3.5 RL	8	Yes	front of shifter; behind ashtray
Acura	2001	Integra, 2.2 CL, 2.3 CL, 3.0 CL	8	No	passenger side of console
Acura	2001	MDX SUV	3	No	under dash at R; connector face down
Acura	2001	NSX	7	No	under passenger dash
Audi	2001	A4 1.8T & Quattro, A4 2.8 & Quattro, A4 Avant & 2.8 wagon, A6 & Quattro, A8 3.7 & 4.2	2	No	lower dash, left of steering column
	<b>NOTE:</b>	From 1998 to 2002 all Audi DLC's are located at 2, uncovered, including S4 Quattro and TT Coupe and Roadster			
Bentley	2001	All models	2	No	bottom, passenger side dash (or in glove box)
BMW	2001	3 & 5-series, X-5 SUV	2	Yes	OBD lid below radio & A/C controls
BMW	2001	7 & 8-series	8	Yes	OBD lid below radio & A/C controls
BMW	2001	Z3-series	7	Yes	passenger side dash; next to console
BMW	2001	Z8-series	2	Yes	lower dash; next to kick panel, pull cover down
Buick	2001	All Century	1	No	at R of accelerator pedal
Buick	2001	LeSabre	2	No	lower edge dash; R of parking brake release
Buick	2001	Park Avenue	2	No	lower edge dash; between strg. col. & park brake
Buick	2001	Regal	3	No	lower edge dash; R of strg. col.; next to console
Cadillac	2001	Catera	2	No	
Cadillac	2001	Deville & Concours	2	No	lower edge dash; above park brake pedal (cap)
Cadillac	2001	Eldorado	1	No	
Cadillac	2001	Escalade SUV	2	No	lower edge dash; L of strg. col.; above park brake
Cadillac	2001	Seville	2	No	lower edge dash; R of strg. col. & hood release
Chevrolet Cars	2001	Camaro, Malibu	3	No	



## Appendix A

Manufacturer	Year	Model	Location (See Figure A-1)	Cover	Comments
Chevrolet Cars	2001	Cavalier, Corvette, Metro	1	No	
Chevrolet Cars	2001	Impala, Lumina Sedan & Monte Carlo	3	No	lower edge dash; R of strg. col.
Chevrolet Cars	2001	Prizm	1	No	lower edge dash; R of parking brake pedal
Chevrolet Cars	2001	Venture van	1	No	lower edge dash; L of steering column
Chevrolet Trucks & SUVs	2001	Astro van	1	No	
Chevrolet Trucks & SUVs	2001	Blazer & S-10 Trucks, & C/K Trucks	2	No	Blazer & S-series; lower edge dash; R of parking brake
Chevrolet Trucks & SUVs	2001	Chevy Van & Express, Express van, Silverado, Suburban; Tahoe	2	No	lower edge dash; R of parking brake
Chevrolet Trucks & SUVs	2001	Tracker SUV (also as a Geo)	3	No	lower edge dash; R of parking brake pedal
	<b>NOTE:</b>	Many Chevrolet trucks come with a pull-off cover. This cover is not attached. It may be missing on some vehicles if discarded.			
Chrysler	2001	Cirrus/Concorde/LHS, New Yorker, Sebring, Town & Country Van, 300M	3	No	
Chrysler	2001	Neon	2	No	
Chrysler	2001	Sebring Convertible	2	No	lower edge dash; pver hood release; by kick panel
	<b>NOTE:</b>	On 1998 and later Chrysler vehicles, the DLC is located at 3, lower dash, between parking brake and brake pedal.			
Daewoo	2001	Lanos	6	No	
Daewoo	2001	Leganza	3	No	
Daewoo	2001	Nubira	2	Yes	behind fuse panel cover, on kick panel
Dodge	2001	Avenger	3	No	lower R dash; next to console
Dodge	2001	Caravan & Stratus	2	No	
Dodge	2001	Dakota Truck & Durango SUV	2	No	lower edge dash; L of hood release
Dodge	2001	Intrepid	2	No	lower edge dash; between parking brake & pedal
Dodge	2001	Neon, Stratus & Viper	3	No	lower edge dash surround; R of steering column
Dodge	2001	Ram Van & Wagon	1	No	lower edge dash; between park brake & pedal
Ferrari	2001	All models	3	No	up high, under dash; may be close to steering column
Ford Cars & SUVs	2001	Crown Victoria, Windstar	3	No	
Ford Cars & SUVs	2001	Escape SUV	2	No	lower edge dash; R of hood release
Ford Cars & SUVs	2001	Escort	2	Yes	
Ford Cars & SUVs	2001	Excursion SUV	3	Yes	

## Appendix A

Manufacturer	Year	Model	Location (See Figure A-1)	Cover	Comments
Ford Cars & SUVs	2001	Expedition SUV	3	Yes	lower edge dash; above accelerator pedal
Ford Cars & SUVs	2001	Focus	2	Yes	below dash; L of hood release; behind unmarked pull-down door
Ford Cars & SUVs	2001	Mustang	3	No	rear of lower dash' text to trans. tunnel; faces L
Ford Cars & SUVs	2001	Taurus	2	No	lower edge dash
Ford Trucks	2001	All Econoline Vans & Club Wagon	3	Yes	lower edge dash; below steering column
Ford Trucks	2001	Explorer SportTrac	1	Yes	lower edge dash; L of steering column, cap snaps out
Ford Trucks	2001	All F Series Trucks	3	Yes	
Ford Trucks	2001	Ranger	1	No	lower edge dash; L of hood release
Geo	2001	Prizm	1	No	
Geo	2001	Tracker SUV	3	No	
GMC Trucks	2001	Denali & Denali XL, Envoy, Rally, Vandura & Savana Van	1	No	
GMC Trucks	2001	Safari Van, Sonoma	2	No	lower edge dash; R of parking brake
GMC Trucks	2001	Sierra, Suburban, Yukon	2	No	lower edge dash; above parking brake
	<b>NOTE:</b>	Many GMC trucks come with a pull-off cover. This cover is not attached. It may be missing on some vehicles if discarded.			
Honda	2001	Accord	2	No	above hood release; connector faces down
Honda	2001	Civic	3	No	lower R edge dash; behind console trim
Honda	2001	CR-V SUV	7	No	R of console
Honda	2001	Insight Hybrid	8	No	on R side edge of console; near floor
Honda	2001	Odyssey Van	3	No	far R edge of dash; next to console; faces down
Honda	2001	S-2000 Roadster	7	No	under passenger dash; next to console
Hummer	2001	All models	2	No	
Hyundai	2001	Accent	2	No	rear of lower edge dash; R of hood release
Hyundai	2001	Elantra	2	No	in coin box
Hyundai	2001	Sonata	3	No	rear lower edge dash; next to console
Hyundai	2001	Tiburon	1	No	lower edge dash; R of steering column
Hyundai	2001	Santa Fe SUV	2	Yes	located in fuse box panel
Hyundai	2001	XG-300	3	No	

## Appendix A

<b>Manufacturer</b>	<b>Year</b>	<b>Model</b>	<b>Location (See Figure A-1)</b>	<b>Cover</b>	<b>Comments</b>
Infiniti	2001	All models	1	No	
Isuzu	2001	Amigo	2	No	next to kick panel
Isuzu	2001	Rodeo & Rodeo Sport	2	No	under dash at L; connector faces down
Isuzu	2001	Trooper, VehiCross	2	Yes	behind unmarked panel over hood release
Jaguar	2001	S-Type Sedan, All XJ Sedans, Van den Plas	3	No	
Jaguar	2001	All XK Sports Cars	2	No	
Jeep	2001	Cherokee, Grand Cherokee, Wrangler	2	No	rear of lower L edge dash
Kia	2001	All Vehicles	3	No	lower dash above accelerator pedal
Kia	2001	Optima	2	No	under dash by steering column
Lamborghini	2001	All models	3	No	
Land Rover	2001	Discover & Discovery II	3	No	lower R corner dash; next to console
Land Rover	2001	Range Rover	7	No	lower L passenger dash; next to console
Lexus	2001	ES-300, SC-300, SC-400	2	Yes	lower L of dash
Lexus	2001	GS-300 & 400	1	No	lower edge dash; next to steering column
Lexus	2001	IS-300 & SportCross	2	Yes	lower L edge of dash; next to kick panel
Lexus	2001	LS-430	2	Yes	
Lexus	2001	LX-470 SUV	2	Yes	lower edge dash; next to console
Lexus	2001	RX-300	1	Yes	lower edge dash; next to steering column
Lincoln	2001	Continental	3	No	
Lincoln	2001	LS-6 & LS-8	3	No	lower edge dash; in line with ignition switch
Lincoln	2001	Navigator SUV	3	No	lower R edge of dash
Lincoln	2001	Town Car	3	No	lower edge dash; R of steering column
Lotus	2001	Esprit	7	No	above passenger dash
Mazda	2001	All Mazda B-series pickup trucks	1	No	listing includes 2000, 2300, 2500, 3000 & 4000
Mazda	2001	626	2	No	
Mazda	2001	Millenia	3	No	lower R corner dash; next to tunnel

## Appendix A

Manufacturer	Year	Model	Location (See Figure A-1)	Cover	Comments
Mazda	2001	MPV Van	2	No	behind lower edge dash; to R of hood release
Mazda	2001	MX-5 (Miata)	2	Yes	behind fuse box panel
Mazda	2001	Protege	2	No	rear L edge dash; next to hood release
Mazda	2001	Tribute SUV	2	No	rear edge dash; R of hood release
Mercedes-Benz	2001	C Class & CLK	3	Yes	
Mercedes-Benz	2001	All other models	2	Yes	
Mercury	2001	Cougar	2	No	far L of dash; rear of lower edge
Mercury	2001	Grand Marquis	3	No	
Mercury	2001	Mountaineer SUV	2	Yes	
Mercury	2001	Sable	2	No	
Mitsubishi	2001	Diamante	1	No	
Mitsubishi	2001	Eclipse	3	No	lower R edge dash; next to kick panel
Mitsubishi	2001	Galant, Montero Sport	3	No	
Mitsubishi	2001	Mirage	2	No	
Mitsubishi	2001	Montero SUV	3	No	lower edge dash at far R; connector faces down
Nissan	2001	All passenger car models, Frontier Truck, X-Terra SUV, 200-SX & SE	2	No	
Nissan	2001	Pathfinder SUV	2	No	lower edge dash; R of hood release
Nissan	2001	Quest Van	2	No	lower edge dash; L of steering column
Oldsmobile	2001	Alero	2	No	lower L edge dash; between steering column & hood release
Oldsmobile	2001	Aurora	1	No	
Oldsmobile	2001	Bravada	2	No	lower R edge dash; R of parking brake pedal
Oldsmobile	2001	Intrigue	3	No	lower edge dash; R of steering column; plastic cover
Oldsmobile	2001	Silhouette Van	1	No	lower edge dash; L of steering column
Plymouth	2001	Breeze, Neon, Prowler, Voyager	2	No	lower L of dash; over hood release; next to kick panel
Pontiac	2001	Aztek, Montana Van	1	No	lower edge dash; L of steering column
Pontiac	2001	Bonneville, Sunfire, Grand Am	1	No	
Pontiac	2001	Firebird, Grand Prix	3	No	

## Appendix A

<b>Manufacturer</b>	<b>Year</b>	<b>Model</b>	<b>Location (See Figure A-1)</b>	<b>Cover</b>	<b>Comments</b>
Porsche	2001	All 911 models, Carrera & Turbo	6	Yes	
Porsche	2001	Boxter, Boxter S	2	No	
Roll Royce	2001	All models	2	No	
Saab	2001	9-3	1	Yes	lower edge dash; R of steering column; plastic cover
Saab	2001	9-5	3	Yes	
Saturn	2001	All S Series, All L Series	2	No	
Subaru	2001	Forester, Impreza & WRZ	2	Yes	lower L dash; pull-down door
Subaru	2001	Legacy, Brighton & Outback	2	No	lower dash; below hood release; hinged cover
Suzuki	2001	Vitara, Grand Vitara	3	No	lower edge dash; new R console kick panel
Toyota	2001	Avalon, RAV 4 SUV	1	No	
Toyota	2001	Camry, Solara	1	No	lower edge dash; below steering column
Toyota	2001	Celica	2	Yes	
Toyota	2001	Corolla, Echo	2	No	
Toyota	2001	Land Cruiser	2	No	behind fuse box cover
Toyota	2001	MR-2 Spyder	1	No	L of steering column
Toyota	2001	Prius Hybrid, T-100 Truck, 4-Runner SUV	3	No	
Toyota	2001	Sequoia SUV	3	No	lower edge dash; above accelerator pedal
Toyota	2001	Sienna Van	3	No	lower edge dash; mounted on a bracket; above accelerator pedal
Toyota	2001	Tacoma Truck, Tundra Truck	3	No	lower edge dash; next to console; connector faces down
Volkswagen	2001	Cabrio, Golf, Jetta; New Beetle	2	No	under dash at L side
Volkswagen	2001	Eurovan, Passat	3	No	
Volkswagen	2001	GTI	6	No	remove ashtray; sliding cover; next to ashtray
Volvo	2001	C 70, V 90	8	Yes	in center console compartment under cover marked DLC
Volvo	2001	S/V 40	6	No	
Volvo	2001	S 80, V 70	2	No	

## Appendix A

# 2000

Manufacturer	Year	Model	Location (See Figure A-1)	Cover	Comments
Audi	2000	A4,A8,TT,S4	2	No	
BMW	2000	3/5/8/X5-series	2	Yes	
BMW	2000	7-series	6	Yes	under stereo control
BMW	2000	Z3-series	9	Yes	under passenger dash
Daimler Chrysler	2000	Cirrus/Stratus/Breeze	2	No	
Daimler Chrysler	2000	Concorde/Intrepid	2	No	
Daimler Chrysler	2000	Dakota, Durango	3	No	
Daimler Chrysler	2000	Grand Cherokee, Cherokee	2	No	
Daimler Chrysler	2000	Neon	2	No	
Daimler Chrysler	2000	Prowler, Viper	2	No	
Daimler Chrysler	2000	Ram pick-up/van	3	No	
Daimler Chrysler	2000	Sebring conv.	2	No	
Daimler Chrysler	2000	Voyager/Caravan/T&C	2	No	
Daimler Chrysler	2000	Wrangler	2	No	
Ferrari	2000	456 MGT/MGTA	3	No	
Ferrari	2000	550 Maranello, F 131	3	No	
Ford	2000	Continental	3	No	
Ford	2000	Contour/Mystique	2	No	
Ford	2000	Cougar	2	No	
Ford	2000	Crown Vic/Grand Marq	3	No	
Ford	2000	Econoline	3	Yes	
Ford	2000	Escort/Tracer	2	Yes	
Ford	2000	Excursion	3	Yes	
Ford	2000	Expedition/Navigator	3	Yes	
Ford	2000	Explorer/Mountaineer	2	Yes	
Ford	2000	F-Series	3	Yes	
Ford	2000	Lincoln LS	3	No	
Ford	2000	Mustang	3	No	
Ford	2000	Ranger	2	Yes	
Ford	2000	Taurus/Sable	2	No	
Ford	2000	Town Car	3	No	
Ford	2000	Villager	2	No	
Ford	2000	Windstar	3	No	
Honda	2000	Accord	2	No	above shifter
Honda	2000	Acura 3.5RL	9	No	under passenger. dash
Honda	2000	Acura3.2TL, CL	9	No	above shifter
Honda	2000	Civic	2	No	
Honda	2000	CR-V	7	No	under passenger dash

## Appendix A

<b>Manufacturer</b>	<b>Year</b>	<b>Model</b>	<b>Location (See Figure A-1)</b>	<b>Cover</b>	<b>Comments</b>
Honda	2000	Integra	7	No	under passenger dash
Honda	2000	NSX, S2000	9	No	under passenger dash
Honda	1999	Odyssey	1	No	
Honda	2000	Prelude	9	No	under passenger dash
Hummer	2000	HMC2, XLC2, HMCO, VLCO, HMC4, HMCS	2	No	
Hyundai	2000	Accent, Elantra, Tiburon, Sonata	2	No	
Infiniti	2000	All Vehicles	2	No	
Isuzu	2000	Rodeo, Amigo	2	No	
Isuzu	2000	Trooper, VehiCross	2	Yes	
Jaguar	2000	XJ8	3	No	
Kia	2000	All Vehicles	3	No	
Lamborghini	2000	Diablo DB 132/144	3	No	
Lotus	2000	Esprit	9	No	above passenger dash
Mazda	2000	Millenia	3	No	
Mazda	2000	MX-6, MVP, Protege, 626	2	No	
Mercedes-Benz	2000	S430, S500	2	Yes	
Mercedes-Benz	2000	All Other Vehicles	1	No	
Mitsubishi	2000	Mirage, Eclipse, Galant, Avenger, Sebring	3	No	
Mitsubishi	2000	Montero	2	No	
Mitsubishi	2000	Montero Sp, Nativa, Diamante	1	No	
Nissan	2000	All Vehicles	2	No	
Porsche	2000	All Vehicles	2	No	
Rover	2000	Discovery Series II	3	No	
Rover	2000	Range Rover	9	No	under passenger dash
Saab	2000	9-3	1	Yes	
Saab	2000	9-5	3	Yes	
Subaru	2000	Imperza, Legacy, Forester	1	Yes	
Suzuki	2000	Swift, Geo metro, Esteem	1	No	

## Appendix A

<b>Manufacturer</b>	<b>Year</b>	<b>Model</b>	<b>Location (See Figure A-1)</b>	<b>Cover</b>	<b>Comments</b>
Suzuki	2000	Vitara, GM Traker, Grand Vitara	1	No	
Toyota	2000	4Runner 2WD/4WD	3	No	
Toyota	2000	Avalon	1	No	
Toyota	2000	Camry Solara	1	No	
Toyota	2000	Camry/ES 300	3	No	
Toyota	2000	Celica	2	Yes	
Toyota	2000	Corolla/Prizm	2	No	
Toyota	2000	GS 300/ GS 400	3	No	
Toyota	2000	Land Cruiser/LX 470	3	No	
Toyota	2000	LS 400	2	Yes	
Toyota	2000	New Hybrid	7	No	
Toyota	2000	New Small	2	Yes	
Toyota	2000	RAV 4	3	No	
Toyota	2000	RX 300	2	Yes	
Toyota	2000	SC 300/ SC 400	2	Yes	
Toyota	2000	Sienna	3	Yes	
Toyota	2000	Tacoma 2WD/4WD	3	No	
Toyota	2000	Tundra 2WD/4WD	3	No	
Volvo	2000	C/S/V 70	8	Yes	
Volvo	2000	S/V 40	6	Yes	
Volvo	2000	S80	2	Yes	
VW	2000	New Beetle,Passat,Golf,Jetta	2	No	



## 1999

Manufacturer	Year	Model	Location (See Figure A-1)	Cover	Comments
Audi	1999	A4, A8, TT, S4	2	No	
Bentley	1999	Arnage, Azure, Turbo RT (LWD)	2	No	
Bentley	1999	Brooklands R Limo, Continental (R,T,SC)	2	No	
BMW	1999	(3,5,8,X5)-series	2	Yes	
BMW	1999	7-series	6	Yes	
BMW	1999	Z3-series	9	Yes	
Daimler Chrysler	1999	Cirrus/Stratus/Breeze	2	No	
Daimler Chrysler	1999	Concorde/Intrepid	2	No	
Daimler Chrysler	1999	Grand Cherokee, Cherokee	2	No	
Daimler Chrysler	1999	Neon	2	No	
Daimler Chrysler	1999	Prowler, Viper	2	No	
Daimler Chrysler	1999	Ram pick-up/van	3	No	
Daimler Chrysler	1999	Sebring conv.	2	No	
Daimler Chrysler	1999	Voyager/Caravan/T&C	2	No	
Daimler Chrysler	1999	Wrangler, Dakota, Durango	2	No	
Ferrari	1999	355F1 (Berlinetta, GTS, Spider)	3	No	
Ferrari	1999	456 (GT, GTA)	3	No	
Ferrari	1999	F355 (Berlinetta, GTS, Spider)	3	No	
Ferrari	1999	F131, 550 Maranello	3	No	
Ford	1999	Continental	3	No	
Ford	1999	Contour/Mystique	2	No	
Ford	1999	Cougar	2	No	
Ford	1999	Crown Vic/Grand Marq	3	No	
Ford	1999	Econoline	3	No	
Ford	1999	Escort/Tracer	2	Yes	
Ford	1999	Expedition/Navigator	3	Yes	
Ford	1999	Explorer/Mountaineer	2	Yes	
Ford	1999	F Series	3	No	
Ford	1999	Mustang	3	No	
Ford	1999	Ranger	2	Yes	
Ford	1999	Taurus/Sable	2	No	
Ford	1999	Town Car	3	No	
Ford	1999	Villeager	2	No	
Ford	1999	Windstar	3	Yes	
General Motors	1999	c-car	2	No	
General Motors	1999	e-car (Cadillac Eldorado)	1	No	
General Motors	1999	f-car (Chv Camaro, Pontiac Firebird)	3	No	

## Appendix A

Manufacturer	Year	Model	Location (See Figure A-1)	Cover	Comments
General Motors	1999	g-car (Olds Aurora, Buick Riviera)	1	No	
General Motors	1999	h-car (Bonneville, Le Sabre, Eighty Eight, LSS)	1	No	
General Motors	1999	j-car (Chv Cavalier, Pontiac Sunfire)	1	No	
General Motors	1999	k-car (Cadillac Seville)	2	No	
General Motors	1999	kSPL-car (Cadillac Deville, Cadillac Concours)	1	No	
General Motors	1999	m-car (Geo Metro)	1	No	
General Motors	1999	n-car (Pontiac Grand Am, Olds Achieva, Skylark)	1	No	
General Motors	1999	s-car (Geo Prizm)	1	No	
General Motors	1999	v-car (Cadillac Catera)	2	No	
General Motors	1999	w-car (Lumina, M. Carlo, G. Prix, Regal, Cut. Supreme)	3	No	
General Motors	1999	y-car (Chv Corvette)	1	No	
General Motors	1999	z-car (Saturn)	2	No	
General Motors	1999	c/k (Yukon, Suburban, Sierra, Tahoe, Chv Pickup)	1	No	
General Motors	1999	s/t (Sonoma, Jimmy S1,0, Blazer, Bravada)	2	No	
General Motors	1999	G-van (Vandura, Rally, Savana, Express, Chv van)	1	No	
General Motors	1999	m/l-van (Safari, Astro)	1	No	
General Motors	1999	j/e-truck (Geo Traker)	3	No	
General Motors	1999	u-van (Lumina van, Trans sport, Silhouette)	1	No	
General Motors	1999	p-truck (various/custom)	1	No	
Honda	1999	Accord	2	No	
Honda	1999	Acura (2.2,2.3,3.0)CL	8	No	above shifter
Honda	1999	Acura 3.5RL	8	No	above shifter
Honda	1999	Acura 3.2TL, CL	8	No	above shifter
Honda	1999	Civic	2	No	
Honda	1999	CR-V	9	No	under passgr. dash
Honda	1999	DelSol/Hybrid	9	No	under passgr. dash
Honda	1999	Integra	9	No	under passgr. dash
Honda	1999	NSX, S2,000	9	No	under passgr. dash
Honda	1999	Odyssey	1	No	
Honda	1999	prelude	9	No	under passgr. dash
Hummer	1999	XLC2, HMCO, HMC4, HMCS	2	No	
Hyundai	1999	Accent, Elantra, Tiburon, Sonata	2	No	
Isuzu	1999	Rodeo, Amigo	2	No	
Isuzu	1999	Trooper, VehiCross,	2	Yes	
Jaguar	1999	XJ8	3	No	

## Appendix A

<b>Manufacturer</b>	<b>Year</b>	<b>Model</b>	<b>Location (See Figure A-1)</b>	<b>Cover</b>	<b>Comments</b>
Kia	1999	All Vehicles	3	No	
Lamborghini	1999	Diablo DB 132/144	3	No	
Lotus	1999	Esprit	9	No	Above Passenger Dash
Mazda	1999	MX-5 (Miata), MX-6, Protege, 626	2	No	
Mazda	1999	MVP	1	No	
Mercedes-Benz	1999	All Vehicles	2	Yes	
Mitsubishi	1999	3000GT/Stealth	3	No	
Mitsubishi	1999	Avenger/Sebring	3	No	
Mitsubishi	1999	Diamante	2	No	
Mitsubishi	1999	Eclipse/Eagle Talon	3	No	
Mitsubishi	1999	Expo/Summit Wagon	2	No	
Mitsubishi	1999	Galant	3	No	
Mitsubishi	1999	Mirage/ Eagle Summit	2	No	
Mitsubishi	1999	Montero	2	No	
Mitsubishi	1999	Montero Sp/Nativa	3	No	
Nissan	1999	Infiniti (All Vehicles)	2	No	
Nissan	1999	Nissan (All Vehicles)	2	No	
Porsche	1999	All Vehicles	2	No	
Rolls-Royce	1999	Silver Seraph, Silver Spur, Park Ward Limo	2	No	
Rover	1999	911 models	3	No	
Rover	1999	Range Rover	9	No	under passngr dash
Saab	1999	9-3	1	Yes	
Saab	1999	9-5	3	Yes	
Subaru	1999	Legacy, Impreza, Forester	2	Yes	
Suzuki	1999	Esteem	1	No	
Suzuki	1999	Grand Vitara	1	No	
Suzuki	1999	Swift/GM metro	1	No	
Suzuki	1999	Vitara/GM Traker	1	No	
Toyota	1999	4Runner (2/4 WD)	3	No	
Toyota	1999	Avalon	2	Yes	behind fuse cover
Toyota	1999	Camry	3	No	
Toyota	1999	Camry Solara	1	No	
Toyota	1999	Celica	3	Yes	

## Appendix A

<b>Manufacturer</b>	<b>Year</b>	<b>Model</b>	<b>Location (See Figure A-1)</b>	<b>Cover</b>	<b>Comments</b>
Toyota	1999	Corolla	1	No	
Toyota	1999	ES 300	3	No	
Toyota	1999	GS 300/400	3	No	
Toyota	1999	Land Cruiser	3	No	
Toyota	1999	LS400	2	Yes	
Toyota	1999	LX 470	3	No	
Toyota	1999	Paseo	2	Yes	behind fuse cover
Toyota	1999	Prizm	1	No	
Toyota	1999	RAV4 (2/4 WD)	3	No	
Toyota	1999	RX 300	2	Yes	
Toyota	1999	SC 300/400	2	Yes	
Toyota	1999	Sienna	3	No	
Toyota	1999	Tacoma (2/4 WD)	3	No	
Toyota	1999	Tercel	2	Yes	behind fuse cover
VOLVO	1999	S80	2	Yes	
VOLVO	1999	All Other Vehicles	9	Yes	hand brake area
VW	1999	EuroVan	4	Yes	
VW	1999	Golf, Jetta	7	No	
VW	1999	New Golf, New Jetta, New Beetle, Passat, Cabrio	2	No	

# 1998

Manufacturer	Year	Model	Location (See Figure A-1)	Cover	Comments
Audi	1998	A4,A8,TT,S4,Cabriolet	2	No	
Bentley	1998	Brooklands (R, R Limo)	9	No	under passngr dash
Bentley	1998	Continental (R,T,SC),Azure,Turbo RT	9	No	under passngr dash
BMW	1998	(3,5,8,X5)-series	2	Yes	
BMW	1998	7-series	6	Yes	under stereo control
BMW	1998	Z3-series	9	Yes	under passngr dash
Daimler Chrysler	1998	Cherokee	2	No	
Daimler Chrysler	1998	Cirrus/Stratus/Breeze	2	No	
Daimler Chrysler	1998	Concorde/Intrepid	2	No	
Daimler Chrysler	1998	Dakota	3	No	
Daimler Chrysler	1998	Durango	3	No	
Daimler Chrysler	1998	G. Cherokee	2	No	
Daimler Chrysler	1998	Neon	2	No	
Daimler Chrysler	1998	Prowler	2	No	
Daimler Chrysler	1998	Ram pick-up	3	No	
Daimler Chrysler	1998	Ram van	3	No	
Daimler Chrysler	1998	Sebring conv.	2	No	
Daimler Chrysler	1998	Viper	2	No	
Daimler Chrysler	1998	Voyager/Caravan/T&C	2	No	
Daimler Chrysler	1998	Wrangler	2	No	
Ferrari	1998	355F1(Berlinetta,GTS,Spider),550 Maranello	3	No	
Ferrari	1998	F355(Berlinetta,GTS,Spider),456 (GT,GTA)	3	No	
Ford	1998	Continental	3	No	
Ford	1998	Contour/Mystique	2	No	
Ford	1998	Crown Vic/Grand Marq	3	No	
Ford	1998	Econoline	3	No	
Ford	1998	Escort/Tracer	2	No	
Ford	1998	Expedition/Navigator	3	Yes	
Ford	1998	Explorer/Mountaineer	2	Yes	
Ford	1998	F Series	3	Yes	
Ford	1998	Mark VIII	2	No	
Ford	1998	Mustang	3	No	
Ford	1998	Ranger	2	Yes	
Ford	1998	Taurus/Sable	2	No	
Ford	1998	Town Car	3	No	
Ford	1998	Villeager	2	No	
Ford	1998	Windstar	3	Yes	

## Appendix A

Manufacturer	Year	Model	Location (See Figure A-1)	Cover	Comments
General Motors	1998	c-car	2	No	
General Motors	1998	e-car (Cadillac Eldorado)	1	No	
General Motors	1998	f-car (Chv Camaro, Pontiac Firebird)	3	No	
General Motors	1998	g-car (Olds Aurora, Buick Riviera)	1	No	
General Motors	1998	h-car (Bonneville, Le Sabre, Eighty Eight, LSS)	1	No	
General Motors	1998	j-car (Chv Cavalier, Pontiac Sunfire)	1	No	
General Motors	1998	k-car (Cadillac Seville)	2	No	
General Motors	1998	kSPL-car (Cadillac Deville, Cadillac Concours)	1	No	
General Motors	1998	m-car (Geo Metro)	1	No	
General Motors	1998	n-car (Pontiac Grand Am, Olds Achieva, Skylark)	1	No	
General Motors	1998	s-car (Geo Prizm)	1	No	
General Motors	1998	v-car (Cadillac Catera)	2	No	
General Motors	1998	w-car (Lumina, M. Carlo, G. Prix, Regal, Cut. Supreme)	3	No	
General Motors	1998	y-car (Chv Corvette)	1	No	
General Motors	1998	z-car (Saturn)	2	No	
General Motors	1998	c/k (Yukon, Suburban, Sierra, Tahoe, Chv Pickup)	1	No	
General Motors	1998	s/t (Sonoma, Jimmy S10, Blazer, Bravada)	2	No	
General Motors	1998	G-van (Vandura, Rally, Savana, Express, Chv van)	1	No	
General Motors	1998	m/l-van (Safari, Astro)	1	No	
General Motors	1998	j/e-truck (Geo Traker)	3	No	
General Motors	1998	u-van (Lumina van, Trans sport, Silhouette)	1	No	
General Motors	1998	p-truck (various/custom)	1	No	
Honda	1998	Accord	6	No	insde storage
Honda	1998	Acura (2.2,2.3,3.0)CL	9	No	under passgr. dash
Honda	1998	Acura 2.5TL,3.2TL	8	No	above shifter
Honda	1998	Acura 3.5RL	9	No	under passgr. dash
Honda	1998	Civic	2	No	
Honda	1998	CR-V	9	No	under passgr. dash
Honda	1998	Integra	9	No	under passgr. dash
Honda	1998	NSX, S2000	9	No	under passgr. dash
Honda	1998	Odyssey	9	No	under passgr. dash
Honda	1998	prelude	9	No	under passgr. dash
Hummer	1998	XLC2,HMCO,HMC4,HMCS	2	No	
Hyundai	1998	Accent,Elantra,Tiburon,Sonata	2	No	
Isuzu	1998	Rodeo,Amigo	2	No	
Isuzu	1998	Trooper	2	Yes	

## Appendix A

<b>Manufacturer</b>	<b>Year</b>	<b>Model</b>	<b>Location (See Figure A-1)</b>	<b>Cover</b>	<b>Comments</b>
Jaguar	1998	XJ8	3	No	
Kia	1998	All Vehicles	3	No	
Lamborghini	1998	Diablo DB 132/144	3	No	
Lotus	1998	Esprit	9	No	Above Passenger Dash
Mazda	1998	Millenia	3	No	
Mazda	1998	Protege,626	2	No	
Mercedes-Benz	1998	All Vehicles	2	Yes	
Mitsubishi	1998	3000GT/Stealth	3	No	
Mitsubishi	1998	Avenger/Sebring	3	No	
Mitsubishi	1998	Diamante	2	No	
Mitsubishi	1998	Eclipse/Eagle Talon	3	No	
Mitsubishi	1998	Expo/Summit Wagon	2	No	
Mitsubishi	1998	Galant	3	No	
Mitsubishi	1998	Mirage/ Eagle Summit	2	No	
Mitsubishi	1998	Montero	2	No	
Mitsubishi	1998	Montero Sp/Nativa	3	No	
Nissan	1998	Infiniti (All Vehicles)	2	No	
Nissan	1998	Nissan (All Vehicles)	2	No	
Porsche	1998	911 models	6	Yes	
Porsche	1998	Boxster	2	No	
Rolls-Royce	1998	Silver Spur,Park Ward	9	No	under passngr dash
Rover	1998	Discovery	3	No	
Rover	1998	Range Rover	9	No	under passngr dash
Saab	1998	900, 9000	1	Yes	
Subaru	1998	Legacy,Impreza,Forester	2	Yes	
Suzuki	1998	Esteem	1	No	
Suzuki	1998	Side Kick	1	No	
Suzuki	1998	Side Kick Sport	1	No	
Suzuki	1998	Swift/GM metro	1	No	
Suzuki	1998	X-90	1	No	
Toyota	1998	4Runner (2/4 WD)	3	No	
Toyota	1998	Avalon	2	Yes	behind fuse cover

## Appendix A

<b>Manufacturer</b>	<b>Year</b>	<b>Model</b>	<b>Location (See Figure A-1)</b>	<b>Cover</b>	<b>Comments</b>
Toyota	1998	Camry	3	No	
Toyota	1998	Celica	3	Yes	
Toyota	1998	Corolla	1	No	
Toyota	1998	ES 300	3	No	
Toyota	1998	GS 300/400	3	No	
Toyota	1998	Land Cruiser	3	No	
Toyota	1998	LS400	2	Yes	
Toyota	1998	LX 470	3	No	
Toyota	1998	Paseo	2	Yes	behind fuse cover
Toyota	1998	Prizm	1	No	
Toyota	1998	RAV4 (2/4 WD)	3	No	
Toyota	1998	SC 300/400	2	Yes	
Toyota	1998	Sienna	3	No	
Toyota	1998	Supra	2	Yes	
Toyota	1998	T100 (2/4 WD)	3	No	
Toyota	1998	Tacoma (2/4 WD)	3	No	
Toyota	1998	Tercel	2	Yes	behind fuse cover
Volvo	1998	S80	2	Yes	
Volvo	1998	All Other Vehicles	9	Yes	hand brake area
VW	1998	EuroVan,Passat	4	No	
VW	1998	Golf,Jetta,Cabrio	7	Yes	
VW	1998	New Beetle	2	No	



## 1997

Manufacturer	Year	Model	Location (See Figure A-1)	Cover	Comments
Audi	1997	A4, A8, TT, S4	2	No	
Audi	1997	Cabriolet,A6	9	Yes	rear ashtray
Bentley	1997	Azure, Turbo (R,RT), Continental (R,T)	9	Yes	under passngr dash
Bentley	1997	Brooklands, Brooklands(LWB)	9	Yes	under passngr dash
BMW	1997	(3,5,8,X5)-series	2	Yes	
BMW	1997	7-series	6	Yes	under stereo control
BMW	1997	Z3-series	9	Yes	under passngr dash
Daimler Chrysler	1997	Cherokee	2	No	
Daimler Chrysler	1997	Cirrus/Stratus/Breeze	2	No	
Daimler Chrysler	1997	Concorde/Intrepid/Vision	3	No	
Daimler Chrysler	1997	Dakota	3	No	
Daimler Chrysler	1997	G. Cherokee	2	No	
Daimler Chrysler	1997	Neon	2	No	
Daimler Chrysler	1997	Prowler	2	No	
Daimler Chrysler	1997	Ram pick-up	3	No	
Daimler Chrysler	1997	Ram van	3	No	
Daimler Chrysler	1997	Sebring conv.	2	No	
Daimler Chrysler	1997	Viper	2	No	
Daimler Chrysler	1997	Voyager/Caravan/T&C	2	No	
Daimler Chrysler	1997	Wrangler	2	No	
Ferrari	1997	456 (GT,GTA),550 Maranello	3	No	
Ferrari	1997	F355(Berlinetta,GTS,Spider)	3	No	
Ford	1997	Aerostar	3	Yes	
Ford	1997	Aspire	3	No	
Ford	1997	Continental	3	No	
Ford	1997	Contour/Mystique	2	No	
Ford	1997	Crown Vic/Grand Marq	3	No	
Ford	1997	Econoline	3	Yes	
Ford	1997	Escort/Tracer	2	No	
Ford	1997	Expedition/Navigator	3	Yes	
Ford	1997	Explorer/Mountaineer	2	Yes	
Ford	1997	F Series	3	Yes	
Ford	1997	Mark VIII	2	No	
Ford	1997	Mustang	3	No	
Ford	1997	Probe	3	No	
Ford	1997	Ranger	2	Yes	
Ford	1997	Taurus/Sable	2	No	
Ford	1997	Thunderbird/Cougar	3	Yes	

## Appendix A

<b>Manufacturer</b>	<b>Year</b>	<b>Model</b>	<b>Location (See Figure A-1)</b>	<b>Cover</b>	<b>Comments</b>
Ford	1997	Town Car	3	No	
Ford	1997	Villeager	2	No	
Ford	1997	Windstar	3	Yes	
General Motors	1997	c-car	2	No	
General Motors	1997	e-car (Cadillac Eldorado)	1	No	
General Motors	1997	f-car (Chv Camaro, Pontiac Firebird)	3	No	
General Motors	1997	g-car (Olds Aurora, Buick Riviera)	1	No	
General Motors	1997	h-car (Bonneville, Le Sabre, Eighty Eight, LSS)	1	No	
General Motors	1997	j-car (Chv Cavalier, Pontiac Sunfire)	1	No	
General Motors	1997	k-car (Cadillac Seville)	2	No	
General Motors	1997	kSPL-car (Cadillac Deville, Cadillac Concours)	1	No	
General Motors	1997	m-car (Geo Metro)	1	No	
General Motors	1997	n-car (Pontiac Grand Am, Olds Achieva, Skylark)	1	No	
General Motors	1997	s-car (Geo Prizm)	1	No	
General Motors	1997	v-car (Cadillac Catera)	2	No	
General Motors	1997	w-car (Lumina, M. Carlo, G. Prix, Regal, Cut. Supreme)	3	No	
General Motors	1997	y-car (Chv Corvette)	1	No	
General Motors	1997	z-car (Saturn)	2	No	
General Motors	1997	c/k (Yukon, Suburban, Sierra, Tahoe, Chv Pickup)	1	No	
General Motors	1997	s/t (Sonoma, Jimmy S1,0, Blazer, Bravada)	2	No	
General Motors	1997	G-van (Vandura, Rally, Savana, Express, Chv van)	2	No	
General Motors	1997	m/l-van (Safari, Astro)	1	No	
General Motors	1997	j/e-truck (Geo Traker)	3	No	
General Motors	1997	u-van (Lumina van, Trans sport, Silhouette)	1	No	
General Motors	1997	p-truck (various/custom)	1	No	
Honda	1997	Accord	6	No	insde storage
Honda	1997	Acura (2.2,2.3,3.0)CL/3.5RL, Integra	9	No	under passgr. dash
Honda	1997	Acura 2.5TL,3.2TL	8	No	above shifter
Honda	1997	Civic	2	No	
Honda	1997	CR-V,prelude,DelSol/Hybrid	9	No	under passgr. dash
Honda	1997	NSX, S2000,Odyssey	9	No	under passgr. dash
Hummer	1997	XLC2,HMCO,HMC4,HMCS	2	No	
Hyundai	1997	Accent,Elantra,Tiburon,Sonata	2	No	
Isuzu	1997	Rodeo	2	No	
Isuzu	1997	Trooper	2	Yes	

## Appendix A

<b>Manufacturer</b>	<b>Year</b>	<b>Model</b>	<b>Location (See Figure A-1)</b>	<b>Cover</b>	<b>Comments</b>
Jaguar	1997	XJ8	3	No	
Kia	1997	All Vehicles	3	No	
Lamborghini	1997	Diablo DB 132/144	3	No	
Lotus	1997	Esprit	9	No	Above Passenger Dash
Mazda	1997	MVP	1	No	
Mazda	1997	MX-5 (Miata), MX-6, 626, Millenia	3	No	
Mazda	1997	Protege	2	No	
Mercedes-Benz	1997	All Vehicles	2	Yes	
Mitsubishi	1997	3000GT/Stealth	3	No	
Mitsubishi	1997	Avenger/Sebring	3	No	
Mitsubishi	1997	Diamante	2	No	
Mitsubishi	1997	Eclipse/Eagle Talon	3	No	
Mitsubishi	1997	Expo/Summit Wagon	2	No	
Mitsubishi	1997	Galant	3	No	
Mitsubishi	1997	Mirage/ Eagle Summit	2	No	
Mitsubishi	1997	Montero	2	No	
Mitsubishi	1997	Montero Sp/Nativa	3	No	
Nissan	1997	Infiniti (All)	2	No	
Nissan	1997	Nissan (All)	2	No	
Porsche	1997	911 models	6	Yes	
Porsche	1997	Boxster	2	No	
Rolls-Royce	1997	Silver Spur, Silver Dawn, Park Ward, Limousine	9	No	under passngr dash
Rover	1997	Defender	6	Yes	under parcel tray
Rover	1997	Discovery	3	No	
Rover	1997	Range Rover	9	No	under passngr dash
Saab	1997	900, 9000	1	Yes	
Subaru	1997	Legacy, Impreza, Forester	2	Yes	
Subaru	1997	SVX	3	Yes	
Suzuki	1997	Esteem	1	No	
Suzuki	1997	Side Kick	1	No	
Suzuki	1997	Side Kick Sport	1	No	
Suzuki	1997	Swift/GM metro	1	No	
Suzuki	1997	X-90	1	No	

## Appendix A

Manufacturer	Year	Model	Location (See Figure A-1)	Cover	Comments
Toyota	1997	4Runner (2/4 WD)	3	No	
Toyota	1997	Avalon	2	Yes	behind fuse cover
Toyota	1997	Camry	3	No	
Toyota	1997	Celica	3	Yes	
Toyota	1997	Corolla	1	No	
Toyota	1997	ES 300	3	No	
Toyota	1997	GS 300	1	No	
Toyota	1997	Land Cruiser	2	Yes	behind fuse cover
Toyota	1997	LS4,00	2	Yes	
Toyota	1997	LX 450	2	Yes	behind fuse cover
Toyota	1997	Paseo	2	Yes	behind fuse cover
Toyota	1997	Previa (2/4 WD)	6	Yes	top instrmt panel
Toyota	1997	Prizm	1	No	
Toyota	1997	RAV4 (2/4 WD)	3	No	
Toyota	1997	SC 300/400	2	Yes	
Toyota	1997	Supra	2	Yes	
Toyota	1997	T100 (2/4 WD)	3	No	
Toyota	1997	Tacoma (2/4 WD)	3	No	
Toyota	1997	Tercel	2	Yes	behind fuse cover
Volvo	1999	S80	2	Yes	
Volvo	1999	All Other Vehicles	9	Yes	hand brake area
VW	1997	EuroVan,Passat	4	Yes	
VW	1997	Golf,Jetta,Cabrio	7	Yes	

## 1996

Manufacturer	Year	Model	Location (See Figure A-1)	Cover	Comments
Audi	1996	A4	2	No	
Audi	1996	Cabriolet, A6	9	Yes	rear ashtray
Bentley	1996	Azure, Brooklands, Brooklands (LWB), Limousine	9	Yes	under passgr. dash
Bentley	1996	Continental (R,T), Turbo (R,RL,RT(LWB))	9	Yes	under passgr. dash
BMW	1996	(3,5,8,X5)-series	2	Yes	
BMW	1996	7-series	6	Yes	under stereo control
BMW	1996	Z3-series	9	Yes	under passgr. dash
Daimler Chrysler	1996	Cherokee	2	No	
Daimler Chrysler	1996	Cirrus/Stratus/Breeze	2	No	
Daimler Chrysler	1996	Concorde/Intrepid/Vision	3	No	
Daimler Chrysler	1996	Dakota	3	No	
Daimler Chrysler	1996	G. Cherokee	2	No	
Daimler Chrysler	1996	Neon	2	No	
Daimler Chrysler	1996	Prowler	2	No	
Daimler Chrysler	1996	Ram pick-up	3	No	
Daimler Chrysler	1996	Ram van	3	No	
Daimler Chrysler	1996	Sebring conv.	2	No	
Daimler Chrysler	1996	Viper	2	No	
Daimler Chrysler	1996	Voyager/Caravan/T&C	2	No	
Daimler Chrysler	1996	Wrangler	2	No	
Ferrari	1996	F335(Berlinetta,GTS,Spider)	3	No	
Ford	1996	Aerostar	3	Yes	
Ford	1996	Aspire	3	No	
Ford	1996	Bronco	7	Yes	
Ford	1996	Continental	3	No	
Ford	1996	Contour/Mystique	2	No	
Ford	1996	Crown Vic/Grand Marq	3	No	
Ford	1996	Econoline	3	Yes	
Ford	1996	Escort/Tracer	2	No	
Ford	1996	Explorer/Mountaineer	2	Yes	
Ford	1996	F Series	7	Yes	
Ford	1996	Mark VIII	2	No	
Ford	1996	Mustang	3	No	
Ford	1996	Probe	3	No	
Ford	1996	Ranger	2	Yes	
Ford	1996	Taurus/Sable	2	No	
Ford	1996	Thunderbird/Cougar	3	Yes	

## Appendix A

<b>Manufacturer</b>	<b>Year</b>	<b>Model</b>	<b>Location (See Figure A-1)</b>	<b>Cover</b>	<b>Comments</b>
Ford	1996	Town Car	3	No	
Ford	1996	Villeager	2	No	
Ford	1996	Windstar	3	Yes	
General Motors	1996	a-car (Olds Cierra, Buick Century)	1	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	3	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	2	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	3	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	1	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	3	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	1	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	1	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	1	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	2	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	1	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	1	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	1	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	1	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	1	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	1	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	3	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	3	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	2	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	1	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	2	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	2	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	3	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	1	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	3	No	
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	1	No	

## Appendix A

<b>Manufacturer</b>	<b>Year</b>	<b>Model</b>	<b>Location (See Figure A-1)</b>	<b>Cover</b>	<b>Comments</b>
General Motors	1996	b-car (Chv. Caprice/Impala SS, Buick Roadmaster)	1	No	
Honda	1996	Accord	6	No	insde storage
Honda	1996	Acura 2.5TL,3.2TL	8	No	above shifter
Honda	1996	Civic	2	No	
Honda	1996	DelSol/Hybrid	9	No	under passgr. dash
Honda	1996	Integra	9	No	under passgr. dash
Honda	1996	Odyssey	9	No	under passgr. dash
Honda	1996	Prelude	8	No	above shifter
Hummer	1996	HMC2, HMC4, HMCO, HMCS, VLCO, XLC2	2	No	
Hyundai	1996	Accent,Elantra, Tiburon, Sonata	2	No	
Isuzu	1996	Amigo, Rodeo	2	No	
Isuzu	1996	Trooper,VehiCross	2	Yes	
Jaguar	1996	XJ8	3	No	
Jaguar	1996	XJS	2	No	
Kia	1996	All Vehicles	3	No	
Lamborghini	1996	Diablo DB 132/144	3	No	
Mazda	1996	MVP	1	No	
Mazda	1996	MX-5 (Miata),MX-3,MX-6, 626, Milenia	3	No	
Mazda	1996	Protege	2	No	
Mercedes -Benz	1996	All Vehicles	2	Yes	
Mitsubishi	1996	3000GT/Stealth	3	No	
Mitsubishi	1996	Avenger/Sebring	3	No	
Mitsubishi	1996	Diamante	2	No	
Mitsubishi	1996	Eclipse/Eagle Talon	3	No	
Mitsubishi	1996	Expo/Summit Wagon	2	No	
Mitsubishi	1996	Galant	3	No	
Mitsubishi	1996	Mirage/ Eagle Summit	2	No	
Mitsubishi	1996	Montero	2	No	
Mitsubishi	1996	Montero Sp/Nativa	3	No	
Mitsubishi	1996	Truck(2WD)	2	No	
		911 models			
Nissan	1996	Infiniti (All)	2	No	
Nissan	1996	Nissan (All)	2	No	

## Appendix A

Manufacturer	Year	Model	Location (See Figure A-1)	Cover	Comments
Porsche	1996	All Vehicles	6	Yes	
Rolls-Royce	1996	Silver Spur, Silver Dawn, Park Ward, Limousine	9	Yes	under passngr dash
Rover	1996	Discovery	3	No	
Rover	1996	Range Rover	9	No	under passngr dash
Saab	1996	900, 9000	1	Yes	
Subaru	1996	Legacy, Impreza, Forester	2	Yes	
Subaru	1996	SVX	3	Yes	
Suzuki	1996	Esteem	1	No	
Suzuki	1996	Side Kick	1	No	
Suzuki	1996	Side Kick Sport	1	No	
Suzuki	1996	Swift/GM metro	1	No	
Suzuki	1996	X-90	1	No	
Toyota	1996	4Runner (2/4 WD)	3	No	
Toyota	1996	Avalon	2	Yes	behind fuse cover
Toyota	1996	Camry	2	Yes	behind coin box
Toyota	1996	Celica	3	Yes	
Toyota	1996	Corolla	2	No	
Toyota	1996	ES 300	3	Yes	
Toyota	1996	GS 300	1	No	
Toyota	1996	Land Cruiser	2	Yes	behind fuse cover
Toyota	1996	LS400	2	Yes	
Toyota	1996	Paseo	2	Yes	behind fuse cover
Toyota	1996	Previa (2/4 WD)	6	Yes	top instrumt panel
Toyota	1996	Prizm	1	No	
Toyota	1996	RAV4 (2/4 WD)	3	No	
Toyota	1996	SC 300/400	2	Yes	
Toyota	1996	Supra	2	Yes	
Toyota	1996	T100 (2/4 WD)	3	No	
Toyota	1996	Tacoma (2/4 WD)	3	No	
Toyota	1996	Tercel	2	Yes	behind fuse cover
VOLVO	1999	S80	2	Yes	
VOLVO	1999	All Other Vehicles	9	Yes	hand brake area
VW	1996	Cabrio, Golf, Jetta	7	Yes	
VW	1996	EuroVan, Passat	4	Yes	





# ***Snap-on Diagnostics***