DIGITAL Can OBD2 & 1 Tool

OWNER'S MANUAL

**The Easiest
And Best Way
To Troubleshoot
OBD2 and OBD1
Vehicles!**

I/M MONITOR STATUS
MIS
FUE
CCM
CAT
EVA
AIR
O2S
EGR
MIL
01
G
FREEZE FRAME
02
P2019
Intake manifold runner position sensor/switch circuit bank 2
EMISSION STATUS
DTC
FF

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WHAT IS OBD?

The Enhanced OBD2 & 1 Tool is designed to work on most Chrysler, Ford, GM and Toyota OBD1 systems and all OBD2 compliant vehicles.

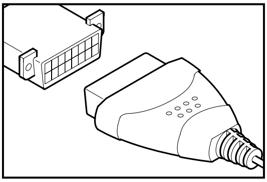
SERVICE
CHECK
SOON!

One of the most exciting improvements in the automobile industry was the addition of on-board diagnostics (OBD) on vehicles, or in more basic terms, the computer that activates the vehicle's "CHECK ENGINE" light. OBD1 was designed to monitor manufacturer-specific systems on vehicles built from 1981 to 1995. Then came the development of OBD2, which is on all 1996 cars and light trucks sold in the United States. These systems are part of a government mandate to lower vehicle emissions. The sophisticated programs in the vehicle's on-board computer system are designed to detect failures in a range of vehicle systems. Diagnostic information can be accessed through a Data Link Connector test port specifically designed for this purpose. For all OBD systems, if a problem is found, the computer turns on the "CHECK ENGINE" light to warn the driver, and sets a Diagnostic Trouble Code (DTC) to identify where the problem occurred. A special diagnostic tool, such as the Enhanced OBD2 & 1 Tool, is required to retrieve these codes, which consumers and professionals use as a starting point for repairs.

The Enhanced OBD2 & 1 Tool provides the additional ability to retrieve *enhanced* DTCs from most Chrysler/Jeep, General Motors, Ford, Mazda and Isuzu vehicles. The types of enhanced data available depends on the vehicle make.

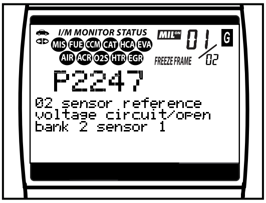
Easy To Use . . . .

- Connect the Tool to the vehicle's test connector.
- Turn the ignition key "On."
- Press the **POWER/LINK** button.



Easy To View . . . .

- The Tool retrieves stored codes, as well as Freeze Frame data and I/M Readiness status (OBD2 systems only).
- Codes, I/M Readiness status and Freeze Frame data are displayed on the Tool's LCD display screen. System status is indicated by LED indicators.

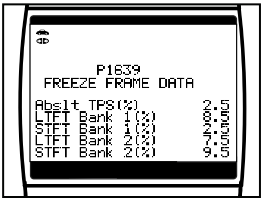

I/M MONITOR STATUS
MIL ON
MIS FUE CCM CAT HCA EVA
AIR ACR O2S HTR EGR
01
G
FREEZE FRAME
02

P2247

02 sensor reference
voltage circuit/open
bank 2 sensor 1

Easy To Define . . . .

- Read code definitions from the Tool's LCD display.
- View Freeze Frame data (OBD2 systems only).

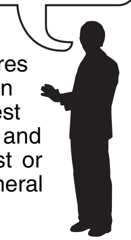


```
     P1639
 FREEZE FRAME DATA
Abslt TPS(%)      2.5
LTFT Bank  1(%)   8.5
STFT Bank  1(%)   2.5
LTFT Bank  2(%)   7.5
STFT Bank  2(%)   9.5
```

SAFETY FIRST!

To avoid personal injury, instrument damage and/or damage to your vehicle; do not use the OBD2 Code Reader before reading this manual.

This manual describes common test procedures used by experienced service technicians. Many test procedures require precautions to avoid accidents that can result in personal injury, and/or damage to your vehicle or test equipment. Always read your vehicle's service manual and follow its safety precautions before and during any test or service procedure. **ALWAYS** observe the following general safety precautions:



When an engine is running, it produces carbon monoxide, a toxic and poisonous gas. To prevent serious injury or death from carbon monoxide poisoning, operate the vehicle **ONLY** in a **well-ventilated** area.

To protect your eyes from propelled objects as well as hot or caustic liquids, **always** wear **approved** safety eye protection.

When an engine is running, many parts (such as the coolant fan, pulleys, fan belt etc.) turn at high speed. To avoid serious injury, always be aware of moving parts. Keep a safe distance from these parts as well as other potentially moving objects.

Engine parts become very hot when the engine is running. To prevent severe burns, avoid contact with hot engine parts.

Before starting an engine for testing or troubleshooting, make sure the parking brake is engaged. Put the transmission in **park** (for automatic transmission) or **neutral** (for manual transmission). Block the drive wheels with suitable blocks.

Connecting or disconnecting test equipment when the ignition is **ON** can damage test equipment and the vehicle's electronic components. Turn the ignition **OFF** before connecting the Code Reader to or disconnecting the Code Reader from the vehicle's Data Link Connector (DLC).

To prevent damage to the on-board computer when taking vehicle electrical measurements, always use a digital multimeter with at least 10 MegOhms of impedance.

Fuel and battery vapors are highly flammable. To prevent an explosion, keep all sparks, heated items and open flames away from the battery and fuel / fuel vapors. DO NOT SMOKE NEAR THE VEHICLE DURING TESTING.

Don't wear loose clothing or jewelry when working on an engine. Loose clothing can become caught in the fan, pulleys, belts, etc. Jewelry is highly conductive, and can cause a severe burn if it makes contact between a power source and ground.

BATTERY INSTALLATION / REPLACEMENT

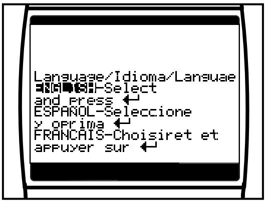
Replace batteries when the battery symbol ▭ is visible on display and/or the 3 LEDS are all lit and no other data is visible on screen.

1. Locate the battery cover on the back of the Tool.
2. Slide the battery cover off (use your fingers).
3. Replace batteries with three AA-size batteries (for longer life, use Alkaline-type batteries).
4. Reinstall the battery cover on the back of the Tool.

Language Selection After Battery Installation

The first time the unit is turned on , you must select the desired display language (English, French or Spanish) as follows:

1. Press and hold the **POWER/LINK** button for approximately 3 seconds to turn the Tool "ON."
   - The Select Language screen displays.



Language/Idioma/Languae
ENGLISH-Select
and press ↵
ESPAÑOL-Seleccione
y oprima ↵
FRANCAIS-Choisiret et
appuyer sur ↵

2. Use the **UP** ⊜ and **DOWN** ⊜ buttons, as necessary, to highlight the desired display language.
3. When the desired display language is selected, press the **ENTER/FF** button to confirm your selection.

After the initial language selection is performed, it, as well as other settings, can be changed as desired. Proceed to "ADJUSTMENTS/SETTINGS AND DTC LIBRARY" below for further instructions.

ADJUSTMENTS/SETTINGS AND DTC LIBRARY

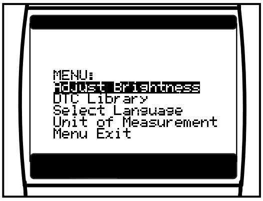
The OBD2 & 1 Tool lets you make several adjustments and settings to configure the tool to your particular needs. It also contains an OBD2 DTC Library that allows you to search for DTC definitions. The following functions, adjustments and settings can be performed when the OBD2 & 1 Tool is in "MENU Mode":

- **Adjust Brightness:** Adjusts the brightness of the LCD display screen.
- **DTC Library:** Lets you search the library of OBD2 DTC definitions.
- **Select Language:** Sets the display language for the Tool to English, French or Spanish.

- **Unit of Measurement:** Sets the Unit of Measurement for the Tool's display to USA or Metric.

Adjustments and settings can be made only when the Tool is NOT connected to a vehicle.

To enter the MENU Mode:



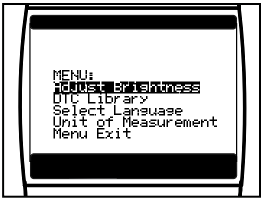
MENU:
Adjust Brightness
DTC Library
Select Language
Unit of Measurement
Menu Exit

1. With the Tool OFF, press and hold the **UP** button, then press and release the **POWER/LINK** button.
   - The adjustments and setting **MENU** displays.
2. Release the **UP** button.

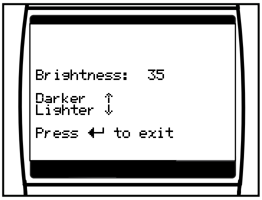
*DO NOT release the **UP** button until the adjustments and settings **MENU** is visible on the display.*

3. Make adjustments and settings as described in the following paragraphs.

Adjusting Display Brightness



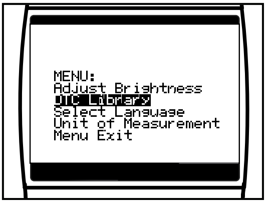
MENU:
Adjust Brightness
DTC Library
Select Language
Unit of Measurement
Menu Exit



Brightness: 35
Darker ↑
Lighter ↓
Press ↵ to exit

1. Use the **UP** and **DOWN** buttons, as necessary, to highlight **Adjust Brightness** in the **MENU**, then press the **ENTER/FF** button.
   - The Adjust Brightness screen displays.
   - The **Brightness** field shows the current brightness setting, from 0 to 43.
2. Press the **UP** button to decrease the brightness of the LCD display (make the display darker).
3. Press the **DOWN** button to increase the brightness of the LCD display (make the display lighter).
4. When the desired brightness is obtained, press the **ENTER/FF** button to save your changes and return to the **MENU**.

Searching for a DTC Definition Using the DTC Library (applicable to OBD2 systems only)

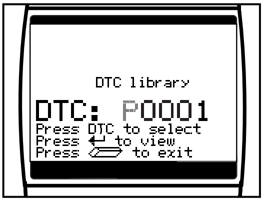


MENU:
Adjust Brightness
DTC Library
Select Language
Unit of Measurement
Menu Exit

1. Use the **UP** and **DOWN** buttons, as necessary, to highlight **DTC Library** in the **MENU**, then press the **ENTER/FF** button.

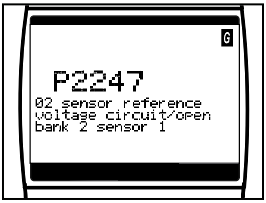
- The Enter DTC screen displays. The screen shows the code "P0001", with the "P" flashing.

2. Use the **UP** and **DOWN** buttons, as necessary, to scroll to the desired DTC type (P=Powertrain, U=Network, B=Body, C=Chassis), then press the **DTC SCROLL** button.
   - The selected character displays "solid", and the next character begins flashing.



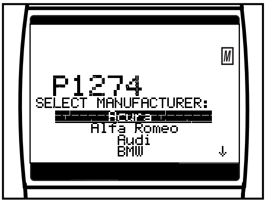
DTC library
DTC: P0001
Press DTC to select
Press ↵ to view
Press to exit

3. Select the remaining characters in the DTC in the same way, pressing the **DTC SCROLL** button to confirm each character. When you have selected all the DTC characters, press the **ENTER/FF** button to view the DTC definition.
   - If you entered a "Generic" DTC (DTCs that start with "P0", "P2" and some "P3"):
     - The selected DTC and DTC definition (if available), show on the Scan Tool's LCD display.



G
P2247
02 sensor reference voltage circuit/open bank 2 sensor 1

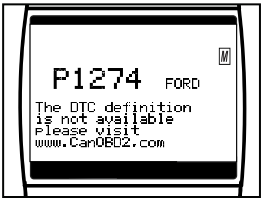
   - If you entered a "Manufacturer-Specific" DTC (DTCs that start with "P1" and some "P3"):
     - The "Select Manufacturer" screen displays.
     - Use the **UP** and **DOWN** buttons, as necessary, to highlight the appropriate manufacturer, then press the **ENTER/FF** button to display the correct DTC for your vehicle.



M
P1274
SELECT MANUFACTURER:
Acura
Alfa Romeo
Audi
BMW ↓

If a definition for the DTC you entered is not available, an advisory message shows on the CanOBD2&1 Tool's display.

4. If you wish to view definitions for additional DTCs, press the **ENTER/FF** button to return to the DTC Library screen, and repeat steps 2 and 3.

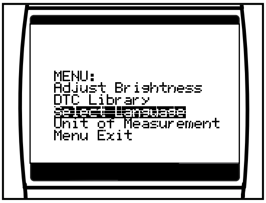


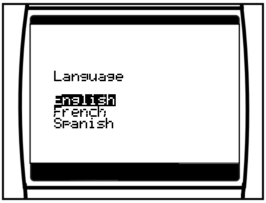
M
P1274 FORD
The DTC definition is not available please visit www.CanOBD2.com

5. When all desired DTCs have been viewed, press the **ERASE** button to exit the DTC Library.

Selecting the Display Language

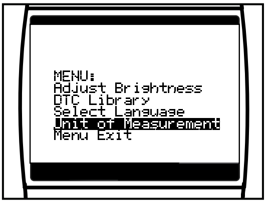
1. Use the **UP** and **DOWN** buttons, as necessary, to highlight **Select Language** in the **MENU**, then press the **ENTER/FF** button.
    - The Select Language screen displays.
    - The currently selected display **Language** is highlighted.
2. Press the **UP** or **DOWN** button, as necessary, to highlight the desired display language.
3. When the desired display language is highlighted, press the **ENTER/FF** button to save your changes and return to the **MENU** (shown in the selected display language).

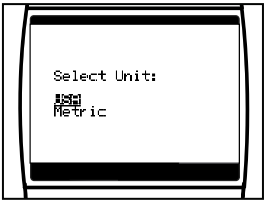

MENU:
Adjust Brightness
DTC Library
Select Language
Unit of Measurement
Menu Exit


Language
English
French
Spanish

Setting the Unit of Measurement

1. Use the **UP** and **DOWN** buttons, as necessary, to highlight **Unit of Measurement** in the **MENU**, then press the **ENTER/FF** button.
2. Press the **UP** or **DOWN** button, as necessary, to highlight the desired **Unit of Measurement**.
3. When the desired **Unit of Measurement** value is selected, press the **ENTER/FF** button to save your changes.


MENU:
Adjust Brightness
DTC Library
Select Language
Unit of Measurement
Menu Exit


Select Unit:
USA
Metric

Exiting the MENU Mode

1. Use the **UP** and **DOWN** buttons, as necessary, to highlight **Menu Exit** in the **MENU**, then press the **ENTER/FF** button.
    - The LCD display returns to the DTC screen (if data is currently stored in the Tool's memory) or the "To Link" screen (if no data is stored).

CONTROLS AND INDICATORS

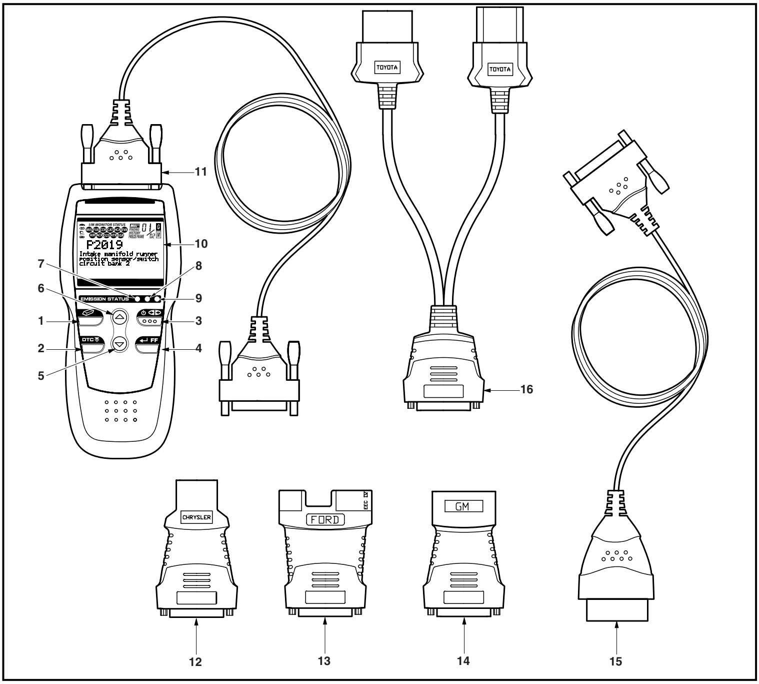

11
10
7
8
6
9
1
3
2
4
5
16
12
13
14
15
TOYOTA
TOYOTA
CHRYSLER
FORD
GM
I/M MONITOR STATUS
P2019
Intake manifold runner position sensor/switch circuit bank 2
EMISSION STATUS
DTC
FF

Figure 1. Controls and Indicators

See Figure 1 for the locations of items 1 through 16, below.

1. **ERASE button** - Erases Diagnostic Trouble Codes (DTCs), and “Freeze Frame” data from your vehicle’s computer, and resets Monitor status. (“Freeze Frame” data and Monitor status are applicable to OBD2 systems only.)
2. **DTC SCROLL button** - Displays the DTC View screen and/or scrolls the LCD display to view DTCs when more than one DTC is present.
3. **POWER/LINK button** - When the Tool IS NOT connected to a vehicle, turns the Tool “**On**” and “**Off**”. When the Tool is connected to a vehicle, links the Tool to the vehicle’s PCM to retrieve diagnostic data from the computer’s memory. (The LINK function is applicable to OBD2 systems only.)

To turn the Tool "On", you must press and hold the ***POWER/LINK*** *button for approximately 3 seconds.*

4. ↵FF **ENTER/FREEZE FRAME button** - When in MENU mode, confirms the selected option or value. When retrieving and viewing DTCs, displays Freeze Frame data for the highest priority code. (The Freeze Frame function is applicable to OBD2 systems only.)

5. ▽ **DOWN button** - When in MENU mode, scrolls DOWN through the menu and submenu selection options. When retrieving and viewing DTCs, scrolls down through the current display screen to display any additional data.

6. △ **UP button** - When in MENU mode, scrolls UP through the menu and submenu selection options. When retrieving and viewing DTCs, scrolls ups through the current display screen to display any additional data.

7. **GREEN LED** - Indicates that all engine systems are running normally (all Monitors on the vehicle are active and performing their diagnostic testing, and no DTCs are present). (Monitors are applicable to OBD2 systems only.)

8. **YELLOW LED** - Indicates there is a possible problem. A “Pending” or a history DTC is present and/or some of the vehicle’s emission monitors have not run their diagnostic testing. (Monitors and pending DTCs are applicable to OBD2 systems only.)

9. **RED LED** - Indicates there is a problem in one or more of the vehicle’s systems. The red LED is also used to show that DTC(s) are present. DTCs are shown on the Tool’s LCD display. In this case, the Malfunction Indicator (“Check Engine”) lamp on the vehicle’s instrument panel will light steady on.

10. **LCD Display** - Displays settings Menu and submenus, test results, Tool functions and Monitor status information. See **DISPLAY FUNCTIONS**, on next page, for more details. (Monitors are applicable to OBD2 systems only.)

11. **Cable** - Connects the Tool to the vehicle’s Data Link Connector (DLC) when retrieving codes from OBD1 systems (used with items 12, 13, 14 and 16).

12. **CHRYSLER Connector Cable Adaptor** - Installs on cable (item 11) when connecting to a Chrysler OBD1 Data Link Connector.

13. **FORD Connector Cable Adaptor** - Installs on cable (item 11) when connecting to a Ford OBD1 Data Link Connector.

14. **GM Connector Cable Adaptor** - Installs on cable (item 11) when connecting to a GM OBD1 Data Link Connector.

15. **OBD II Cable** - Connects the Tool to the vehicle's Data Link Connector (DLC) when retrieving codes from OBD2 systems.

16. **TOYOTA Connector Cable Adaptor** - Installs on cable (item 11) when connecting to a Toyota OBD1 Data Link Connector.

DISPLAY FUNCTIONS

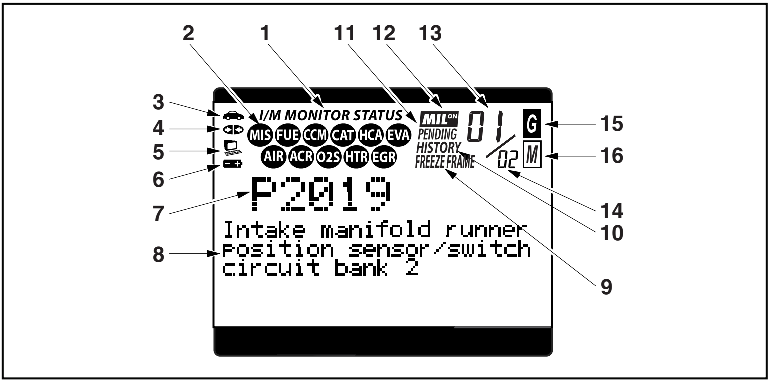

2
1
11
12
13
3
4
5
6
7
8
I/M MONITOR STATUS
MIS FUE CCM CAT HCA EVA
AIR ACR O2S HTR EGR
MIL ON
PENDING
HISTORY
FREEZE FRAME
01
02
G
M
P2019
Intake manifold runner position sensor/switch circuit bank 2
15
16
14
10
9

Figure 2. Display Functions

See Figure 2 for the locations of items 1 through 16, below.

1. **I/M MONITOR STATUS field** - Identifies the I/M Monitor status area. (This function is applicable to OBD2 systems only.)
2. **Monitor icons** - Indicate which Monitors are supported by the vehicle under test, and whether or not the associated Monitor has run its diagnostic testing (Monitor status). When a Monitor icon is solid, it indicates that the associated Monitor has completed its diagnostic testing. When a Monitor icon is flashing, it indicates that the vehicle supports the associated Monitor, but the Monitor has not yet run its diagnostic testing. (This function is applicable to OBD2 systems only.)
3. **Vehicle icon** - Indicates whether or not the Tool is being properly powered through the vehicle's Data Link Connector (DLC). A visible icon indicates that the Tool is being powered through the vehicle's DLC connector.
4. **Link icon** - Indicates whether or not the Tool is communicating (linked) with the vehicle's on-board computer. When visible, the Tool is communicating with the computer. If the Link icon is not visible, the Tool is not communicating with the computer.
5. **Computer icon** - When this icon is visible it indicates that the Tool is linked to a personal computer. An optional "PC Link Kit" is available that makes it possible to upload retrieved data to a personal computer.
6. **Tool Internal Battery icon** - When visible, indicates the Tool batteries are "low" and should be replaced. If the batteries are not replaced when the battery symbol is "on", all 3 LEDs will light up as a last resort indicator to warn you that the batteries need replacement. No data will be displayed on screen when all 3 LEDs are lit.

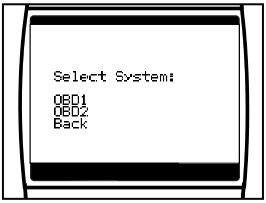
7. **DTC Display Area** - Displays the Diagnostic Trouble Code (DTC) number. Each fault is assigned a code number that is specific to that fault.
8. **Test Data Display Area** - Displays DTC definitions, Freeze Frame data, and other pertinent test information messages.
9. **MIL icon** - Indicates the status of the Malfunction Indicator Lamp (MIL). The MIL icon is visible only when a DTC has commanded the MIL on the vehicle’s dashboard to light.
10. **HISTORY icon** – Indicates the currently displayed DTC is a “History” code.
11. **CODE icon** - Identifies the Code Number Sequence display area.
12. **PENDING icon** - Indicates the currently displayed DTC is a “Pending” code. (This function is applicable to OBD2 systems only.)
13. **Code Number Sequence** - The Tool assigns a sequence number to each DTC that is present in the computer’s memory, starting with “01.” This number indicates which code is currently displayed. Code number “01” is always the highest priority code, and the one for which “Freeze Frame” data has been stored. (Freeze Frame data is applicable to OBD2 systems only.)

    If “01” is a “Pending” code, there may or may not be “Freeze Frame” data stored in memory.
14. **Code Enumerator** - Indicates the total number of codes retrieved from the vehicle’s computer.
15. **G Generic DTC icon** - When visible, indicates that the currently displayed DTC is a “Generic” or “Universal” code. (This function is applicable to OBD2 systems only.)
16. **M Manufacturer Specific DTC icon** - When visible, indicates that the currently displayed DTC is a Manufacturer Specific Code. (This function is applicable to OBD2 systems only.)

VIEWING DTCs IN THE TOOL'S MEMORY

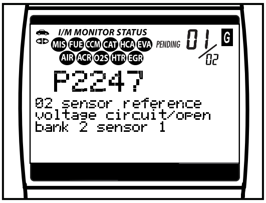
To view DTC's and other diagnostic data stored in the Tool's memory, do the following:

1. With no DLC cable connected to the Tool, press the **POWER/LINK** button to turn the Tool "on".
2. Press the **ENTER/FF** button.



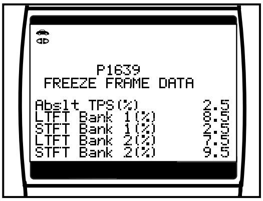
```
Select System:

OBD1
OBD2
Back
```

3. Use the and keys to highlight and select your vehicle's OBD system (OBD1 or OBD2). Press the **ENTER/FF** button to continue.
   - Select "Back" if you wish to return to the Main Menu.
4. If DTCs are present in the Tool's memory, the first stored DTC will display on the screen.
   - If more than one DTC is present, use the **DTC SCROLL** button to scroll through the DTC's.


I/M MONITOR STATUS
MIS FUE CCM CAT HCA EVA
AIR ACR O2S HTR EGR
PENDING
01
02
G

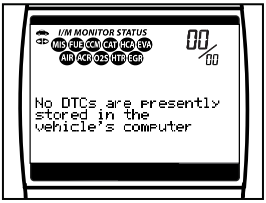
```
P2247
02 sensor reference
voltage circuit/open
bank 2 sensor 1
```

5. "For OBD2 systems only" - Saved Freeze Frame data and Monitor status are also available (press the **ENTER/FF** button to view Freeze Frame data).



```
      P1639
 FREEZE FRAME DATA
Abslt TPS(%)        2.5
LTFT Bank 1(%)      8.5
STFT Bank 1(%)      2.5
LTFT Bank 2(%)      7.5
STFT Bank 2(%)      9.5
```

6. If no DTCs are in the Tool's memory, a "No DTC's are presently stored in the Tool's memory" message displays.


I/M MONITOR STATUS
MIS FUE CCM CAT HCA EVA
AIR ACR O2S HTR EGR
00
00

```
No DTCs are presently
stored in the
vehicle's computer
```

PRELIMINARY VEHICLE DIAGNOSTIC WORKSHEET

The purpose of this form is to help you gather preliminary information on your vehicle before you retrieve codes. By having a complete account of your vehicle's current problem(s), you will be able to systematically pinpoint the problem(s) by comparing your answers to the fault codes you retrieve. You can also provide this information to your mechanic to assist in diagnosis and help avoid costly and unnecessary repairs. It is important for you to complete this form to help you and/or your mechanic have a clear understanding of your vehicle's problems.

NAME: ______

DATE: ______

VIN*: ______

YEAR: ______

MAKE: ______

MODEL: ______

ENGINE SIZE: ______

VEHICLE MILEAGE: ______

*VIN: Vehicle Identification Number, found at the base of the windshield on a metallic plate, or at the driver door latch area (consult your vehicle owner's manual for location).

TRANSMISSION:

☐ Automatic

☐ Manual

Please check all applicable items in each category.

DESCRIBE THE PROBLEM:

WHEN DID YOU FIRST NOTICE THE PROBLEM:

☐ Just Started
☐ Started Last Week
☐ Started Last Month
☐ Other:

LIST ANY REPAIRS DONE IN THE PAST SIX MONTHS:

PROBLEMS STARTING

☐ No symptoms
☐ Will not crank
☐ Cranks, but will not start
☐ Starts, but takes a long time

ENGINE QUITS OR STALLS

☐ No symptoms
☐ Right after starting
☐ When shifting into gear
☐ During steady-speed driving
☐ Right after vehicle comes to a stop
☐ While idling
☐ During acceleration
☐ When parking

IDLING CONDITIONS

☐ No symptoms
☐ Is too slow at all times
☐ Is too fast
☐ Is sometimes too fast or too slow
☐ Is rough or uneven
☐ Fluctuates up and down

RUNNING CONDITIONS

☐ No symptoms
☐ Runs rough
☐ Lacks power
☐ Bucks and jerks
☐ Poor fuel economy
☐ Hesitates or stumbles on accelerations
☐ Backfires
☐ Misfires or cuts out
☐ Engine knocks, pings or rattles
☐ Surges
☐ Dieseling or run-on

AUTOMATIC TRANSMISSION PROBLEMS (if applicable)

☐ No symptoms
☐ Shifts too early or too late
☐ Changes gear incorrectly
☐ Vehicle does not move when in gear
☐ Jerks or bucks

PROBLEM OCCURS

☐ Morning
☐ Afternoon
☐ Anytime

ENGINE TEMPERATURE WHEN PROBLEM OCCURS

☐ Cold
☐ Warm
☐ Hot

DRIVING CONDITIONS WHEN PROBLEM OCCURS

☐ Short - less than 2 miles
☐ 2 - 10 miles
☐ Long - more than 10 miles
☐ Stop and go
☐ While turning
☐ While braking
☐ At gear engagement
☐ With A/C operating
☐ With headlights on
☐ During acceleration
☐ Mostly driving downhill
☐ Mostly driving uphill
☐ Mostly driving level
☐ Mostly driving curvy roads
☐ Mostly driving rough roads

DRIVING HABITS

☐ Mostly city driving
☐ Highway
☐ Park vehicle inside
☐ Park vehicle outside
☐ Drive less than 10 miles per day
☐ Drive 10 to 50 miles per day
☐ Drive more than 50 miles per day

GASOLINE USED

☐ 87 Octane
☐ 89 Octane
☐ 91 Octane
☐ More than 91 Octane

WEATHER CONDITIONS WHEN PROBLEM OCCURS

☐ 32 - 55° F (0 - 13° C)
☐ Below freezing (32° F / 0° C)
☐ Above 55° F (13° C)

CHECK ENGINE LIGHT / DASH WARNING LIGHT

☐ Sometimes ON
☐ Always ON
☐ Never ON

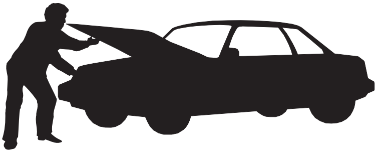
PECULIAR SMELLS

☐ "Hot"
☐ Sulfur ("rotten egg")
☐ Burning rubber
☐ Gasoline
☐ Burning oil
☐ Electrical

STRANGE NOISES

☐ Rattle
☐ Knock
☐ Squeak
☐ Other

BEFORE YOU BEGIN



The Enhanced OBD2 & 1 Tool aids in monitoring electronic- and emissions-related faults in your vehicle and retrieving fault codes related to malfunctions in these systems. Mechanical problems such as low oil level or damaged hoses, wiring or electrical connectors can cause poor engine performance and may also cause a fault code to set. Fix any known mechanical problems before performing any test. See your vehicle's service manual or a mechanic for more information.

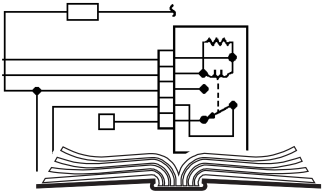
Check the following areas **before** starting any test:

- Check the engine oil, power steering fluid, transmission fluid (if applicable), engine coolant and other fluids for proper levels. Top off low fluid levels if needed.
- Make sure the air filter is clean and in good condition. Make sure all air filter ducts are properly connected. Check the air filter ducts for holes, rips or cracks.
- Make sure all engine belts are in good condition. Check for cracked, torn, brittle, loose or missing belts.
- Make sure mechanical linkages to engine sensors (throttle, gearshift position, transmission, etc.) are secure and properly connected. See your vehicle's service manual for locations.
- Check all rubber hoses (radiator) and steel hoses (vacuum/fuel) for leaks, cracks, blockage or other damage. Make sure all hoses are routed and connected properly.
- Make sure all spark plugs are clean and in good condition. Check for damaged, loose, disconnected or missing spark plug wires.
- Make sure the battery terminals are clean and tight. Check for corrosion or broken connections. Check for proper battery and charging system voltages.
- Check all electrical wiring and harnesses for proper connection. Make sure wire insulation is in good condition, and there are no bare wires.
- Make sure the engine is mechanically sound. If needed, perform a compression check, engine vacuum check, timing check (if applicable), etc.

VEHICLE SERVICE MANUALS

Always refer to the manufacturer's service manual for your vehicle before performing any test or repair procedures. Contact your local car dealership, auto parts store or bookstore for availability of these manuals. The following companies publish valuable repair manuals:

- **Haynes Publications**
  861 Lawrence Drive
  Newbury Park, California 91320
  Phone: 800-442-9637
  Web: www.haynes.com
- **Mitchell 1**
  14145 Danielson Street
  Poway, California 92064
  Phone: 888-724-6742
  Web: www.m1products.com
- **Motor Publications**
  5600 Crooks Road, Suite 200
  Troy, Michigan 48098
  Phone: 800-426-6867
  Web: www.motor.com



FACTORY SOURCES

Ford, GM, Chrysler, Honda, Isuzu, Hyundai and Subaru Service Manuals

- **Helm Inc.**
  14310 Hamilton Avenue
  Highland Park, Michigan 48203
  Phone: 800-782-4356
  Web: www.helminc.com

Procedures for Retrieving Diagnostic Trouble Codes from OBD1 systems are vehicle manufacturer specific. Each manufacturer uses their own procedure.

Procedures for retrieving Diagnostic Trouble Codes from OBD2 systems are generic, and apply to all vehicles equipped with OBD2 systems.

From the following list, select the procedure that applies to your vehicle's OBD system, and proceed to appropriate section for detailed code retrieval procedures.

OBD1 SYSTEMS

Most cars and light trucks (under 8500 GW) sold in the U.S. from early 1980's to 1995 are equipped with what is known as the first generation of On-Board Diagnostics or "OBD1".

- If your Chrysler/Jeep, Ford, GM or Toyota vehicle, (1995 and older) is equipped with an 'OBD1 System", proceed to the proper section as indicated below, for a detailed application list and code retrieval procedures:
- CHRYSLER/JEEP .... page 47
- FORD .... page 52
- GM .... page 73
- TOYOTA .... page 79

OBD2 SYSTEMS

ALL 1996 and newer cars and light trucks (under 8500 GW) sold in the U.S. are equipped with what is known as the second generation of On-Board Diagnostics or "OBD2".

- If your vehicle (1996 and newer) is equipped with an "OBD2 System", proceed to the "OBD2 SYSTEMS" section on page 19 for a detailed application list, code retrieval procedures, Monitor status, and Freeze Frame data information.

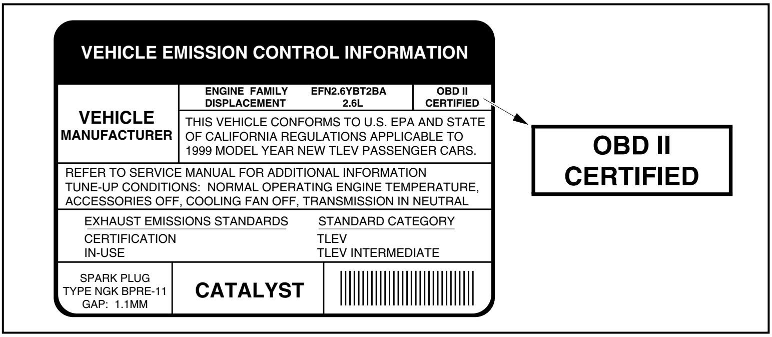
VEHICLES COVERED

The Enhanced OBD2 & 1 Tool is designed to work on all OBD2 compliant vehicles. All 1996 and newer vehicles (cars and light trucks) sold in the United States are OBD2 compliant.

Federal law requires that all 1996 and newer cars and light trucks sold in the United States must be OBD2 compliant; this includes all Domestic, Asian and European vehicles.

Some 1994 and 1995 vehicles are OBD2 compliant. To find out if a 1994 or 1995 vehicle is OBD2 compliant, check the following:

1. **The Vehicle Emissions Control Information (VECI) Label.** This label is located under the hood or by the radiator of most vehicles. If the vehicle is OBD2 compliant, the label will state "**OBD II Certified**."



VEHICLE EMISSION CONTROL INFORMATION

VEHICLE
MANUFACTURER

ENGINE FAMILY **EFN2.6YBT2BA**
DISPLACEMENT **2.6L**

OBD II
CERTIFIED

THIS VEHICLE CONFORMS TO U.S. EPA AND STATE OF CALIFORNIA REGULATIONS APPLICABLE TO 1999 MODEL YEAR NEW TLEV PASSENGER CARS.

REFER TO SERVICE MANUAL FOR ADDITIONAL INFORMATION
TUNE-UP CONDITIONS: NORMAL OPERATING ENGINE TEMPERATURE, ACCESSORIES OFF, COOLING FAN OFF, TRANSMISSION IN NEUTRAL

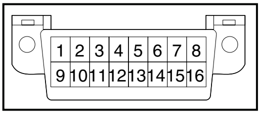
EXHAUST EMISSIONS STANDARDS	STANDARD CATEGORY
CERTIFICATION	TLEV
IN-USE	TLEV INTERMEDIATE

SPARK PLUG
TYPE NGK BPRE-11
GAP: 1.1MM

CATALYST

OBD II
CERTIFIED

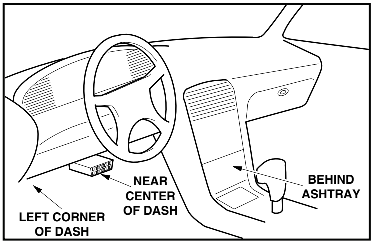
2. Government Regulations require that all OBD2 compliant vehicles **must** have a "common" sixteen-pin **Data Link Connector (DLC)**.



Some 1994 and 1995 vehicles have 16-pin connectors but are not OBD2 compliant. Only those vehicles with a Vehicle Emissions Control Label stating "OBD II Certified" are OBD2 compliant.

Data Link Connector (DLC) Location

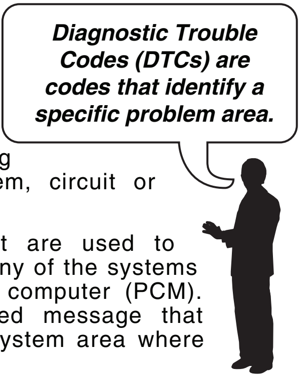
The 16-pin DLC is usually located under the instrument panel (dash), within 12 inches (300 mm) of center of the panel, on the driver's side of most vehicles. It should be easily accessible and visible from a kneeling position outside the vehicle with the door open.



On some Asian and European vehicles the DLC is located behind the "ashtray" (the ashtray must be removed to access it) or on the far left corner of the dash. If the DLC cannot be located, consult the vehicle's service manual for the location.

DIAGNOSTIC TROUBLE CODES (DTCs)

Diagnostic Trouble Codes (DTCs) are meant to guide you to the proper service procedure in the vehicle's service manual. **DO NOT** replace parts based only on DTCs without first consulting the vehicle's service manual for proper testing procedures for that particular system, circuit or component.


Diagnostic Trouble Codes (DTCs) are codes that identify a specific problem area.

DTCs are alphanumeric codes that are used to identify a problem that is present in any of the systems that are monitored by the on-board computer (PCM). Each trouble code has an assigned message that identifies the circuit, component or system area where the problem was found.

OBD2 diagnostic trouble codes are made up of five characters:

- The 1st character is a **letter**. It identifies the "main system" where the fault occurred (Body, Chassis, Powertrain, or Network).
- The 2nd character is a **numeric digit**. It identifies the "type" of code (Generic or Manufacturer-Specific).

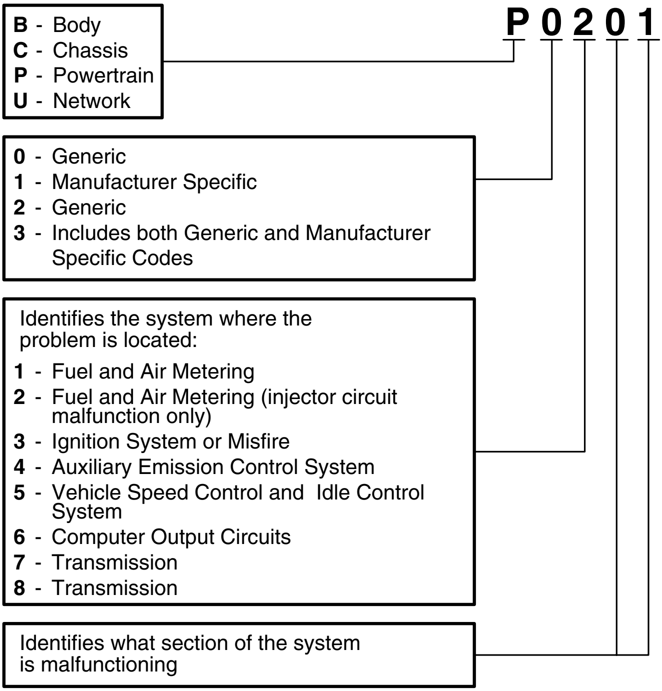
Generic DTCs *are codes that are used by all vehicle manufacturers. The standards for generic DTCs, as well as their definitions, are set by the Society of Automotive Engineers (SAE).*

Manufacturer-Specific DTCs *are codes that are controlled by the vehicle manufacturers. The Federal Government does not require vehicle manufacturers to go beyond the standardized generic DTCs in order to comply with the new OBD2 emissions standards. However, manufacturers are free to expand beyond the standardized codes to make their systems easier to diagnose.*

- The 3rd character is a **numeric digit**. It identifies the specific system or sub-system where the problem is located.
- The 4th and 5th characters are **numeric digits**. They identify the section of the system that is malfunctioning.

OBD2 DTC EXAMPLE

P0201 - Injector Circuit Malfunction, Cylinder 1



B - Body
C - Chassis
P - Powertrain
U - Network

0 - Generic
1 - Manufacturer Specific
2 - Generic
3 - Includes both Generic and Manufacturer Specific Codes

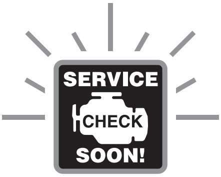
Identifies the system where the problem is located:

1 - Fuel and Air Metering
2 - Fuel and Air Metering (injector circuit malfunction only)
3 - Ignition System or Misfire
4 - Auxiliary Emission Control System
5 - Vehicle Speed Control and Idle Control System
6 - Computer Output Circuits
7 - Transmission
8 - Transmission

Identifies what section of the system is malfunctioning

DTCs and MIL Status

When the vehicle's on-board computer detects a failure in an emissions-related component or system, the computer's internal diagnostic program assigns a diagnostic trouble code (DTC) that points to the system (and subsystem) where the fault was found. The diagnostic program saves the code in the computer's memory. It records a "Freeze Frame" of conditions present when the fault was found, and lights the Malfunction Indicator Lamp (MIL). Some faults require detection for two trips in a row before the MIL is turned on.



The "Malfunction Indicator Lamp" (MIL) is the accepted term used to describe the lamp on the dashboard that lights to warn the driver that an emissions-related fault has been found. Some manufacturers may still call this lamp a "Check Engine" or "Service Engine Soon" light.

CODE RETRIEVAL PROCEDURE

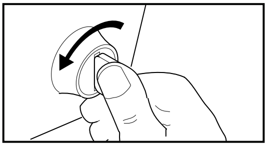
Retrieving and using Diagnostic Trouble Codes (DTCs) for troubleshooting vehicle operation is only one part of an overall diagnostic strategy.

Never replace a part based only on the DTC definition. Each DTC has a set of testing procedures, instructions and flow charts that must be followed to confirm the location of the problem. This information is found in the vehicle's service manual. Always refer to the vehicle's service manual for detailed testing instructions.

Check your vehicle thoroughly before performing any test. See BEFORE YOU BEGIN on page 17 for details.

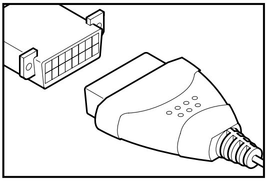
***ALWAYS** observe safety precautions whenever working on a vehicle. See Safety Precautions on page 3 for more information.*

1. Turn the ignition OFF.
2. Locate the vehicle's 16-pin Data Link Connector (DLC). See page 20 for connector location.

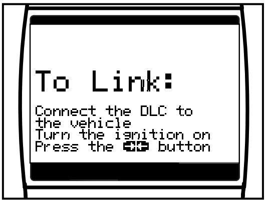


Some DLCs have a plastic cover that must be removed before connecting the Tool cable connector.

*If the Tool is ON, turn it OFF by pressing the **POWER/LINK** button BEFORE connecting the Tool to the DLC.*



3. Connect the OBD II Cable to the Tool, then connect to the vehicle's DLC.
   - If you have problems connecting the cable connector to the DLC, rotate the connector 180° and try again.
   - If you still have problems, check the pins on the Tool's DLC and on the vehicle's DLC.



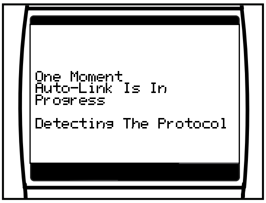
To Link:
Connect the DLC to the vehicle
Turn the ignition on
Press the button

4. When the Tool's cable connector is properly connected to the vehicle's DLC, the unit automatically turns ON, and the LCD display shows instructions for linking to the vehicle's on-board computer.
   - If the unit does not power on automatically when connected to the vehicle's DLC connector, it usually indicates there is no power present at the vehicle's DLC connector. Check your fuse panel and replace any burned-out fuses.

- If replacing the fuse(s) does not correct the problem, consult your vehicle's repair manual to identify the proper computer (PCM) fuse/circuit, and perform any necessary repairs before proceeding.

5. Turn the ignition on. **DO NOT** start the engine.
6. Press and release the Tool's **POWER/LINK** button.

- The Tool will automatically start a check of the vehicle's computer to determine which type of communication protocol it is using. When the Tool identifies the computer's communication protocol, a communication link is established. The protocol type used by the vehicle's computer is shown on the LCD display.



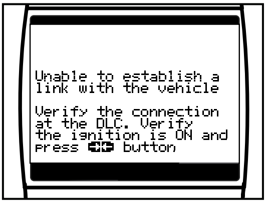
One Moment
Auto-Link Is In
Progress

Detecting The Protocol

A PROTOCOL is a set of rules and procedures for regulating data transmission between computers, and between testing equipment and computers. As of this writing, five different types of protocols (ISO 9141, Keyword 2000, J1850 PWM, J1850 VPW and CAN) are in use by vehicle manufacturers. The Tool automatically identifies the protocol type and establishes a communication link with the vehicle's computer.

7. After approximately 10~60 seconds, the Tool will **retrieve** and **display** any Diagnostic Trouble Codes, Monitor Status and Freeze Frame Data retrieved from the vehicle's computer memory.

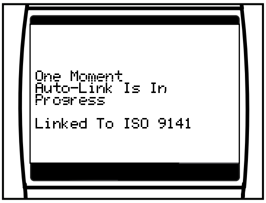
- If the Tool fails to link to the vehicle's computer a "Linking Failed" message shows on the Tool's LCD display.
  - Verify the connection at the DLC and verify the ignition is ON.
  - Turn the ignition OFF, wait 5 seconds, then turn back ON to reset the computer.
  - Ensure your vehicle is OBD2 compliant. See VEHICLES COVERED on page 20 for vehicle compliance verification information.



Unable to establish a
link with the vehicle

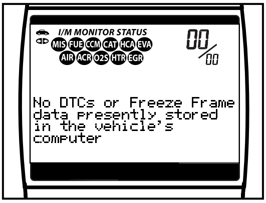
Verify the connection
at the DLC. Verify
the ignition is ON and
press button

- The Tool will automatically re-link to the vehicle's computer every 30 seconds to refresh the data being retrieved. When data is being refreshed, the message "One moment Auto – link in progress" is shown on the LCD display. This action repeats as long as the Tool is communicating with the vehicle's computer.



One Moment
Auto-Link Is In
Progress

Linked To ISO 9141



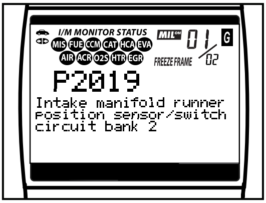
No DTCs or Freeze Frame data presently stored in the vehicle's computer

- The Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No DTC's are presently stored in the vehicle's computer" message is displayed.
- The Tool is capable of retrieving and storing up to 32 codes in memory, for immediate or later viewing.

8. To read the display:

Refer to DISPLAY FUNCTIONS on page 11 for a description of LCD display elements.

- A visible 🚗 icon indicates that the Tool is being powered through the vehicle's DLC connector.
- A visible ⇄ icon indicates that the Tool is linked to (communicating with) the vehicle's computer.
- The I/M Monitor Status icons indicate the type and number of Monitors the vehicle supports, and provides indications of the current status of the vehicle's Monitors. A **solid** Monitor icon indicates the associated Monitor **has run** and completed its testing. A **blinking** Monitor icon indicates the associated Monitor **has not run** and completed its testing.



P2019
Intake manifold runner position sensor/switch circuit bank 2

- The upper right hand corner of the display shows the number of the code currently being displayed, the total number of codes retrieved, the type of code (**G** = Generic; **M** = Manufacturer Specific), and whether or not the displayed code commanded the MIL on. If the code being displayed is a PENDING code, the PENDING icon is shown.
- The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display.

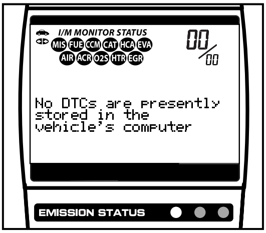
In the case of long code definitions, or when viewing Freeze Frame data, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the △ and ▽ buttons, as necessary, to view the additional information.

If a definition for the currently displayed code is not available, an advisory message shows on the Tool's display.

9. Read and interpret Diagnostic Trouble Codes/system condition using the LCD display and the green, yellow and red LEDs.

The green, yellow and red LEDs are used (with the LCD display) as visual aids to make it easier to determine engine system conditions.

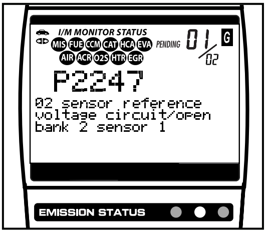
- **Green LED** – Indicates that all engine systems are “OK” and operating normally. All monitors supported by the vehicle have run and performed their diagnostic testing, and no trouble codes are present. A zero will show on the Tool’s LCD display, and all Monitor icons will be solid.


I/M MONITOR STATUS
MIS FUE CCM CAT HCA EVA
AIR ACR O2S HTR EGR
00
00
EMISSION STATUS

No DTCs are presently stored in the vehicle’s computer

- **Yellow LED** – Indicates one of the following conditions:

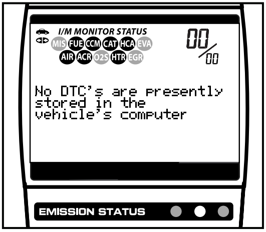
A. A PENDING CODE IS PRESENT – If the yellow LED is illuminated, it may indicate a Pending code is present. Check the Tool’s LCD display for confirmation. A Pending code is confirmed by the presence of a numeric code and the word PENDING on the Tool’s LCD display.


I/M MONITOR STATUS
MIS FUE CCM CAT HCA EVA
AIR ACR O2S HTR EGR
PENDING
01
G
02
EMISSION STATUS

P2247

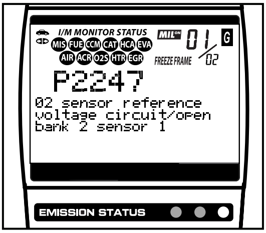
02 sensor reference voltage circuit/open bank 2 sensor 1

B. MONITOR NOT RUN STATUS – If the Tool’s LCD display shows a zero (indicating there are no DTC’s present in the vehicle’s computer memory), but the yellow LED is illuminated, it may be an indication that some of the Monitors supported by the vehicle have not yet run and completed their diagnostic testing. Check the Tool’s LCD display for confirmation. All Monitor icons that are **blinking** have not yet run and completed their diagnostic testing; all Monitor icons that are **solid** have run and completed their diagnostic testing.


I/M MONITOR STATUS
MIS FUE CCM CAT HCA EVA
AIR ACR O2S HTR EGR
00
00
EMISSION STATUS

No DTC’s are presently stored in the vehicle’s computer

- **Red LED** – Indicates there is a problem with one or more of the vehicle’s systems. The red LED is also used to indicate that DTC(s) are present (displayed on the Tool’s screen). In this case, the Multifunction Indicator (Check Engine) lamp on the vehicle’s instrument panel will be illuminated.

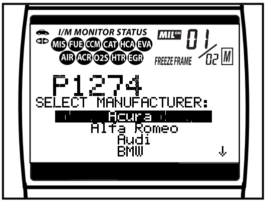

I/M MONITOR STATUS
MIS FUE CCM CAT HCA EVA
AIR ACR O2S HTR EGR
MIL ON
01
G
FREEZE FRAME
02
EMISSION STATUS

P2247

02 sensor reference voltage circuit/open bank 2 sensor 1

- DTC’s that start with “P0”, “P2” and some “P3” are considered Generic (Universal). All Generic DTC definitions are the same on all OBD2 equipped vehicles. The Tool automatically displays the code definitions for Generic DTC’s.

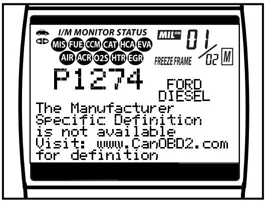
- DTC's that start with "P1" and some "P3" are Manufacturer Specific codes and their code definitions vary with each vehicle manufacturer. When a Manufacturer Specific DTC is retrieved, the LCD display shows a list of vehicle manufacturers. Use the **UP** and **DOWN** buttons, as necessary, to highlight the appropriate manufacturer, then press the **ENTER/FF** button to display the correct code definition for your vehicle.



```
P1274
SELECT MANUFACTURER:
Acura
Alfa Romeo
Audi
BMW
```

If the manufacturer for your vehicle is not listed, use the ***UP*** *and* ***DOWN*** *buttons, as necessary, to select* ***Other manufacturer*** *and press the* ***ENTER/FF*** *button for additional DTC information.*

If the Manufacturer Specific definition for the currently displayed code is not available, an advisory message shows on the Tool's LCD display.



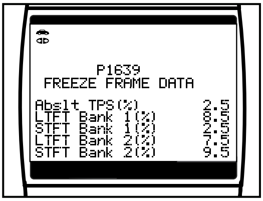
```
P1274     FORD
        DIESEL
The Manufacturer
Specific Definition
is not available
Visit: www.CanOBD2.com
for definition
```

10. If more than one code was retrieved press the **DTC SCROLL** button, as necessary, to display additional codes one at a time.

- Whenever the Scroll function is used to view additional codes, the Tool's communication link with the vehicle's computer disconnects. To re-establish communication, press the **LINK** button again.

11. Freeze Frame Data (if available) can be viewed at any time (except MENU mode) by pressing the **ENTER/FF** button.

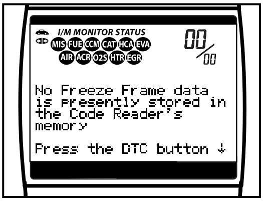
- In OBD2 systems, when an emissions-related engine malfunction occurs that causes a DTC to set, a record or snapshot of engine conditions at the time that the malfunction occurred is also saved in the vehicle's computer memory. The record saved is called Freeze Frame data. Saved engine conditions include, but are not limited to: engine speed, open or closed loop operation, fuel system commands, coolant temperature, calculated load value, fuel pressure, vehicle speed, air flow rate, and intake manifold pressure.



```
      P1639
 FREEZE FRAME DATA
Abslt TPS(%)      2.5
LTFT Bank  1(%)   8.5
STFT Bank  1(%)   2.5
LTFT Bank  2(%)   7.5
STFT Bank  2(%)   9.5
```

*If more than one malfunction is present that causes more than one DTC to be set, only the code with the highest priority will contain Freeze Frame data. The code designated "**01**" on the Tool display is referred to as the PRIORITY code, and Freeze Frame data always refers to this code. The priority code is also the one that has commanded the MIL on.*

*If Freeze Frame data is not available for the code shown on the LCD display when the **ENTER/FF** button is pressed, an advisory message shows on the LCD display. Press the **DTC SCROLL** button to return to the previous code display.*



No Freeze Frame data is presently stored in the Code Reader's memory

Press the DTC button ↓

Retrieved information can be uploaded to a Personal Computer (PC) with the use of an optional "PC Link Kit." See instructions included with PC-Link program for more information.

12. When the last retrieved DTC has been displayed and the **DTC SCROLL** button is pressed, the Tool enters the "enhanced" mode.

- See VIEWING ENHANCED DATA on page 29 to view enhanced DTCs and/or vehicle information for your vehicle.
- If you do not wish to view enhanced DTCs, press the **DTC SCROLL** button to return to the OBD2 DTC screen.

13. Determine engine system(s) condition by viewing the Tool's LCD display for any retrieved Diagnostic Trouble Codes, code definitions, Freeze Frame data and interpreting the green, yellow and red LEDs.

- If DTC's were retrieved and you are going to perform the repairs yourself, proceed by consulting the Vehicle's Service Repair Manual for testing instructions, testing procedures, and flow charts related to retrieved code(s).
- If you plan to take the vehicle to a professional to have it serviced, complete the PRELIMINARY VEHICLE DIAGNOSTIC WORKSHEET on page 14 and take it together with the retrieved codes, freeze frame data and LED information to aid in the troubleshooting procedure.
- To prolong battery life, the Tool automatically shuts "Off" approximately three minutes after it is disconnected from the vehicle. The DTCs retrieved, Monitor Status and Freeze Frame data (if any) will remain in the Tool's memory, and may be viewed at any time by turning the unit "On". If the Tool's batteries are removed, or if the Tool is re-linked to a vehicle to retrieve codes/data, any prior codes/data in its memory are automatically cleared.

VIEWING ENHANCED DATA

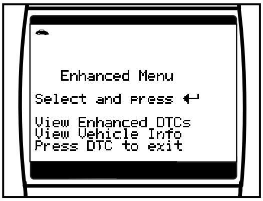
Following the code retrieval procedure (see CODE RETRIEVAL PROCEDURE on page 23), when the last retrieved DTC has been displayed and the **DTC SCROLL** button is pressed, the Tool enters the "enhanced" mode. The "enhanced" mode provides the ability to retrieve *enhanced* DTCs from most Chrysler/Jeep, Ford/Mazda, GM/Isuzu, Honda/Acura and Toyota/Lexus vehicles. The types of enhanced data available depends on the vehicle make.

You can also view vehicle information, which includes the vehicle's VIN number, calibration ID(s) and other related information, as well as a list of available modules for the vehicle.

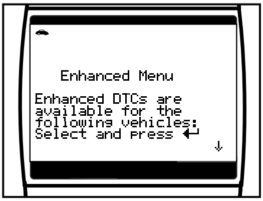
Vehicle information is available for model year 2000 and newer OBD2-compliant vehicles only.

The screen shown when the Tool enters the "enhanced" mode depends on the type(s) of DTC(s) returned during the code retrieval process:

- If *no* DTCs were retrieved, or *only* generic DTCs were retrieved, the Enhanced Menu displays. Use the **UP** and **DOWN** buttons, as necessary, to highlight the desired option, then press the **ENTER/FF** button to view the selected information, or, press the **DTC SCROLL** button to return to the OBD2 DTC screen.

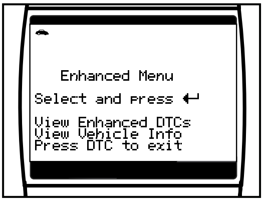

Enhanced Menu
Select and press ↵
View Enhanced DTCs
View Vehicle Info
Press DTC to exit

  - When **View Enhanced DTCs** is selected, the Select Manufacturer screen displays. Use the **UP** and **DOWN** buttons, as necessary, to highlight the appropriate manufacturer, then press the **ENTER/FF** button to view enhanced DTCs.

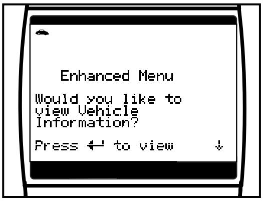

Enhanced Menu
Enhanced DTCs are
available for the
following vehicles:
Select and press ↵
↓

*If the manufacturer of the vehicle from which codes were retrieved is not listed, highlight **Exit** and press the **ENTER/FF** button to return to the Enhanced Menu screen. Enhanced DTCs are not available for your vehicle.*

- If a Manufacturer specific DTC was retrieved, and the manufacturer selected for the code *was* Chrysler, Jeep, Ford, Mazda, General Motors, Isuzu, Honda, Acura, Toyota or Lexus, the Select Data menu displays. Use the **UP** and **DOWN** buttons, as necessary, to highlight the desired option, then press the **ENTER/FF** button to view the selected information, or, press the **DTC SCROLL** button to return to the OBD2 DTC screen.


Enhanced Menu
Select and press ↵
View Enhanced DTCs
View Vehicle Info
Press DTC to exit

- If a Manufacturer specific DTC was retrieved, and the manufacturer selected for the code *was not* Chrysler, Jeep, Ford, Mazda, General Motors, Isuzu, Honda, Acura, Toyota or Lexus, the View Vehicle Information confirmation message displays. Press the **ENTER/FF** button to view vehicle information, or, press the **DTC SCROLL** button to return to the OBD2 DTC screen.



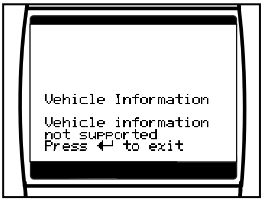
Enhanced Menu
Would you like to view Vehicle Information?
Press ↵ to view ↓

Refer to the appropriate paragraph to view enhanced data for your vehicle:

- Chrysler/Jeep Enhanced DTCs ....page 30
- Ford/Mazda Enhanced DTCs ....page 32
- GM/Isuzu Enhanced DTCs ....page 33
- Honda/Acura Enhanced DTCs ....page 35
- Toyota/Lexus Enhanced DTCs..............page 36

Refer to VIEWING VEHICLE INFORMATION on page 38 to view vehicle information for your vehicle.

*If vehicle information is not supported by the vehicle under test, an advisory message shows on the Tool's display. Press the **ENTER/FF** button to exit.*

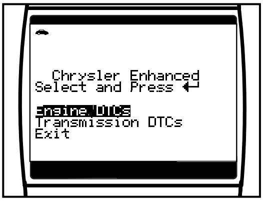


Vehicle Information
Vehicle information not supported
Press ↵ to exit

Chrysler/Jeep Enhanced DTCs

When **Chrysler/Jeep** is selected from the Enhanced DTCs Main menu, the Chrysler Enhanced menu displays. You may view either "Engine DTCs" or "Transmission DTCs."

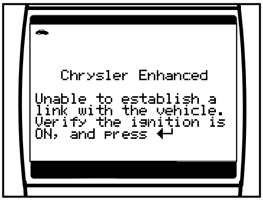
1. Use the **UP** and **DOWN** buttons, as necessary, to highlight the desired option, then press the **ENTER/FF** button.



Chrysler Enhanced
Select and Press ↵
Engine DTCs
Transmission DTCs
Exit

*Transmission DTCs **are not** supported on most Chrysler/Jeep vehicles manufactured prior to 2002.*

   - A "One moment please" message displays while the Tool retrieves the selected DTCs.
   - If the Tool fails to link to the vehicle's computer, a "Linking Failed" message shows on the Tool's display.
     - Verify the ignition is ON, then press the **ENTER/FF** button to continue.

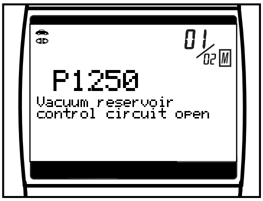


Chrysler Enhanced
Unable to establish a link with the vehicle. Verify the ignition is ON, and press ↵

2. To read the display:

Refer to DISPLAY FUNCTIONS on page 11 for a description of LCD display elements.

- A visible 🚗 icon indicates that the Tool is being powered through the vehicle's DLC connector.
- A visible ◁▷ icon indicates that the Tool is linked to (communicating with) the vehicle's computer.
- The upper right hand corner of the display shows the number of the code currently being displayed, the total number of codes retrieved.
- The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display.



01/02 M

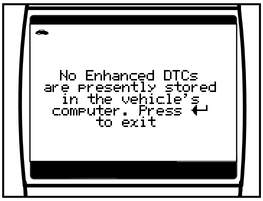
P1250

Vacuum reservoir
control circuit open

I/M MONITOR STATUS icons are not displayed when viewing enhanced DTCs.

In the case of long code definitions, or when viewing Freeze Frame data, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the △ and ▽ buttons, as necessary, to view the additional information.

- The Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No Enhanced DTC's are presently stored in the vehicle's computer" is displayed. Press the **ENTER/FF** ↵ FF button to return to the Chrysler Enhanced menu.



No Enhanced DTCs
are presently stored
in the vehicle's
computer. Press ↵
to exit

3. If more than one code was retrieved press the **DTC SCROLL** DTC button, as necessary, to display additional codes one at a time.
   - Whenever the Scroll function is used to view additional codes, the Tool's communication link with the vehicle's computer disconnects. To re-establish communication, press the **LINK** ◁▷ button again.
4. When the last retrieved DTC has been displayed and the **DTC SCROLL** DTC button is pressed, the Tool returns to the Chrysler Enhanced menu.
   - To view *additional* enhanced DTCs, repeat steps **1** through **4**, above.
   - To exit the enhanced mode, use the **UP** △ and **DOWN** ▽ buttons, as necessary, to select **Exit** from the Chrysler Enhanced menu, then press the **ENTER/FF** ↵ FF button. The Tool returns to the OBD2 DTC screen.

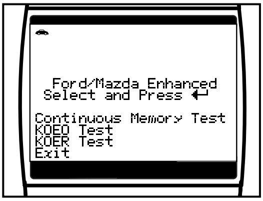
Ford/Mazda Enhanced DTCs

*Mazda Enhanced DTCs are available for **Mazda-branded Ford vehicles only**.*

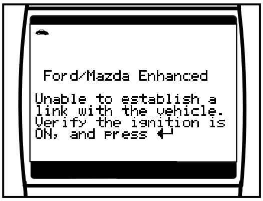
When **Ford/Mazda** is selected from the Enhanced DTCs Main menu, the Ford/Mazda Enhanced menu displays. You may view DTCs for either the "Continuous Memory Test", "KOEO (Key On Engine Off) Test" or "KOER (Key On Engine Running) Test."

1. Use the **UP** ▲ and **DOWN** ▼ buttons, as necessary, to highlight the desired option, then press the **ENTER/FF** ↵ button.

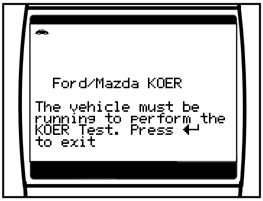
   *When choosing to view **KOER Test** DTCs, start the vehicle's engine before making your selection.*


Ford/Mazda Enhanced
Select and Press ↵
Continuous Memory Test
KOEO Test
KOER Test
Exit

- A "One moment please" message displays, while the Tool retrieves the selected DTCs.
- If the Tool fails to link to the vehicle's computer, a "Linking Failed" message shows on the Tool's Display.
  - Verify the ignition is ON, then press the **ENTER/FF** ↵ button to continue.


Ford/Mazda Enhanced
Unable to establish a link with the vehicle. Verify the ignition is ON, and press ↵

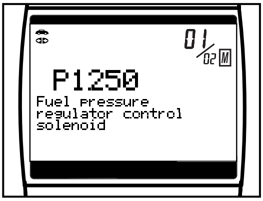
- If the KOER Test was selected, and the vehicle's engine *is not* running, an advisory message shows on the Tool's display.
  - Start the vehicle's engine, then press the **ENTER/FF** ↵ button to continue.


Ford/Mazda KOER
The vehicle must be running to perform the KOER Test. Press ↵ to exit

2. To read the display:

   Refer to DISPLAY FUNCTIONS on page 11 for a description of LCD display elements.

- A visible 🚗 icon indicates that the Tool is being powered through the vehicle's DLC connector.
- A visible ⇔ icon indicates that the Tool is linked to (communicating with) the vehicle's computer.
- The upper right hand corner of the display shows the number of the code currently being displayed, the total number of codes retrieved.
- The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display.

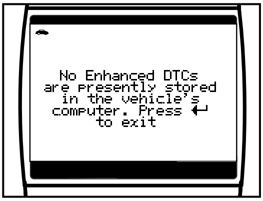


P1250
Fuel pressure regulator control solenoid

I/M MONITOR STATUS icons are not displayed when viewing enhanced DTCs.

In the case of long code definitions, or when viewing Freeze Frame data, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the △ and ▽ buttons, as necessary, to view the additional information.

- The Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No Enhanced DTC's are presently stored in the vehicle's computer" is displayed. Press the **ENTER/FF** button to return to the Ford/Mazda Enhanced menu.



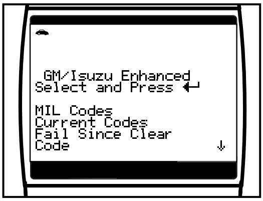
```
 No Enhanced DTCs
are presently stored
 in the vehicle's
computer. Press ↵
    to exit
```

3. If more than one code was retrieved press the **DTC SCROLL** button, as necessary, to display additional codes one at a time.
   - Whenever the Scroll function is used to view additional codes, the Tool's communication link with the vehicle's computer disconnects. To re-establish communication, press the **LINK** button again.
4. When the last retrieved DTC has been displayed and the **DTC SCROLL** button is pressed, the Tool returns to the Ford/Mazda Enhanced menu.
   - To view *additional* enhanced DTCs, repeat steps **1** through **4**, above.
   - To exit the enhanced mode, use the **UP** and **DOWN** buttons, as necessary, to select **Exit** from the Ford/Mazda Enhanced menu, then press the **ENTER/FF** button. The Tool returns to the OBD2 DTC screen.

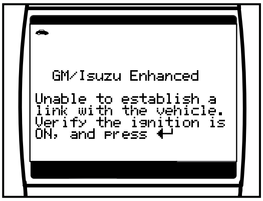
General Motors/Isuzu Enhanced DTCs

When **GM/Isuzu** is selected from the Enhanced DTCs Main menu, the GM/Isuzu Enhanced menu displays. You may view the "MIL DTC", "Current DTC", "Fail Since Clear DTC" or "History DTC."

1. Use the **UP** and **DOWN** buttons, as necessary, to highlight the desired option, then press the **ENTER/FF** button.
   - A "One moment please" message displays while the Tool retrieves the selected DTCs.



```
 GM/Isuzu Enhanced
Select and Press ↵

MIL Codes
Current Codes
Fail Since Clear
Code               ↓
```



GM/Isuzu Enhanced

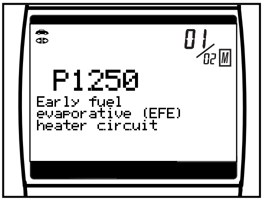
Unable to establish a link with the vehicle. Verify the ignition is ON, and press ↵

- If the Tool fails to link to the vehicle's computer, a "Linking Failed" message shows on the Tool's display.
  - Verify the ignition is ON, then press the **ENTER/FF** ↵ button to continue.

2. To read the display:

Refer to DISPLAY FUNCTIONS on page 11 for a description of LCD display elements.

- A visible 🚗 icon indicates that the Tool is being powered through the vehicle's DLC connector.
- A visible ◁▷ icon indicates that the Tool is linked to (communicating with) the vehicle's computer.
- The upper right hand corner of the display shows the number of the code currently being displayed, the total number of codes retrieved.
- The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display.



01/02 M

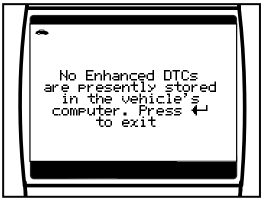
P1250

Early fuel evaporative (EFE) heater circuit

I/M MONITOR STATUS icons are not displayed when viewing enhanced DTCs.

In the case of long code definitions, or when viewing Freeze Frame data, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the △ and ▽ buttons, as necessary, to view the additional information.

- The Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No Enhanced DTC's are presently stored in the vehicle's computer" is displayed. Press the **ENTER/FF** ↵ button to return to the GM Enhanced menu.



No Enhanced DTCs are presently stored in the vehicle's computer. Press ↵ to exit

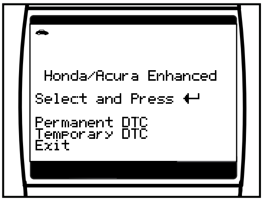
3. If more than one code was retrieved press the **DTC SCROLL** button, as necessary, to display additional codes one at a time.
   - Whenever the Scroll function is used to view additional codes, the Tool's communication link with the vehicle's computer disconnects. To re-establish communication, press the **LINK** button again.

4. When the last retrieved DTC has been displayed and the **DTC SCROLL** button is pressed, the Tool returns to the GM/Isuzu Enhanced menu.
   - To view *additional* enhanced DTCs, repeat steps **1** through **4**, above.
   - To exit the enhanced mode, use the **UP** △ and **DOWN** ▽ buttons, as necessary, to select **Exit** from the GM/Isuzu Enhanced menu, then press the **ENTER/FF** ↵ button. The Tool returns to the OBD2 DTC screen.

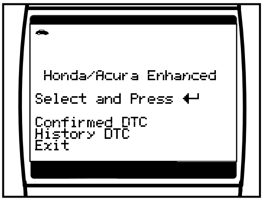
Honda/Acura Enhanced DTCs

When **Honda/Acura** is selected from the Enhanced DTCs Main menu, the Honda/Acura Enhanced menu displays. Depending on the protocol used to communicate with your vehicle, the Honda/Acura Enhanced menu provides options to view:

- Permanent DTCs or Temporary DTCs
- Confirmed DTCs or History DTCs

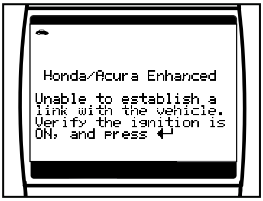


Honda/Acura Enhanced
Select and Press ↵
Permanent DTC
Temporary DTC
Exit



Honda/Acura Enhanced
Select and Press ↵
Confirmed DTC
History DTC
Exit

1. Use the **UP** △ and **DOWN** ▽ buttons, as necessary, to highlight the desired option, then press the **ENTER/FF** ↵ button.
   - A “One moment please” message displays while the Tool retrieves the selected DTCs.
   - If the Tool fails to link to the vehicle’s computer, a “Linking Failed” message shows on the Tool’s display.
     - Verify the ignition is ON, then press the **ENTER/FF** ↵ button to continue.



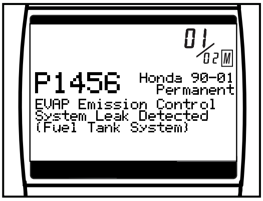
Honda/Acura Enhanced
Unable to establish a link with the vehicle. Verify the ignition is ON, and press ↵

2. To read the display:

Refer to DISPLAY FUNCTIONS on page 11 for a description of LCD display elements.

- A visible 🚗 icon indicates that the Tool is being powered through the vehicle’s DLC connector.
- A visible ⇄ icon indicates that the Tool is linked to (communicating with) the vehicle’s computer.
- The upper right hand corner of the display shows the number of the code currently being displayed, the total number of codes retrieved.

- The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display.

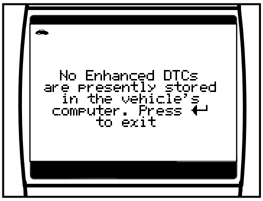


```
                          01/02 M
P1456  Honda 90-01
          Permanent
EVAP Emission Control
System Leak Detected
(Fuel Tank System)
```

I/M MONITOR STATUS icons are not displayed when viewing enhanced DTCs.

In the case of long code definitions, or when viewing Freeze Frame data, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the △ and ▽ buttons, as necessary, to view the additional information.

- The Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No Enhanced DTC's are presently stored in the vehicle's computer" is displayed. Press the **ENTER/FF** button to return to the Honda/Acura Enhanced menu.

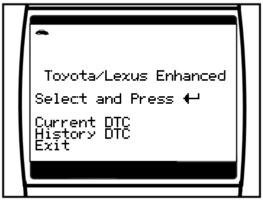


```
  No Enhanced DTCs
are presently stored
  in the vehicle's
 computer. Press ↵
      to exit
```

3. If more than one code was retrieved press the **DTC SCROLL** button, as necessary, to display additional codes one at a time.
   - Whenever the Scroll function is used to view additional codes, the Tool's communication link with the vehicle's computer disconnects. To re-establish communication, press the **LINK** button again.
4. When the last retrieved DTC has been displayed and the **DTC SCROLL** button is pressed, the Tool returns to the Honda/Acura Enhanced menu.
   - To view *additional* enhanced DTCs, repeat steps **1** through **4**, above.
   - To exit the enhanced mode, use the **UP** △ and **DOWN** ▽ buttons, as necessary, to select **Exit** from the Honda/Acura Enhanced menu, then press the **ENTER/FF** button. The Tool returns to the OBD2 DTC screen.

Toyota/Lexus Enhanced DTCs

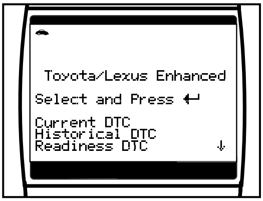
When **Toyota/Lexus** is selected from the Enhanced DTCs Main menu, the Toyota/Lexus Enhanced menu displays. Depending on the protocol used to communicate with your vehicle, the Toyota/Lexus Enhanced menu provides options to view:



```
 Toyota/Lexus Enhanced
Select and Press ↵
Current DTC
History DTC
Exit
```

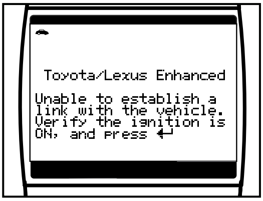
- Current DTCs or History DTCs
- Current DTCs, Historical DTCs or Readiness DTCs

1. Use the **UP** △ and **DOWN** ▽ buttons, as necessary, to highlight the desired option, then press the **ENTER/FF** ↵ button.



```
Toyota/Lexus Enhanced
Select and Press ↵
Current DTC
Historical DTC
Readiness DTC          ↓
```

   - A "One moment please" message displays, while the Tool retrieves the selected DTCs.
   - If the Tool fails to link to the vehicle's computer, a "Linking Failed" message shows on the Tool's Display.
     - Verify the ignition is ON, then press the **ENTER/FF** ↵ button to continue.

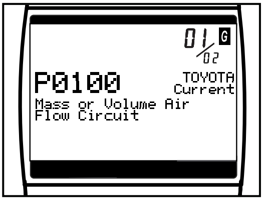


```
Toyota/Lexus Enhanced
Unable to establish a
link with the vehicle.
Verify the ignition is
ON, and press ↵
```

2. To read the display:

Refer to DISPLAY FUNCTIONS on page 11 for a description of LCD display elements.

   - A visible 🚗 icon indicates that the Tool is being powered through the vehicle's DLC connector.
   - A visible ◁▷ icon indicates that the Tool is linked to (communicating with) the vehicle's computer.
   - The upper right hand corner of the display shows the number of the code currently being displayed, the total number of codes retrieved.
   - The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display.

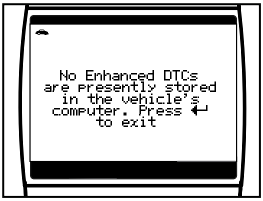


```
                    01 G
                     /02
P0100             TOYOTA
                 Current
Mass or Volume Air
Flow Circuit
```

I/M MONITOR STATUS icons are not displayed when viewing enhanced DTCs.

In the case of long code definitions, or when viewing Freeze Frame data, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the △ and ▽ buttons, as necessary, to view the additional information.

   - The Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No Enhanced DTC's are presently stored in the vehicle's computer" is displayed. Press the **ENTER/FF** ↵ button to return to the Toyota/Lexus Enhanced menu.

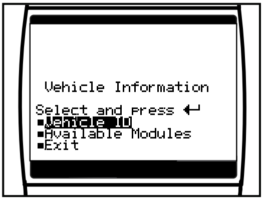


```
No Enhanced DTCs
are presently stored
in the vehicle's
computer. Press ↵
to exit
```

3. If more than one code was retrieved press the **DTC SCROLL** button, as necessary, to display additional codes one at a time.
   - Whenever the Scroll function is used to view additional codes, the Tool's communication link with the vehicle's computer disconnects. To re-establish communication, press the **LINK** button again.
4. When the last retrieved DTC has been displayed and the **DTC SCROLL** button is pressed, the Tool returns to the Toyota/Lexus Enhanced menu.
   - To view *additional* enhanced DTCs, repeat steps **1** through **4**, above.
   - To exit the enhanced mode, use the **UP** and **DOWN** buttons, as necessary, to select **Exit** from the Toyota/Lexus Enhanced menu, then press the **ENTER/FF** button. The Tool returns to the OBD2 DTC screen.

VIEWING VEHICLE INFORMATION

When you select **View Vehicle Info** from the Enhanced Select Data menu, or press the **ENTER/FF** button from the View Vehicle Information confirmation message (see VIEWING ENHANCED DATA on page 29), the Vehicle Information menu displays.



The Vehicle Information menu offers two options for retrieving reference information for the vehicle under test; **Vehicle ID** and **Available Modules**.

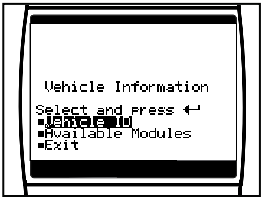
Retrieving Vehicle ID Information

The Vehicle ID function is applicable to model year 2000 and newer OBD2-compliant vehicles.

The Tool can retrieve a list of information (provided by the vehicle manufacturer), unique to the vehicle under test, from the vehicle's on-board computer. This information may include:

- The vehicle's VIN number
- The control module identification number
- The vehicle's calibration ID(s). These IDs uniquely identify the software version(s) for the vehicle's control module(s).
- The Vehicle's Calibration Verification Number(s) (CVNs) required by ODB2 regulations. CVNs are used to determine if emission-related calibrations for the vehicle under test have been changed. One or more CVNs may be returned by the vehicle's computer.

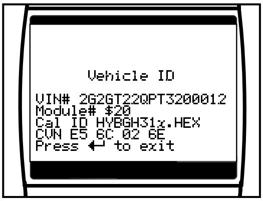
1. On the Vehicle Information menu, use the **UP** and **DOWN** buttons, as necessary, to highlight Vehicle ID, then press the **ENTER/FF** button.
2. A "One moment please..." message displays while the requested information is retrieved from the vehicle's computer.



```
Vehicle Information

Select and press ↵
▪Vehicle ID
▪Available Modules
▪Exit
```

*The first time the **Vehicle ID** function is used, it may take <u>several minutes</u> to retrieve the information from the vehicle's computer.*

3. When the retrieval process is completed, the vehicle ID information is shown on the Tool's display. Use the **UP** and **DOWN** buttons, as necessary, to view the entire list.
4. When you have finished viewing the retrieved vehicle ID information, press the **ENTER/FF** button to return to exit.

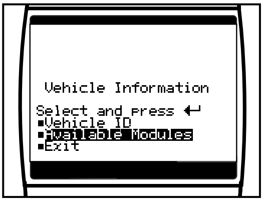


```
Vehicle ID

VIN# 2G2GT22QPT3200012
Module# $20
Cal ID HYBGH31x.HEX
CVN E5 6C 02 6E
Press ↵ to exit
```

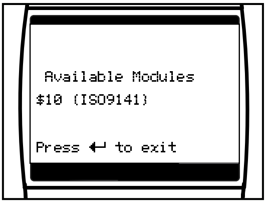
Viewing Available Modules

The Tool can retrieve a list of modules supported by the vehicle under test.

1. From the Vehicle Information menu, use the **UP** and **DOWN** buttons, as necessary, to highlight Available Modules, then press the **ENTER/FF** button.
2. A "One moment please..." message displays while the requested information is retrieved from the vehicle's computer.
3. When the retrieval process is completed, a complete list of modules supported by the vehicle under test is shown on the Tool's display. Use the **UP** and **DOWN** buttons, as necessary, to view the entire list.



```
Vehicle Information

Select and press ↵
▪Vehicle ID
▪Available Modules
▪Exit
```



```
Available Modules

$10 (ISO9141)


Press ↵ to exit
```

4. When you have finished viewing the list of available modules, press the **ENTER/FF** button to return to exit.

ERASING DIAGNOSTIC TROUBLE CODES (DTCs)

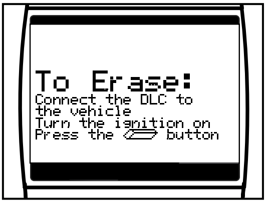
When the Tool's ERASE function is used to erase DTCs from the vehicle's on-board computer, "Freeze Frame" data and manufacturer-specific enhanced data are also erased.

If you plan to take the vehicle to a Service Center for repair, DO NOT erase the codes from the vehicle's computer. If the codes are erased, valuable information that might help the technician troubleshoot the problem will also be erased.

Erase DTCs from the computer's memory as follows:

When DTCs are erased from the vehicle's computer memory, the I/M Readiness Monitor Status program resets the status of all Monitors to a not run "flashing" condition. To set all of the Monitors to a DONE status, an OBD2 Drive Cycle must be performed. Refer to your vehicle's service manual for information on how to perform an OBD2 Drive Cycle for the vehicle under test.

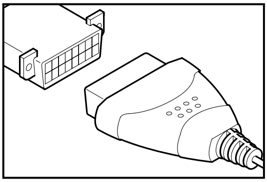
The Tool must be connected to the vehicle's DLC to erase the codes from the computer's memory. If you press the ***ERASE*** *button when the Tool is not connected to the vehicle's DLC, the erase instruction screen displays.*



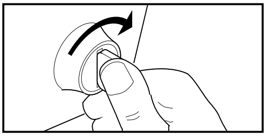
To Erase:
Connect the DLC to
the vehicle
Turn the ignition on
Press the button

The Erase function can be performed ***only*** *from the OBD2 DTC screen. The Erase function* ***cannot*** *be performed while the Tool is in "enhanced" mode.*

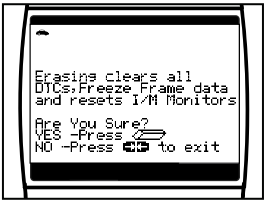
1. If not connected already, connect the Tool to the vehicle's DLC, and turn the ignition "On." (If the Tool is already connected and linked to the vehicle's computer, proceed directly to step 4. If not, continue to step 2.)



2. Turn the ignition ON. **DO NOT** start the engine. Press and release the **POWER/LINK** button to establish communication with the vehicle's computer.



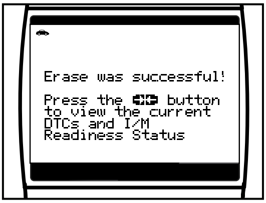
3. Press and release the **ERASE** button. A confirmation message shows on the LCD display.
   - If you are sure you want to proceed press the **ERASE** button again to erase DTCs from the vehicle's computer.
   - If you do not want to continue with the erase process, press the **POWER/LINK** button to exit the erase mode.



Erasing clears all
DTCs,Freeze Frame data
and resets I/M Monitors

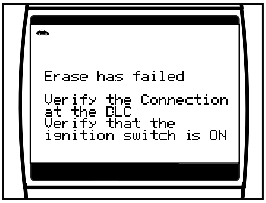
Are You Sure?
YES -Press
NO -Press to exit

4. If you chose to erase DTCs, a progress screen displays while the erase function is in progress.



Erase was successful!

Press the ◀▶ button
to view the current
DTCs and I/M
Readiness Status



Erase has failed

Verify the Connection
at the DLC
Verify that the
ignition switch is ON

- If the erase was successful, a confirmation message shows on the LCD display. Press the **POWER/LINK** button to return to the DTC screen.
- If the erase was not successful, an advisory message shows on the LCD display. Verify that the Tool is properly connected to the vehicle's DLC and that the ignition is on, then repeat steps **2** and **3**, above.

Erasing DTCs does not fix the problem(s) that caused the code(s) to be set. If proper repairs to correct the problem that caused the code(s) to be set are not made, the code(s) will appear again (and the check engine light will illuminate) as soon as the vehicle is driven long enough for its Monitors to complete their testing.

I/M READINESS TESTING

I/M is an Inspection and Maintenance program legislated by the Government to meet federal clean-air standards.

The program requires that a vehicle be taken periodically to an Emissions Station for an "Emissions Test" or "Smog Check," where the emissions-related components and systems are inspected and tested for proper operation. Emissions Tests are generally performed once a year, or once every two years.

On OBD2 systems, the I/M program is enhanced by requiring vehicles to meet stricter test standards. One of the tests instituted by the Federal Government is called I/M 240. On I/M 240, the vehicle under test is driven under different speeds and load conditions on a dynamometer for 240 seconds, while the vehicle's emissions are measured.

Emissions tests vary depending on the geographic or regional area in which the vehicle is registered. If the vehicle is registered in a highly urbanized area, the I/M 240 is probably the type of test required. If the vehicle is registered in a rural area, the stricter "dynamometer type" test may not be required.

I/M Readiness Monitors

I/M Readiness shows whether the various emissions-related systems on the vehicle are operating properly and are ready for Inspection and Maintenance testing.

State and Federal Governments enacted Regulations, Procedures and Emission Standards to ensure that all emissions-related components and systems are **continuously** or **periodically** monitored, tested and diagnosed whenever the vehicle is in operation. It also requires vehicle manufacturers to automatically detect and report any problems or faults that may increase the vehicle's emissions to an unacceptable level.

The vehicle's emissions control system consists of several components or sub-systems (Oxygen Sensor, Catalytic Converter, EGR, Fuel System, etc.) that aid in reducing vehicle emissions.

To have an efficient Vehicle Emission Control System, all the emissions-related components and systems must work correctly whenever the vehicle is in operation.

To comply with State and Federal Government regulations, vehicle manufacturers designed a series of special computer programs called "Monitors" that are programmed into the vehicle's computer. Each of these Monitors is specifically designed to run tests and diagnostics on a specific emissions-related component or system (Oxygen Sensor, Catalytic Converter, EGR Valve, Fuel System, etc.) to ensure their proper operation. Currently, there are a maximum of eleven Monitors available for use.

Each Monitor has a specific function to test and diagnose only its designated emissions-related component or system. The names of the Monitors (Oxygen Sensor Monitor, Catalyst Monitor, EGR Monitor, Misfire Monitor, etc.) describe which component or system each Monitor is designed to test and diagnose.

Emissions Inspection and Maintenance (I/M) Readiness

Monitor Status Information

I/M Readiness Monitor Status shows which of the vehicle's Monitors have run and completed their diagnosis and testing, and which ones have not yet run and completed testing and diagnosis of their designated sections of the vehicle's emissions system.

- If a Monitor was able to meet all the conditions required to enable it to perform the self-diagnosis and testing of its assigned engine system, it means the monitor "HAS RUN.”
- If a Monitor has not yet met all the conditions required for it to perform the self-diagnosis and testing of its assigned engine system; it means the Monitor "HAS NOT RUN.”

The Monitor Run/Not Run status does not show whether or not a problem exists in a system. Monitor status only indicates whether a particular Monitor has or has not run and performed the self-diagnosis and testing of its associated system.

Performing I/M Readiness Quick Check

When a vehicle first comes from the factory, all Monitors indicate a “HAVE RUN” status. This indicates that all Monitors have run and completed their diagnostic testing. The “HAVE RUN” status remains in the computer's memory, unless the Diagnostic Trouble Codes are erased or the vehicle's computer memory is cleared.

The Tool allows you to retrieve Monitor/System Status Infor-mation to help you determine if the vehicle is ready for an Emissions Test (Smog Check). In addition to retrieving Diagnostic Trouble Codes, the Tool also retrieves Monitor Run/Not Run status. This information is very important since different areas of the state/country have different emissions laws and regulations concerning Monitor Run/Not Run status.

Before an Emissions Test (Smog Check) can be performed, your vehicle must meet certain rules, requirements and procedures legislated by the Federal and state (country) governments where you live.

1. In most areas, one of the requirements that must be met before a vehicle is allowed to be Emissions Tested (Smog Checked) is that the vehicle does not have any Diagnostic Trouble Codes present (with the exception of PENDING Diagnostic Trouble Codes).
2. In addition to the requirement that no Diagnostic Trouble Codes be present, some areas also require that all the Monitors that a particular vehicle supports indicate a "Has Run" status condition before an Emissions Check may be performed.
3. Other areas may only require that some (but not all) Monitors indicate a "Has Run" status before an Emissions Test (Smog Check) may be performed.

Monitors with a "Has Run" status indicate that all the required conditions they needed to perform diagnosis and testing of their assigned engine area (system) have been met, and all diagnostic testing has completed successfully.

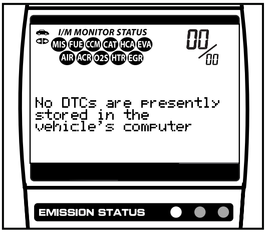
Monitors with a "Has Not Run" status have not yet met the conditions they need to perform diagnosis and testing of their assigned engine area (system), and have not been able to perform diagnostic testing on that system.

The green, yellow and red LEDs provide a quick way to help you determine if a vehicle is ready for an Emissions Test (Smog Check). Follow the instructions below to perform the Quick Check.

Perform the CODE RETRIEVAL PROCEDURE as described on page 23, then interpret the LED indications as follows:

Interpreting I/M Readiness Test Results

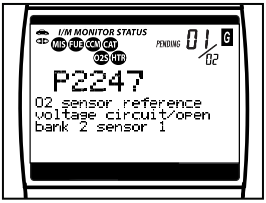
1. **GREEN LED** - Indicates that all engine systems are "OK" and operating normally (all Monitors supported by the vehicle have run and performed their self-diagnostic testing). The vehicle is ready for an Emissions Test (Smog Check), and there is a good possibility that it can be certified.



No DTCs are presently stored in the vehicle's computer

2. **YELLOW LED** - Determine from the CODE RETRIEVAL PROCEDURE (page 23) which of the two possible conditions is causing the yellow LED to light.

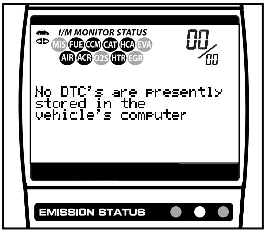
- If a "PENDING" Diagnostic Trouble Code is causing the yellow LED to light, it is possible that the vehicle will be allowed to be tested for emissions and certified. Currently, most areas (states) will allow an Emissions Test (Smog Check) to be performed if the only code in the vehicle's computer is a "PENDING" Diagnostic Trouble Code.



P2247

02 sensor reference voltage circuit/open bank 2 sensor 1

- If the illumination of the Yellow LED is being caused by monitors that “have not run” their diagnostic testing, then the issue of the vehicle being ready for an Emissions Test (Smog Check) depends on the emissions regulations and laws of your local area.

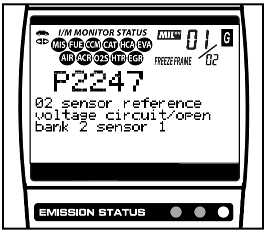


No DTC's are presently stored in the vehicle's computer

  - Some areas require that all Monitors indicate a "Has Run" status before they allow an Emissions Test (Smog Check) to be performed. Other areas only require that some, but not all, Monitors have run their self-diagnostic testing before an Emissions Test (Smog Check) may be performed.

    From the code retrieval procedure, determine the status of each Monitor (a solid Monitor icon shows Monitor "Has Run" status, a flashing Monitor icon indicates "Has Not Run" status). Take this information to an emissions professional to determine (based on your test results) if your vehicle is ready for an Emissions Test (Smog Check).

3. **RED LED** - Indicates there is a problem with one or more of the vehicle's systems. A vehicle displaying a red LED is definitely not ready for an Emissions Test (Smog Check). The red LED is also an indication that there are Diagnostic Trouble Code(s) present (displayed on the Tool's screen). The Multifunction Indicator (Check Engine) Lamp on the vehicle's instrument panel will light steady. The problem that is causing the red LED to light must be repaired before an Emissions Test (Smog Check) can be performed. It is also suggested that the vehicle be inspected/repaired before driving the vehicle further.



P2247

02 sensor reference voltage circuit/open bank 2 sensor 1

If the Red LED was obtained, there is a definite problem present in the system(s). In these cases, you have the following options.

- Repair the vehicle yourself. If you are going to perform the repairs yourself, proceed by reading the vehicle service manual and following all its procedures and recommendations.

- Take the vehicle to a professional to have it serviced. The problem(s) causing the red LED to light must be repaired before the vehicle is ready for an Emissions Test (Smog Check).

Using the I/M Readiness Monitor Status to Confirm a Repair

The I/M Readiness Monitor Status function can be used (after repair of a fault has been performed) to confirm that the repair has been performed correctly, and/or to check for Monitor Run Status. Use the following procedure to determine I/M Readiness Monitor Status:

1. Using retrieved Diagnostic Trouble Codes (DTCs) and code definitions as a guide, and following manufacturer's repair procedures, repair the fault or faults as instructed.
2. After the fault or faults have been repaired, connect the Tool to the vehicle's DLC and erase the code or codes from the vehicle's computer memory.
    - See page 29 for procedures to erase DTCs from the vehicle's on-board computer.
    - Write the codes down on a piece of paper for reference before erasing.
3. After the erase procedure is performed, most of the Monitor icons on the Tool’s LCD display will be flashing. Leave the Tool connected to the vehicle, and perform a Trip Drive Cycle for each "flashing" Monitor:

Misfire, Fuel and Comprehensive Component Monitors run continuously and their icons will always be on solid, even after the erase function is performed.

- Each DTC is associated with a specific Monitor. Consult the vehicle's service manual to identify the Monitor (or Monitors) associated with the faults that were repaired. Follow the manufacturer's procedures to perform a Trip Drive Cycle for the appropriate Monitors.
- While observing the Monitor icons on the Tool’s LCD display, perform a Trip Drive Cycle for the appropriate Monitor or Monitors.

WARNING: If the vehicle needs to be driven in order to perform a Trip Drive Cycle, ALWAYS have a second person help you. One person should drive the vehicle while the other person observes the Monitor icons on the Tool for Monitor RUN status. Trying to drive and observe the Tool at the same time is dangerous, and could cause a serious traffic accident.

4. When a Monitor's Trip Drive Cycle is performed properly, the Monitor icon on the Tool’s LCD display changes from "flashing" to "solid,” indicating that the Monitor has run and finished its diagnostic testing.

- If, after the Monitor has run, the MIL on the vehicle's dash is not lit, and no stored or pending codes associated with that particular Monitor are present in the vehicle's computer, the repair was successful.
- If, after the Monitor has run, the MIL on the vehicle's dash lights and/or a DTC associated with that Monitor is present in the vehicle's computer, the repair was unsuccessful. Refer to the vehicle's service manual and recheck repair procedures.

CHRYSLER/JEEP OBD1 SYSTEMS

Chrysler Motors On-Board Computer Systems

Chrysler Motors introduced its first electronic fuel injected vehicle in late 1983. The on-board computer management systems used on Chrysler vehicles have evolved over the years, and their names have changed accordingly.

1983-87: The on-board computer used in these vehicles is a split-system, composed of two separate units: the Logic Module and the Power Module. The Logic Module contains a microprocessor which processes data received from sensors located throughout the vehicle and makes decisions (based on these inputs) which effect engine operation. The Logic Module is usually located on the right-hand side, behind the kick panel. The Power Module supplies operating power to the Logic Module, and contains the circuits which control the high-current devices. Power Module operation is controlled by the Logic Module. The Power Module is located in the engine compartment, near the vehicle's battery.

1987-90: This system is called a Single Module Engine Controller (SMEC). This system still uses two separate circuit boards (Logic Module and Power Module). However, both circuit boards are located in a common enclosure.

1989-95: This system is called a Single Board Engine Controller (SBEC). On this system, the Logic Module and Power Module circuit boards are integrated on a single circuit board.

1993-97: Beginning in 1993, the computer was renamed the Powertrain Control Module (PCM). In addition to controlling the engine management system and emission system, the computer also takes an active role in controlling powertrain (transmission system) operation.

Unless otherwise specified, all references to "computer" within this manual also apply to "Logic Module/ Power Module", "SMEC", "SBEC" or "PCM".

Jeep On-Board Computer Systems

1993-95: In 1993, Jeep on-board computer systems (fuel injected vehicles only) were converted to the Chrysler on-board computer systems. All 1993 through 1995 fuel injected Jeep and Chrysler vehicles are equipped with similar on-board computer systems.

VEHICLES COVERED

This section covers Chrysler fuel injected vehicles from 1983-1995.

Type	Model Year	Model
Passenger Cars	1983-1995	Chrysler, Dodge and Plymouth Fuel Injected Models Only (Excluding Laser/Talon 1.8L, 2.0L (ALL YEARS), 1990 Monaco/Premier, 1993-1995 Intrepid, LHS, Concorde and Vision, 1995 Avenger, Stealth (ALL YEARS) and Cirrus 2.5L (ALL YEARS))
Light Truck and Vans	1987-1995	Chrysler, Dodge and Plymouth Fuel Injected Models Only
	1992-1995	Diesel Models
Jeep	1993-1995	Jeep Fuel Injected Models Only

INSTRUMENT PANEL INDICATOR LIGHTS

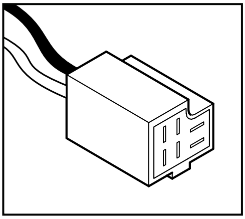
Your vehicle's instrument panel has either a "Power Loss", "Check Engine" or "Malfunction Indicator Lamp", depending on the year of the vehicle. These lights are designed to warn you of component malfunctions.

POWER LOSS **CHECK ENGINE** **MALFUNCTION INDICATOR LAMP**

If your instrument panel indicator lights do not come on when you turn on the ignition, please refer to your vehicle's service manual. You may have problems in the car's circuitry. It is recommended that you fix these problems before retrieving DTC's from your vehicle's computer.

DATA LINK CONNECTOR (DLC)

Chrysler vehicles are equipped with special test connectors that make it possible to connect specialized testing equipment that communicates with the vehicle's on-board computer. Chrysler's vehicle test connectors are usually dark in color (BLACK or GREY) and are located under the hood.



CODE RETRIEVAL PROCEDURE

Retrieving and using Diagnostic Trouble Codes (DTCs) for troubleshooting vehicle operation is only one part of an overall diagnostic strategy.

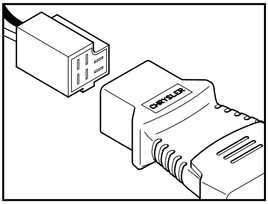
Never replace a part based only on the DTC definition. Each DTC has a set of testing procedures, instructions and flow charts that must be followed to confirm the location of the problem. This information is found in the vehicle's service manual. Always refer to the vehicle's service manual for detailed testing instructions.

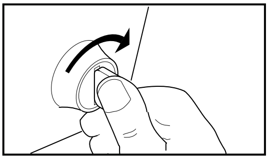
Check your vehicle thoroughly before performing any test. See BEFORE YOU BEGIN on page 17 for details.

***ALWAYS** observe safety precautions whenever working on a vehicle. See Safety Precautions on page 3 for more information.*

1. Locate the vehicle's Data Link Connector (DLC). See **Data Link Connector (DLC)** on page 48 for connector location.

Some DLCs have a plastic cover that must be removed before connecting the Tool's cable connector.



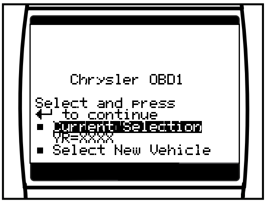


2. Connect the Tool cable (with the Chrysler Connector Cable Adaptor attached) to the Tool, then connect the adaptor to the vehicle's DLC. Press the **POWER/LINK** button to turn the Tool ON.
   - Set the parking brake, and make sure all vehicle accessories are turned off.
3. Turn the ignition ON. **DO NOT** start the engine. Press the **ENTER/FF** button to continue.
4. Select the model year of the vehicle from which you wish to retrieve codes:

If a previous vehicle selection is currently saved in the Tool's memory, the "Current Selection/Select New Vehicle" menu displays. If no previous vehicle selection is stored in the Tool's memory, "Select New Vehicle" displays. Use the △ and ▽ buttons, as necessary, to make your selection.

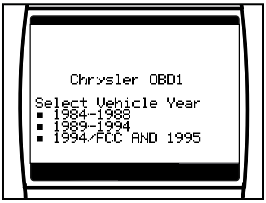
- To retrieve DTCs from the vehicle selection currently in the Tool's memory:

  - From the "Current Selection/ Select New Vehicle" screen, highlight **Current Selection** and press the **ENTER/FF** button.
  - Proceed to step 5 to continue.



```
Chrysler OBD1
Select and press
↵ to continue
■ Current Selection
  YR=XXXX
■ Select New Vehicle
```

- To retrieve DTCs from a new vehicle:
  - From the "Current Selection/Select New Vehicle" screen, highlight **Select New Vehicle** and press the **ENTER/FF** button; the "Select Vehicle Year" menu displays.
  - Highlight the desired year, then press the **ENTER/FF** button. The "Current Selection/Select New Vehicle" screen displays for your confirmation.



```
Chrysler OBD1
Select Vehicle Year
■ 1984-1988
■ 1989-1994
■ 1994/FCC AND 1995
```

FCC - means 1994 Four Cylinder Control Module for the 1994 Chrysler vehicles.

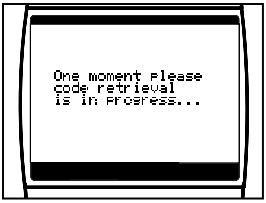
  - If the year shown in the "Current Selection" field is correct, highlight **Current Selection** and press the **ENTER/FF** button. Proceed to step 5 to continue.

*If the year shown is not correct, highlight **Select New Vehicle** and press the **ENTER/FF** button to return to the "Select Vehicle Year" menu to make your corrections.*

5. Prepare the vehicle to retrieve codes:

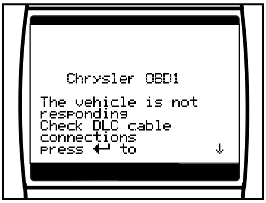
- **For 1988-1995 Chrysler/Jeep vehicles:** The Tool will automatically begin the code retrieval process. Proceed to step 6 to continue.
- **For 1984-1988 Chrysler vehicles ONLY:** WITHOUT starting the engine, turn ignition ON, OFF, ON, OFF and ON again within 5 seconds to activate the code retrieval process. Proceed to step 6 to continue.

6. When the Tool is in the process of retrieving codes, a "One Moment Please..." message shows on the Tool's LCD display.



```
One moment please
code retrieval
is in progress...
```

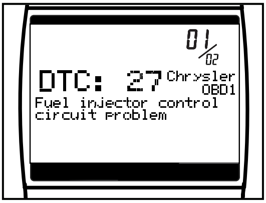
- If the Tool fails to link to the vehicle's computer, a "Vehicle is not responding" message shows on the Tool's LCD display. Do the following:
  - Verify the ignition is ON.
  - Check the cable connections at the Tool and at the vehicle's DLC.
  - Turn the ignition OFF, wait 10-12 seconds, then turn back ON to reset the computer.



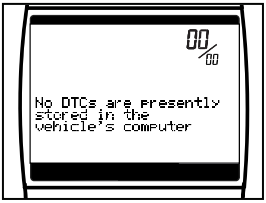
```
Chrysler OBD1
The vehicle is not
responding
Check DLC cable
connections
Press ↵ to          ↓
```

- Press the **ENTER/FF** button and repeat steps 4 through 6 as necessary.

7. If the Tool was able to link to the vehicle successfully a "Code retrieval was successful..." message shows temporarily on the Tool's LCD display followed by any retrieved DTCs.
   - The Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No DTC's are presently stored in the vehicle's computer" message is displayed.
8. If more than one code was retrieved press the **DTC SCROLL** button, as necessary, to display additional codes one at a time.



01/02
DTC: 27 Chrysler OBD1
Fuel injector control circuit problem



00/00
No DTCs are presently stored in the vehicle's computer

In the case of long code definitions, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the ▲ and ▼ buttons, as necessary, to view the additional information.

9. Disconnect the Tool from the vehicle and turn the ignition key OFF.
10. To prolong battery life, the Tool automatically shuts "Off" after approximately three minutes of no button activity. The DTCs retrieved will remain in the Tool's memory, and may be viewed at any time. If the Tool's batteries are removed, or if the Tool is re-linked to a vehicle to retrieve codes, any prior codes in its memory are automatically cleared.
    - See VIEWING DTCs IN THE TOOL'S MEMORY on page 13 to view DTCs stored in the Tool's memory.
11. Follow the testing and repair procedures outlined in the vehicle's service repair manual to correct "hard" DTCs. Codes should be addressed and eliminated in the order they were received, erasing (see *Erasing DTCs* on page 88) and retesting after each repair is made to be sure the fault was eliminated.

The green, yellow and red LEDs are used (with the LCD display) as visual aids to make it easier to determine engine system conditions. See Servicing DTCs on page 86 for information on interpreting LEDs and servicing DTCs.

FORD COMPUTER SYSTEM OVERVIEW

The Enhanced OBD2 & 1 Tool is compatible ***only*** *with* ***EEC-IV*** *Computer Control systems.*

IMPORTANT: *When the computer is in Self-Test mode (is testing the sensors or actuators for proper operation), it relies on voltage signals that is sends to and / or receives from the sensors or actuators to determine whether or not these components are operating properly. The sensors and actuators are all connected to the computer by wires. If any defects are present in any part of the circuit that connects these devices to the computer (such as defective connectors or wires, faulty grounds, improper voltage, shorts etc.), the voltage signal that the computer receives from these devices will be affected. The computer has no way of determining if the improper voltage signal is being caused by a defect in the circuit or by the sensors or actuators themselves. Keep this in mind when servicing fault codes, and do not replace any devices (sensors or actuators) before checking the complete circuit (or circuits) that are part of the device from which the code was generated.*

VEHICLES COVERED

CAR - Ford, Lincoln, Mercury Computer System/Tool Application Table

The following table lists the year and model of all the cars that are covered by the OBD2 & 1 Tool.

Engine	8th VIN Digit**	Fuel Systems (Carburetor Model)	Application/Special Notes	Computer System
1981-1982				
1.6L I-4	5, 2	EFI, EFI Turbo	Escort, EXP, LN7, Lynx	EEC-IV
2.3L I-4	5	EFI Turbo	Capri, Cougar, Mustang, T-Bird	
2.3L I-4 HSC	R, J	FBC (6149)*	Capri, Fairmont, LTD, Marquis, Mustang, Tempo, Topaz, Zephyr	
1984-1986				
1.6L I-4	4, 5, 8	EFI EFI Turbo	Escort, EXP, Lynx	EEC-IV
2.3L I-4 2.3L I-4 OHC	A, J, R	FBC (YFA)* (6149)*	Capri, Cougar, LTD, Marquis, Mustang, Tempo, Topaz	
2.3L I-4	T, W	EFI Turbo	Capri, Cougar, Merkur XR4Ti, Mustang, T-Bird	
2.3L I-4 HSC	S, X	CFI	Tempo, Topaz	
3.8L V-6	3	CFI	Capri, Cougar, LTD, Marquis, Mustang, T-Bird	

Engine	8th VIN Digit**	Fuel Systems (Carburetor Model)	Application/Special Notes	Computer System
1984-1986 (Cont)				
5.0L V-8	F, M	CFI, SEFI	Capri, Continental, Colony Park, Cougar, Country Squire, Crown Victoria, Grand Marquis, LTD, Mark VII, Marquis, Mustang, T-Bird, Town Car	EEC-IV
1987-1993				
1.9L I-4	J, 9	EFI, CFI, SFI	Escort, EXP, Lynx, Tracer	EEC-IV
2.0L I-4	A	SEFI	Probe (1993 manual transmission only)	
2.3L I-4	A	FBC (YFA)*	Capri, LTD, Marquis, Mustang (1996 models)	
2.3L I-4 OHC	A, M	EFI	Mustang	
2.3L I-4	T, W	EFI Turbo	Capri, Cougar, Merkur, Mustang, T-Bird, XR4Ti	
2.3L I-4 HSC	S, X	CFI, EFI, SEFI	Tempo, Topaz	
2.5L I-4	D	EFI, CFI	Sable, Taurus	
3.0L V-6 3.0L V-6 SHO	1, U, Y	EFI, SEFI, SFI	Probe, Sable, Taurus, Tempo, Topaz (VIN 1 Taurus models are Flexible Fuel)	
3.8L V-6	3, 4, C, R	CFI, EFI, SFI	Capri, Continental, Cougar, LTD, Marquis, Mustang, Sable, T-Bird,Taurus	
4.6L V-8	W, V	SEFI	Crown Victoria, Grand Marquis, Mark VII, Town Car	
5.0L V-8	F, M, E, T, D, 4	SEFI	Capri, Continental, Cougar, Crown Victoria, Grand Marquis, Mark VII, Mustang, Mustang Cobra, T-Bird, Town Car	
1994				
1.9L I-4	J	SFI	Escort, Topaz, Tracer	EEC-IV
2.0L I-4	A	SFI	Probe	
3.0L V-6	1, U, Y	SFI	Sable, Taurus, Tempo (VIN 1 Taurus models are Flexible Fuel)	
3.8L V-6 3.8L V-6 SC	4 R	SFI	Continental, Cougar, Sable, Taurus, T-Bird	
4.6L V-8	W, V	SFI	Crown Victoria, Grand Marquis, Mark VIII, Town Car	
5.0L V-8	T, D	SFI	Mustang, Mustang Cobra	
1995				
1.9L I-4	J	SFI	Escort, Tracer	EEC-IV
2.0L I-4	A, 3	SFI	Contour, Mystique, Probe	
2.5L V-6	L	SFI	Contour, Mystique	
3.0L V-6	1, U	SFI	Sable, Taurus (VIN 1 Taurus models are Flexible Fuel)	
3.0L V-6 SHO	Y			
3.8L V-6	4	SFI	Cougar, Sable, Taurus, T-Bird	
3.8L V-6 SC	R			

Engine	8th VIN Digit**	Fuel Systems (Carburetor Model)	Application/Special Notes	Computer System
		1995 (Cont)		
4.6L V8 DOHC	V	SFI	Mark VIII	EEC-IV
5.0L V-8 HO	T	SFI	Mustang	
5.0L V-8 SHP	D			

NOTES

*** Carburetor Model.** Carburetor model numbers are usually stamped on top of the carburetor, or on a metal tab attached to the carburetor. Consult your vehicle's repair manual for proper identification.

****VIN Number.** The VIN number(s) used in this column identify the vehicle's engine type. This number is the 8th digit of the VIN (Vehicle Identification Number). Consult your vehicle's repair manual for details.

Application Table Definitions. CFI = Central Fuel Injection; DOHC = Dual Overhead Cam; EFI = Electronic Fuel Injection; FBC = Feedback Carburetor; HSC = High Swirl Combustion; MFI = Multiport Fuel Injection; OHC = Overhead Cam; SC = Super Charged; SEFI = Sequential Electronic Fuel Injection; SFI = Sequential Fuel Injection; SHO = Super High Output

TRUCKS/VANS - Ford Computer System Tool Application Table

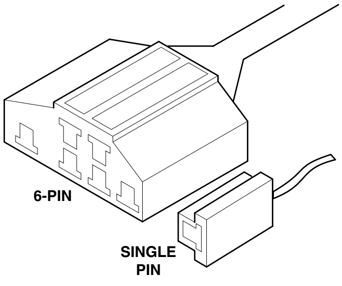
The following table lists the year and model of all the trucks and vans that are covered by the OBD2 & 1 Tool.

Engine	8th VIN Digit**	Fuel Systems (Carburetor Model)	Application/Special Notes	Computer System
		1983		
2.8L V-6	S	FBC (2150A)*	Bronco II and Ranger Pickup	EEC-IV
		1984		
2.8L V-6	S	FBC (2150A)*	Bronco II, Ranger Pickup	EEC-IV
4.9L I-6	Y	FBC (YFA)*	Bronco, E and F Series Trucks/Vans (8500 lb. GVW or less only)	
5.0L V-8	F	FBC (2150A)*		
5.8L V-8	G	FBC (2150A)*		
		1985-1990		
2.3L I-4 OHC	A	EFI	Aerostar, Bronco II, Ranger (excluding Diesel)	EEC-IV
2.9L V-6	T	EFI		
2.8L V-6	S	FBC (2150A)*	Bronco, E and F Series Trucks/Vans (8500 lb. GVW or less only)	
4.9L I-6	Y, 9	FBC (YFA)*, EFI		
5.0L V-8 5.0L V-8	F N	FBC (2150A)* EFI		
5.8L V-8	G	FBC (2150A)*	E and F Series Trucks/Vans (8500 lb. GVW or less only)	
7.3L V-8	M	Diesel		
7.5L V-8	G	EFI		
		1991-1994		
2.3L I-4 OHC	A	EFI, MFI	Ranger	EEC-IV
2.9L V-6	T	EFI		
3.0L V-6	U	EFI, SEFI, SFI	Aerostar, Ranger	

Engine	8th VIN Digit**	Fuel Systems (Carburetor Model)	Application/Special Notes	Computer System
1991-1994 (Cont)				
4.0L V-6	X	EFI, MFI	Aerostar, Explorer, Ranger	EEC-IV
4.9L I-6	Y, H	EFI, MFI, SFI	Bronco, E and F Series Trucks/Vans (8500 lb. GVW or less only)	
5.0L V-8	N	EFI, MFI, SFI		
5.8L V-8	H, R	EFI, MFI, SFI		
7.3L V-8	M	Diesel	E and F Series Trucks/Vans (Excludes 1994 diesel models)	
7.3L V-8	K	Turbo Diesel		
7.5L V-8	G	EFI, MFI		
1995				
3.0L V-6	U	SFI	Aerostar (Excludes Explorer, Ranger and Windstar)	EEC-IV
4.0L V-6	X	SFI		
4.9L I-6	Y	SFI	E and F series Trucks and Vans (Excludes Natural Gas equipped vehicles)	
5.0L V-8	N	SFI	Bronco, E and F series Trucks and Vans	
5.8L V-8	H, R	MFI		
7.5L V-8	G	MFI	E-350; F-250-350 (Excludes California); F-Super Duty (Excludes Diesel)	
NOTES				
* **Carburetor Model.** Carburetor model numbers are usually stamped on top of the carburetor, or on a metal tab attached to the carburetor. Consult your vehicle's repair manual for proper identification.				
****VIN Number.** The VIN number(s) used in this column identify the vehicle's engine type. This number is the 8th digit of the VIN (Vehicle Identification Number). Consult your vehicle's repair manual for details.				
Application Table Definitions. EFI = Electronic Fuel Injection; FBC = Feedback Carburetor; MFI = Multiport Fuel Injection; OHC = Overhead Cam; SC = Super Charged; SEFI = Sequential Electronic Fuel Injection; SFI = Sequential Fuel Injection				

TEST CONNECTORS

Ford vehicles are equipped with special test connectors that make it possible to connect specialized testing equipment that communicates with the vehicle's onboard computer. Ford's vehicle test connectors are usually dark in color (BLACK or GREY). Sometimes they have a plastic cover over them or are labeled EEC Test. The connectors can be found in the following general locations in the engine compartment:



EEC-IV TEST CONNECTOR

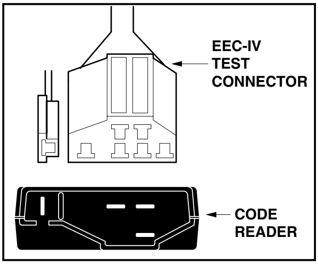
- Near the front corner (right or left).
- Near the fender well (right or left).
- Near the fire wall (right or left).

CONNECTING THE TOOL

The Tool's Ford Connector Cable Adaptor is designed to match the vehicle's computer DLC. When properly connected, the vehicle's DLC should match the pre-molded guides around the adaptor. Make sure the adaptor and the vehicle's DLC mate properly before applying force. Forcing the adaptor onto the DLC improperly may result in damage to the adaptor and/or Tool, and possible damage to the vehicle's computer system.

- Connect the Tool to BOTH.

1. large, six pin female connector with molded housing
2. small, single pin female connector



1988 and newer vehicles may have more than one similar connector for other systems (i.e. Anti-Lock Brakes). Only the connector with an extra single pin is the correct test connector for computer service codes use. If you have any questions about the correct connector, please refer to your vehicle's service manual for detailed information.

DIAGNOSTIC TROUBLE CODES (DTCs)

Diagnostic Trouble Codes, or Fault Codes, can be used to identify engine systems or components that are malfunctioning. The computer records codes for two types of problems:

- **"Hard" Diagnostic Trouble Codes**

  "Hard" DTCs represent problems which are happening now and cause the instrument panel Malfunction Indicator Lamp (MIL) or Check engine light to illuminate and remain on until the failure is repaired. A DTC is stored in the vehicle's computer memory for each fault detected. A Tool or Scanner can be used to retrieve DTCs that are stored in the vehicle's computer memory.

- **Intermittent/History DTCs**

  Intermittent/History DTCs are stored in the computer's memory for problems that occur intermittently, or for problems that happened in the past but are not currently present. Intermittent DTCs may cause the Malfunction Indicator light to flicker or stay on until the intermittent malfunction goes away. However, the corresponding fault code will be stored in memory as a history DTC. If the malfunction that caused the history DTC to set does not recur within a predetermined length of time (usually within 40-80 ignition key start cycles), the computer will automatically erase the related fault code from its memory.

CODE RETRIEVAL PROCEDURES

Overview of Ford Code Retrieval Process

Ford's computer self-diagnostic system is divided into four main sections:

1. "Key On Engine Off" (KOEO) Self-Test
2. "Continuous Memory" (CM) Self-Test
3. "Key On Engine Running" (KOER) Self-Test
4. Other EEC-IV System tests

These Self-Tests are specially designed to monitor and/or test the various components and circuits that are controlled by the vehicle's computer, and to save and/or transmit diagnostic test results to the Tool in the form of numerical fault codes.

The "Continuous Memory" Self-Test is designed to run continuously whenever the vehicle is normal operation. If a fault is detected by the "Continuous Memory" Self-Test, a fault code is saved in the vehicle's computer memory for later retrieval.

Ford’s On-Board Diagnostic Self-Tests are designed in such a way that in order to properly diagnose a problem, you must perform all the Self-Tests, in the proper sequence.

As described previously, some tests are designed to detect problems only when the vehicle is in normal operation. Some tests are designed to activate components and detect problems only with the Key On and Engine Off. Other tests are designed to activate components and test their operation only with the Key On and Engine Running. Do not take short cuts. If you fail to perform a test, or you perform a test out of sequence, you might miss a problem that is only detected during that part of the test.

Key On Engine Off (KOEO) Test

During the KOEO Self-Test, two groups of codes are retrieved by the Tool.

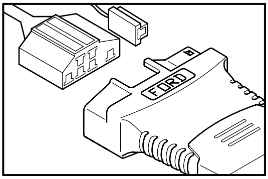
- *The first group of codes retrieved by the Tool are called "KOEO codes". A "KOEO" icon will show in the upper right corner of the LCD display to indicate that the code retrieved is a "KOEO" code.*
- *The second group of codes are called "Continuous Memory" codes. A "CM" icon will show in the upper right corner of the LCD display to indicate that the code retrieved is a "Continuous Memory" code.*

Check your vehicle thoroughly before performing any test. See BEFORE YOU BEGIN on page 17 for details.

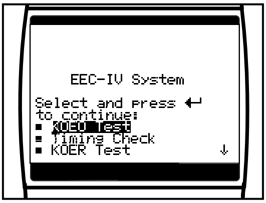
***ALWAYS** observe safety precautions whenever working on a vehicle. See Safety Precautions on page 3 for more information.*

1. Locate the vehicle's Data Link Connector (DLC). See TEST CONNECTORS on page 55 for connector location.

Some DLCs have a plastic cover that must be removed before connecting the Tool's cable connector.



2. Connect the Tool cable (with the Ford Connector Cable Adaptor attached) to the Tool, then connect the adaptor to the vehicle's DLC. Press the **POWER/LINK** button to turn the Tool ON, then press the **ENTER/FF** button to continue.
   - The Ford EEC-IV System menu displays.

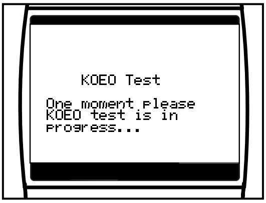


EEC-IV System

Select and press ↵ to continue:
■ KOEO Test
■ Timing Check
■ KOER Test ↓

Use the △ and ▽ buttons, as necessary, to make menu selections.

3. From the Ford EEC-IV System menu, highlight **KOEO Test**, then press the **ENTER/FF** button.
4. Start and warm-up engine to normal operating temperature. Press the **ENTER/FF** button to continue.
5. Turn ignition key OFF and wait for the on screen prompt. If you wish to exit the KOEO test at this time, press the **ENTER/FF** button.
6. If your vehicle is equipped with one of the following engine types, perform the added procedures described below:
   - **For 4.9L engines with standard transmission:** Press and hold the clutch until all codes are sent (steps 7 through 9).
   - **For 7.3L diesel engines:** Press and hold accelerator until all codes are sent (steps 7 through 9).
   - **For 2.3L turbo engines with octane switch:** Put switch in premium position.
7. Turn ignition ON. DO NOT start the engine. Press the **ENTER/FF** button to continue.
8. While codes are being retrieved, a "One moment please KOEO test is in progress..." message shows on the Tool's LCD display.



KOEO Test

One moment please
KOEO test is in
progress...

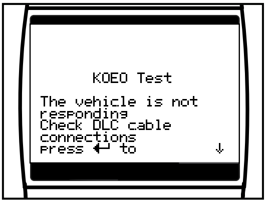
As soon as the ignition is turned "on", the vehicle's computer enters the Self-Test mode. Clicking sounds will be heard coming from the engine. This is normal. It indicates that the vehicle's computer is activating relays, solenoids, and other components to check their operation.

WARNING: On some vehicles equipped with an Electric Cooling Fan, the computer activates the cooling fan to check its operation. To avoid injury, keep hands or any part of your body a safe distance from the engine during this test.

- If the Tool fails to link to the vehicle's computer, a "Vehicle is not responding" message shows on the Tool's LCD display. Do the following:
  - Verify the ignition is ON.
  - Check the cable connections at the Tool and at the vehicle's DLC.
  - Turn the ignition OFF, wait 10 seconds, then turn back ON to reset the computer.

    BE SURE to perform the added procedures in step 6, if appropriate for your vehicle, BEFORE turning the ignition ON.

  - Press **ENTER/FF** button to continue.

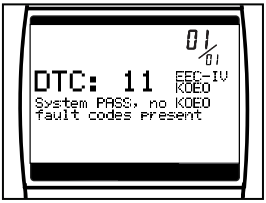


KOEO Test

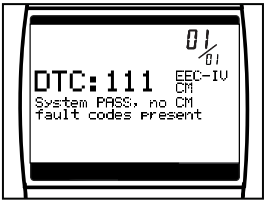
The vehicle is not
responding
Check DLC cable
connections
Press ↵ to ↓

9. If the Tool was able to link to the vehicle successfully a "Code retrieval was successful..." message shows temporarily on the Tool's LCD display followed by any retrieved DTCs.

- The Tool will display a code only if codes are present in the vehicle's computer memory.
- If no problems are found during the KOEO Self-Test, the computer sends a "PASS" code (code 11 or 111) to the Tool.
- If no Continuous Memory codes are present in the vehicle's computer memory, the Tool will display a "PASS" code (code 11 or 111).



01/01
DTC: 11 EEC-IV
KOEO
System PASS, no KOEO
fault codes present



01/01
DTC:111 EEC-IV
CM
System PASS, no CM
fault codes present

Most Ford EEC-IV vehicle computers up to 1991 use a two-digit code system. From 1991 to 1995 most use a three digit code system.

10. If more than one code was retrieved, press **DTC SCROLL** button, as necessary, to display additional codes one at a time.

In the case of long code definitions, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the △ and ▽ buttons, as necessary, to view the additional information.

11. Disconnect the Tool from the vehicle and turn the ignition key OFF.

12. To prolong battery life, the Tool automatically shuts "Off" after approximately three minutes of no button activity. The DTCs retrieved will remain in the Tool's memory, and may be viewed at any time. If the Tool's batteries are removed, or if the Tool is re-linked to a vehicle to retrieve codes, any prior codes in its memory are automatically cleared.

- See VIEWING DTCs IN THE TOOL'S MEMORY on page 13 to view DTCs stored in the Tool's memory.

13. Follow the testing and repair procedures outlined in the vehicle's service repair manual to correct "hard" DTCs. Codes should be addressed and eliminated in the order they were received, erasing (see Erasing DTCs on page 88) and retesting after each repair is done to be sure the fault was eliminated.

IMPORTANT: *DO NOT service "Continuous Memory" codes at this time. Before "Continuous Memory" codes can be serviced, both the KOEO and the KOER Self-Tests must pass (a PASS code 11 or 111 is obtained). After both of these tests have passed, erase the vehicle's computer memory (see Erasing DTCs on page 88), take the vehicle for a short drive, then repeat the KOEO Self-Test. If any Continuous Memory faults are present, service them all this time. Consult the vehicle's service repair manual for servicing Continuous Memory Fault Codes.*

The green, yellow and red LEDs are used (with the LCD display) as visual aids to make it easier to determine engine system conditions. See Servicing DTCs on page 86 for information on interpreting LEDs and servicing DTCs.

Do not proceed to the ignition timing check procedure or the KOER test until a PASS code (code 11 or 111) for KOEO test is obtained.

Engine Timing Check

Before performing the KOER Self-Test, the vehicle's Ignition Base Timing and the computer's ability to electronically control timing advance must be checked for proper operation. Maladjustment of ignition timing, or a problem in the advance circuit, might generate false fault codes when performing the KOER Self-Test that would cause the test to be invalid. Use the following procedures to check for proper ignition timing and to verify the computer's ability to electronically advance ignition timing.

The following "Timing Check" procedure is only applicable to 1992 and older vehicles (excluding diesel engines). For 1993 and newer vehicles, refer to the vehicle's service repair manual for procedures to check and adjust timing. DO NOT ATTEMPT TO ADJUST TIMING ON THESE VEHICLES WITHOUT MANUFACTURER'S SPECIFICATIONS AND PROCEDURES.

For 1992 and older vehicles, the Tool can be used in combination with a timing light to check ignition timing and the vehicle computers ability to advance ignition timing.

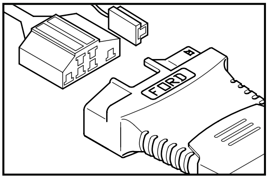
Check your vehicle thoroughly before performing any test. See BEFORE YOU BEGIN on page 17 for details.

***ALWAYS** observe safety precautions whenever working on a vehicle. Read and follow Safety Precautions on page 3 before performing this test.*

- A timing light is required to perform this test.
- The vehicle must pass the KOEO Test (page 57) before performing this test.

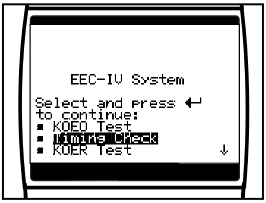
1. Locate the vehicle's Data Link Connector (DLC). See TEST CONNECTORS on page 55 for connector location.

Some DLCs have a plastic cover that must be removed before connecting the Tool's cable connector.



2. Connect the Tool cable (with the Ford Connector Cable Adaptor attached) to the Tool, then connect the adaptor to the vehicle's DLC. Press the **POWER/LINK** button to turn the Tool ON, then press **ENTER/FF** button to continue.
   - The Ford EEC-IV System menu displays.

Use the △ and ▽ buttons, as necessary, to make menu selections.

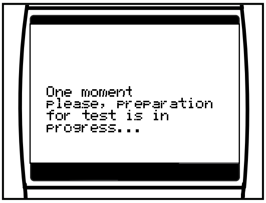


EEC-IV System

Select and press ↵
to continue:
▪ KOEO Test
▪ Timing Check
▪ KOER Test ↓

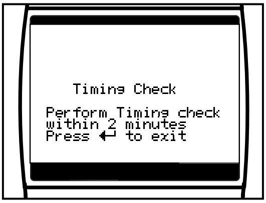
3. From the Ford EEC-IV System menu, highlight **Timing Check**, then press the **ENTER/FF** button.
4. Start and warm-up engine to normal operating temperature. Press the **ENTER/FF** button to continue.
5. Turn ignition key OFF and wait for the on screen prompt. If you wish to exit the Timing Check procedure at this time, press the **ENTER/FF** button.
6. When instructed by the message on the Tool's display, start the engine and press the **ENTER/FF** button.

- A "One moment please preparation for test is in progress: message shows temporarily on the Tool's LCD display, followed by the message "Perform Timing Check within two minutes."



```
One moment
please, preparation
for test is in
progress...
```

7. When "Perform Timing Check within 2 minutes" displays, perform the Timing Check as follows:
   - The vehicle's computer is programmed to advance ignition timing 20° (±3°) above the vehicle's "base timing" value, and to freeze this setting for two minutes from the time the "Perform Timing Check within 2 minutes" message displays. This allows the user to check the computer's ability to advance ignition timing.



```
   Timing Check

Perform Timing check
within 2 minutes
Press ↵ to exit
```

   - Within this two-minute period, follow instructions in the vehicle's service repair manual to check the ignition timing with a timing light and ensure that it is 20° above the specified base timing value (±3°).

Example: If base timing specification is 10° BTDC, the acceptable timing light reading should be in the range of 27° to 33° BTDC.

Base-timing specifications can be found on the Vehicle Emission Control Information (VECI) decal. The decal is located under the hood or near the radiator. If the VECI decal is missing or damaged, refer to your vehicle's service repair manual for specifications.

8. If timing light readings are within the acceptable range:
   - Base timing and the vehicle computer's ability to advance timing are working properly.
   - Proceed to the KOER Self-Test below.
9. If timing light readings are not within the acceptable range:
   - Base timing may be out of adjustment, or the computer may have problems with the timing advance circuit.
   - Refer to the vehicle's service repair manual for procedures on adjusting and/or repairing ignition timing. Repairs to ignition timing must be made before proceeding to the KOER Test.

Key on Engine Running (KOER) Self-Test

IMPORTANT: *The KOEO Self-Test (page 57) must be performed first, and a "pass code" (code 11 or 111) must be obtained before performing the KOER Self-Test; otherwise, results of the KOER Self-Test may be invalid.*

Ignition timing and timing advance must be operating properly in order for the KOER Self-Test results to be considered valid. Perform an Engine Timing check (page 60) before performing the KOER Self-Test.

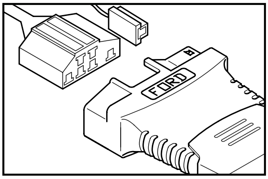
Check your vehicle thoroughly before performing any test. See BEFORE YOU BEGIN on page 17 for details.

***ALWAYS** observe safety precautions whenever working on a vehicle. Read and follow Safety Precautions on page 3 before performing this test.*

1. Locate the vehicle's Data Link Connector (DLC). See TEST CONNECTORS on page 55 for connector location.

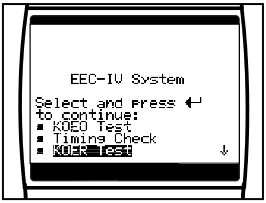
Some DLCs have a plastic cover that must be removed before connecting the Tool cable connector.

2. Connect the Tool cable (with the Ford Connector Cable Adaptor attached) to the Tool, then connect the adaptor to the vehicle's DLC. Press the **POWER/LINK** button to turn the Tool ON, then press the **ENTER/FF** ↵FF button to continue.
   - The Ford EEC-IV System menu displays.



Use the △ and ▽ buttons, as necessary, to make menu selections.

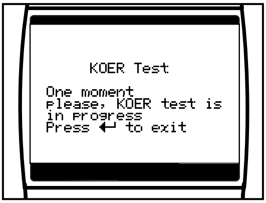
3. From the Ford EEC-IV System menu, highlight **KOER Test**, then press the **ENTER/FF** ↵FF button.



EEC-IV System

Select and press ↵
to continue:
▪ KOEO Test
▪ Timing Check
▪ KOER Test ↓

4. Start and warm-up engine to normal operating temperature. Press the **ENTER/FF** ↵FF button to continue.
5. Turn ignition key OFF and wait for the on screen prompt. If you wish to exit the KOER test at this time, press the **ENTER/FF** ↵FF button.
6. When instructed by the message on the Tool's display, start the engine and press the **ENTER/FF** ↵FF button to continue. A "One moment please KOER test is in progress..." message shows temporarily on the Tool's LCD display.

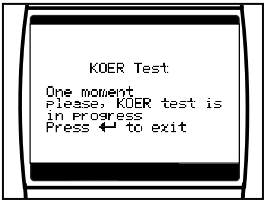


KOER Test

One moment
please, KOER test is
in progress
Press ↵ to exit

7. Perform the following procedures when prompted by the message on the Tool's display.
   - Turn the steering wheel 1/2 turn to right, hold for four seconds and release.
   - Press the brake pedal to the floor and then release it.
   - Cycle the Overdrive Switch (if equipped).

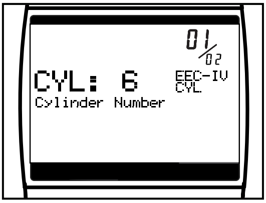
- Quickly press the accelerator pedal to the floor and then release it.



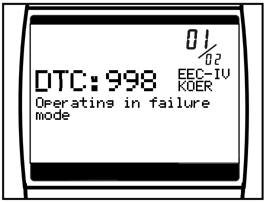
KOER Test

One moment please, KOER test is in progress
Press ↵ to exit

8. After the above procedures are performed a "One moment please KOER test is in progress..." message shows temporarily on the Tool's LCD display, followed by a "Retrieving codes" message.
9. The first code displayed by the Tool is the Cylinder Identification (ID) Code. The Cylinder ID code identifies the number of cylinders of the vehicle that is under test.



01/02
CYL: 6 EEC-IV CYL
Cylinder Number



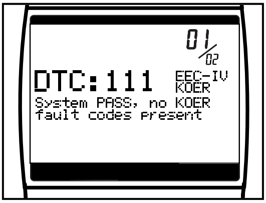
01/02
DTC:998 EEC-IV KOER
Operating in failure mode

*If code **98** or **998** displays instead of a Cylinder ID code, the vehicle is operating in "**Failure Mode**". The computer goes into failure mode when it detects a signal from a sensor that indicates the sensor has failed and is completely out of specifications. The computer substitutes a fixed signal value for the failed sensor to keep the vehicle running. Failure mode codes 98 or 998 are usually accompanied by one or more Diagnostic Trouble Codes that indicate the failed sensor. A vehicle operating in failure mode is operating at a minimal level, and the faults that are causing these Diagnostic Trouble Codes to set must be repaired as soon as possible.*

If the Tool fails to retrieve CYL ID and DTCs, its possible that the KOEO Test was not performed properly before proceeding to the KOER Test. Go back and perform the KOEO Test (page 57) until a PASS code is obtained.

Most Ford EEC-IV vehicle computers up to 1991 use a two-digit code system. From 1991 to 1995 most use a three-digit code system.

10. If no problems are found during the KOER Self-Test, the computer sends a "PASS code" (code 11 or 111) to the Tool. Code 11 or 111 indicates that all the relays and actuators and their related circuits that were tested during the KOER Self-Test are OK, and no faults were found.



01/02
DTC:111 EEC-IV KOER
System PASS, no KOER fault codes present

11. After the Tool retrieves all the KOER Self-Test DTCs, turn the engine off, and disconnect the Tool from the vehicle's test connectors. The DTCs retrieved are now stored in the Tool's memory.

- See VIEWING DTCs IN THE TOOL'S MEMORY on page 13 to view DTCs stored in the Tool's memory.

All retrieved DTCs will remain in the Tool's memory. If the KOER Test procedure is performed again, DTC's from a prior test will automatically clear and will be replaced by the most current DTCs retrieved.

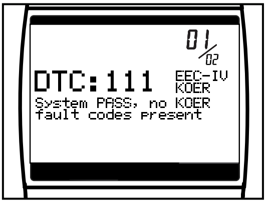
12. All KOER codes that are retrieved by the Tool during the KOER Self-Test represent problems that are present now (at the time the test is performed). The related vehicle problems that caused the codes to be sent must be repaired using the procedures described in the vehicle's repair manual.

The green, yellow and red LEDs are used (with the LCD display) as visual aids to make it easier to determine engine system conditions. See Servicing DTCs on page 86 for information on interpreting LEDs and servicing DTCs.

13. After all repairs have been completed, repeat the KOER Self-Test.

14. If a "pass code" (code 11 or 111) is received, it indicates that the repairs were successful and all the related systems are working properly.

15. If a "pass code" (code 111 or 111) is not received, the repair was unsuccessful. Consult the vehicle's service manual and recheck repair procedure.



01/02

DTC:111 EEC-IV KOER

System PASS, no KOER fault codes present

ADDITIONAL TESTS FOR EEC-IV SYSTEMS

These tests are additional, supplemental tests, and are not needed to retrieve Diagnostic Trouble Codes. Ford has included them to further assist the technician / do-it-yourselfer in the troubleshooting of vehicle problems.

Cylinder Balance Test (Vehicles equipped with Sequential Electronic Fuel Injected (SEFI) systems only)

The Cylinder Balance Test assists in finding a weak or noncontributing cylinder. The computer shuts off fuel (cuts off power to injectors) to each cylinder, in sequence, and monitors for RPM changes (drop). Based on this information, the computer determines if all the cylinders are contributing power equally (for proper engine operation), or if some cylinders are only contributing partially or not contributing at all.

SEFI Introduction

Sequential Electronic Fuel Injection (SEFI) belongs to a family of fuel injection systems called "Multi-port/Multipoint Fuel Injection". Multi-port (MFI) fuel injection systems contain one fuel injector per cylinder, and the vehicle's computer electronically controls their operation. On some multi-port fuel injection systems, the injectors all fire at the same time and at every engine revolution. On other systems the injectors fire in groups and/or at every other engine revolution. What distinguishes Sequential Electronic Fuel Injection systems from other multi-port fuel injection systems is that each injector is independently energized and fires sequentially one after the other in the proper firing order. This gives the vehicle's computer more control to cut the fuel to one injector at a time (this can't be accomplished on the other systems because they fire in groups of two ore more injectors).

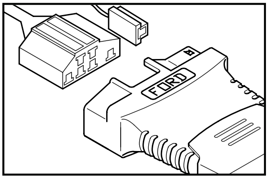
Cylinder Balance Test Procedure

Check your vehicle thoroughly before performing any test. See BEFORE YOU BEGIN on page 17 for details.

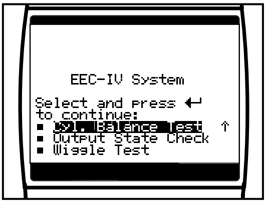
*ALWAYS observe safety precautions whenever working on a vehicle. Read and follow **Safety Precautions** on page 3 before performing this test.*

1. Locate the vehicle's Data Link Connector (DLC). See TEST CONNECTORS on page 55 for connector location.

Some DLCs have a plastic cover that must be removed before connecting the Tool cable connector.



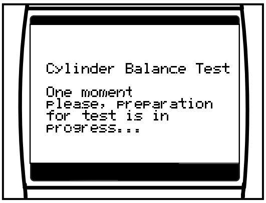
2. Connect the Tool cable (with the Ford Connector Cable Adaptor attached) to the Tool, then connect the adaptor to the vehicle's DLC. Press the **POWER/LINK** button to turn the Tool ON, then press the **ENTER/FF** button to continue.
   - The Ford EEC-IV System menu displays.
3. From the Ford EEC-IV System menu, highlight **Cylinder Balance Test**, then press the **ENTER/FF** button.
4. Start and warm-up engine to normal operating temperature. Press the **ENTER/FF** button to continue.



EEC-IV System

Select and press ↵ to continue:

5. Turn ignition key OFF and wait for the on screen prompt. If you wish to exit the Cylinder Balance test at this time, press the **ENTER/FF** button.
6. When instructed by the message on the Tool's display, start the engine and press the ENTER button. A "One moment please preparation for test is in progress..." message shows temporarily on the Tool's LCD display.

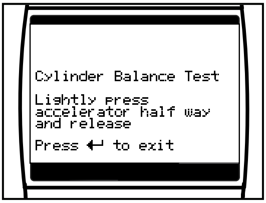


Cylinder Balance Test

One moment please, preparation for test is in progress...

7. When prompted by the message on the Tool's display, lightly press the accelerator pedal half way and release to activate the cylinder balance test.

For 1986 models ONLY: *Fully press accelerator once and release.*



Cylinder Balance Test

Lightly press accelerator half way and release

Press ↵ to exit

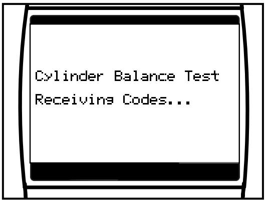
- The computer is now in Cylinder Balance Test mode, and will start cutting fuel to each cylinder in sequence to determine if all the cylinders are contributing equally. **It may take up to five minutes before the test results are transmitted to the Tool.**

8. If the vehicle's computer fails to enter Cylinder Balance Test mode, do the following:

- Lightly press the accelerator pedal again as described in step 7 above.
- Check your vehicle's fuel injection system and make sure that it is a Sequential Electronic Fuel Injection (SEFI) system. This test is applicable only to SEFI or SFI systems.

9. After the Cylinder Balance Test is completed, the test results are sent to the Tool.

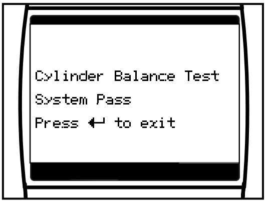
- The computer compares the power contribution that each cylinder makes to engine operation.



Cylinder Balance Test

Receiving Codes...

10. If all cylinders are contributing equally, the computer determines that power distribution is normal and a “System Pass” message will display.



Cylinder Balance Test

System Pass

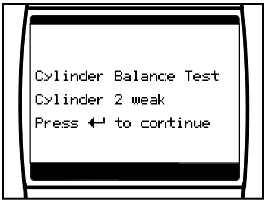
Press ↵ to exit

If the computer detects a problem with a cylinder(s) when performing the initial Cylinder Balance Test, it needs to repeat the test two more times to properly determine which cylinder or cylinders are malfunctioning. If this is the case, the Tool will display the “Lightly press the accelerator half way and release” message again instead of the “System Pass”. Proceed to step 11.

11. If a cylinder is not contributing at the same level as the other cylinders, the computer prompts you to repeat the test two more times by displaying the “Lightly press the accelerator half way and release” message again. Each time the message displays, perform the procedures as instructed.

12. After the repeat Cylinder Balance tests have completed, the computer will identify which cylinder (or cylinders) are not contributing equally, and will send this information to the Tool's LCD display.

- If any weak cylinders are identified, consult the vehicle's service repair manual to perform further testing and/or repairs.



```
Cylinder Balance Test
Cylinder 2 weak
Press ↵ to continue
```

Relay and Solenoid Test (Output State Check)

The "Output State Check" is a special program in the vehicle's computer that allows the user to energize (turn ON) and de-energize (turn OFF), on command, most of the actuators (relays and solenoids) that are controlled by the computer.

Use this test to check computer output voltages and relay/solenoid operation.

The fuel injectors and fuel pump are not energized during this test. Check your vehicle thoroughly before performing any test. See BEFORE YOU BEGIN on page 17 for details.

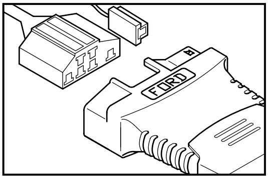
***ALWAYS** observe safety precautions whenever working on a vehicle.*

Read and follow Safety Precautions on page 3 before performing this test.

1. Locate the vehicle's Data Link Connector (DLC). See TEST CONNECTORS on page 55 for connector location.

Some DLCS have a plastic cover that must be removed before connecting the Tool cable connector.

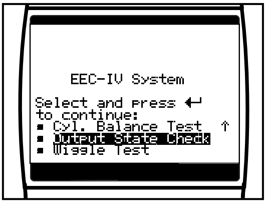
2. Connect the Tool cable (with the Ford Connector Cable Adaptor attached) to the Tool, then connect the adaptor to the vehicle's DLC. Press the **POWER/LINK** button to turn the Tool ON, then press the **ENTER/FF** button to continue.



- The Ford EEC-IV System menu displays.

Use the △ and ▽ buttons, as necessary, to make menu selections.

3. From the Ford EEC-IV System menu, highlight **Output State Check**, then press the **ENTER/FF** button.



```
EEC-IV System
Select and press ↵
to continue:
▪ Cyl. Balance Test  ↑
▪ Output State Check
▪ Wiggle Test
```

4. Start and warm-up engine to normal operating temperature. Press the **ENTER/FF** button to continue.

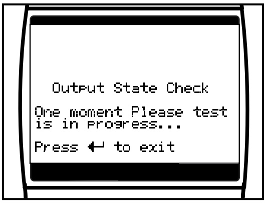
5. Turn ignition key OFF and wait for the on screen prompt. If you wish to exit the Output State Check at this time, press the **ENTER/FF** button.

6. If your vehicle is equipped with one of the following engine types, perform the added procedures described below:

   - **For 4.9L engines with standard transmission:** Press and hold the clutch until the "Output State Check Active" screen displays.
   - **For 7.3L diesel engines:** Press and hold accelerator until the "Output State Check Active" screen displays
   - **For 2.3L turbo engines with octane switch:** Put switch in premium position.

7. Turn ignition ON. DO NOT start the engine. Press the **ENTER/FF** button to continue.

8. A "One moment please test is in progress..." message shows on the Tool's LCD display.

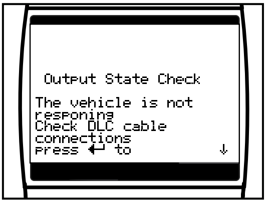


```
Output State Check
One moment Please test
is in progress...
Press ↵ to exit
```

As soon as the ignition is turned "on", the vehicle's computer enters the Self-Test mode. Clicking sounds will be heard coming from the engine. This is normal.

WARNING: On some vehicles equipped with an Electric Cooling Fan, the computer activates the cooling fan to check its operation. To avoid injury, keep hands or any part of your body a safe distance from engine during the test.

- If the Tool fails to link to the vehicle's computer, a "Vehicle is not responding" message shows on the Tool's LCD display. Do the following:
  - Verify the ignition is ON.
  - Check the cable connections at the Code Reader and at the vehicle's DLC.



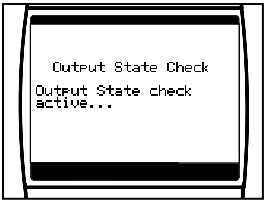
```
Output State Check
The vehicle is not
responing
Check DLC cable
connections
press ↵ to        ↓
```

  - Turn the ignition OFF, wait 10 seconds, then turn back ON to reset the computer.

BE SURE to perform the added procedures in step 6, if appropriate for your vehicle, BEFORE turning the ignition ON.

  - Press **ENTER/FF** button to continue.

9. If the Tool was able to link to the vehicle successfully an "Output State check active..." message shows temporarily on the Tool's LCD display. This message is followed by a display that instructs you how to perform the test.



Output State Check

Output State check active...

10. Press the accelerator pedal once, then release. This activates the Output State Check and energizes most of the actuators (relays and solenoids) that are controlled by the vehicle's computer.

If your vehicle is equipped with an Integrated Vehicle Speed Control, disconnect the vacuum supply hose from the speed control servo before pressing the accelerator. Reconnect vacuum hose after test.

11. To de-energize the actuators, press the accelerator pedal again and release, the actuators are now de-energized.
12. The procedure can be repeated as many times as desired by pressing and releasing the accelerator pedal to energize and de-energize the actuators.
13. Consult the vehicle's service repair manual for a list of actuators (solenoids and relays) controlled by the computer that apply to the vehicle under test, and which actuators should energize and de-energize when performing the Output State Check. All applicable actuators should be on when energized and off when de-energized.
14. If an actuator is not responding to the Output State Check, follow the procedures described in the vehicle's service manual to check computer actuator output circuit voltages and/or grounds.
15. The Output State Check will stay active as long as desired. To quit the Output State Check, turn the ignition OFF and disconnect the Tool from the vehicle.

Wiggle Test

Since any DTC's from Wiggle Test results are saved in Continuous Memory, it is suggested that you clear any DTC's in Continuous Memory before performing Wiggle Test (see Erasing DTCs on page 88 for procedures). This way you start with a clean slate, and any faults detected during the procedure will be related to that particular circuit tested.

Use this test to check for intermittent faults in some circuits.

Circuits Tested:

1984 & Newer - Air Charge Temp Sensor (ACT), Barometer Pressure Sensor (BP), Engine Coolant Temp Sensor (ECT), Exhaust Gas Oxygen Sensor (EGO), EGR Valve Position Sensor (EVP), Manifold Absolute Pressure (MAP), Throttle Position Sensor (TP), Vane Air Temp Sensor (VAT)

1985 & Newer - Vane Air Flow Sensor (VAF)

1986 & Newer - Pressure Feedback EGR Sensor (PFE)

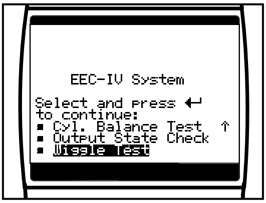
1990 & Newer - Exhaust Gas Oxygen Sensor (EGO), Ignition Diagnostic Monitor (IDM) (DIS or Dual Plug DIS only), Idle Tracking Switch (ITS), Mass Air Flow Sensor (MAF)

***ALWAYS** observe safety precautions whenever working on a vehicle. Read and follow Safety Precautions on page 3 before performing this test.*

1. Locate the vehicle's Data Link Connector (DLC). See TEST CONNECTORS on page 55 for connector location.

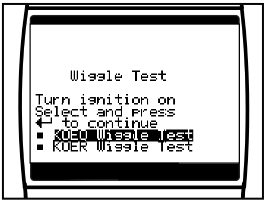
Some DLCs have a plastic cover that must be removed before connecting the Tool cable connector.

2. Connect the Tool cable (with the Ford Connector Cable Adaptor attached) to the Tool, then connect the adaptor to the vehicle's DLC. Press the **POWER/LINK** button to turn the Tool ON, then press the **ENTER/FF** button to continue.
3. From the Ford EEC-IV System menu, highlight **Wiggle Test**, then press the **ENTER/FF** button.
4. Start and warm-up engine to normal operating temperature. Press the **ENTER/FF** button to continue.



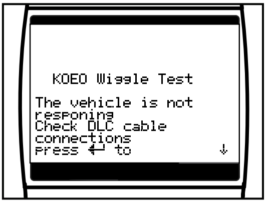
```
EEC-IV System
Select and press ↵
to continue:
▪ Cyl. Balance Test  ↑
▪ Output State Check
▪ Wiggle Test
```

5. Turn ignition key OFF and wait for the on screen prompt. If you wish to exit the KOEO test at this time, press the **ENTER/FF** button.
6. Select the desired Wiggle Test from the menu displayed.
   - To perform the KOEO Wiggle Test:
     - Highlight **KOEO Wiggle Test**.
     - Turn ignition ON. DO NOT START THE ENGINE.
     - Press the **ENTER/FF** button to continue.



```
Wiggle Test
Turn ignition on
Select and press
↵ to continue
▪ KOEO Wiggle Test
▪ KOER Wiggle Test
```

   - To perform the KOER Wiggle Test:
     - Highlight **KOER Wiggle Test**.
     - Turn the ignition ON and start the engine.
     - Press the **ENTER/FF** button to continue.
7. A "One moment please test is in progress" message shows temporarily on the Tool's LCD display.
   - If the Tool fails to link to the vehicle's computer, a "Vehicle is not responding" message shows on the Tool's LCD display. Do the following:



```
KOEO Wiggle Test
The vehicle is not
responing
Check DLC cable
connections
press ↵ to         ↓
```

For KOEO Wiggle Test:

- Verify the ignition is ON.
- Turn the ignition OFF, wait 10 seconds, then turn back ON to reset the computer. Press the **ENTER/FF** ↵ button to continue.

For KOER Wiggle Test:

- Turn the engine OFF, wait 10 seconds, then turn back ON. Press the **ENTER/FF** ↵ button to continue.

BE SURE to perform the added procedures in step 6, if appropriate for your vehicle, BEFORE turning the ignition ON.

- Press **ENTER/FF** ↵ button to continue.

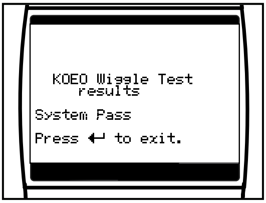
8. If the Tool was able to link to the vehicle successfully, a "Wiggle test is active..." message shows temporarily on the Tool's LCD display. This is followed by a message instructing you how to perform the test.

- Press the **ENTER/FF** ↵ button if you wish to exit the Wiggle Test at this time.

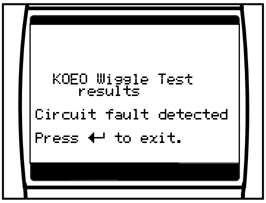
9. Wiggle, tap and move the suspected sensor or wiring.

- If no faults are detected when performing the Wiggle Test, a "System Pass" message displays.
- If a fault is detected when performing the Wiggle Test, a "Circuit Fault detected" message displays.

If the Wiggle Test detects any problems, the related DTC will be stored by the computer in "Continuous Memory". To view any Wiggle Test DTC's you must perform the KOEO Test. See page 57 for KOEO Test procedures.



```
  KOEO Wiggle Test
     results
System Pass
Press ↵ to exit.
```



```
  KOEO Wiggle Test
     results
Circuit fault detected
Press ↵ to exit.
```

10. Follow the procedures in the vehicle's service repair manual to perform troubleshooting and repairs for Wiggle Test results.

11. The Wiggle Test will stay active as long as desired. To quit the Wiggle Test, turn the ignition OFF and disconnect the Tool from the vehicle.

YOUR VEHICLE'S COMPUTER SYSTEM

Today's vehicles are equipped with computer self-testing abilities that can locate problems in your vehicle and store them as Diagnostic Trouble Codes (DTC's) in the vehicle's onboard computer. The Tool allows you access to the computer's memory and retrieves the DTC's.

VEHICLES COVERED

This Tool may be used to retrieve engine service codes from most General Motors (GM) domestic cars and trucks (EXCEPT Geo, Nova, Saturn and Sprint).

Model Year	Make	Model
1982-93	Buick	Century, Electra, Electra Wagon, Estate Wagon, Le Sabre, Le Sabre Wagon, Park Avenue, Reatta, Regal, Grand National, Riviera, Roadmaster, Skyhawk, Skylark, Somerset
	Cadillac	De Ville, El Dorado, Fleetwood, Seville
	Chevrolet	Beretta, Camaro, Caprice, Cavalier, Celebrity, Chevette, Citation, Corsica, Corvette, El Camino, Impala, Lumina, Monte Carlo
	Oldsmobile	Achieva, Calais, Custom Cruiser, Cutlass Calais, Ciera, Cutlass Cruiser, Cruiser Wagon, Cutlass Supreme, Supreme Classic, Delta 88, Eighty-eight, Firenze, Ninety-eight, Omega, Toronado, Touring Sedan, Trofeo
	Pontiac	6000, 6000 STE, Bonneville, Fiero, Firebird, Grand Am, Grand Prix, J 2000, Lemans, J Parisienne, Phoenix, Safari, Safari Wagon, Sunbird, T 1000
	Trucks and Vans	All one ton capacity or less with gas engines
1994	Buick	Roadmaster 5.7 liter
	Chevrolet	Camaro 3.4 liter/5.7 liter, Caprice 5.7 liter, Caprice 5.7 liter, Cavalier 3.1 liter, Lumina 3.1 liter
	Pontiac	Firebird 3.4 liter/5.7 liter, Sunbird 2.0 liter/ 3.1 liter
	Trucks and Vans	All one ton capacity or less with gas engines
1995	Chevrolet	Caprice 4.3 liter
	Trucks and Vans	All one ton capacity or less with gas engines (EXCEPT S/T Series vehicles)

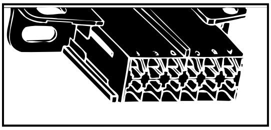
In addition to the list on the previous page, this Tool IS ALSO COMPATIBLE with OBD1 GM models that are equipped with "Climate Control Computers".

For 1994 and 1995 vehicles, only the models listed above are compatible with the Tool.

ABOUT THE TOOL

The Tool is a device that connects to your vehicle's Data Link Connector to retrieve any Diagnostic Trouble Codes that are stored in the vehicle's on-board computer.

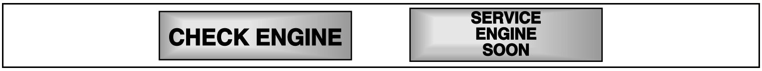
DATA LINK CONNECTOR (DLC)



Your vehicle test connector is known as the Assembly Line Data Link (ALDL) connector, Assembly Line Communication Link (ALCL) Connector or the Data Link Connector (DLC). The GM DLC connector contains 12 pins and is usually black in color. On most GM vehicles, the connector is found under the left side of the dashboard.

MALFUNCTION INDICATOR LIGHT (MIL)

Your vehicle's instrument panel has a Malfunction Indicator Light (MIL) also called the "Check Engine" or "Service Engine soon" light. The MIL is an indicator to warn the vehicle operator of a problem in the computer control system.



If your instrument panel indicator lights do not come on when you turn on the ignition, please refer to your vehicle's service manual. You may have problems in the vehicle's circuitry.

DIAGNOSTIC TROUBLE CODES (DTC's)

The service codes are also called "fault codes", "Diagnostic Trouble Codes" (DTC's) or "trouble codes". These codes can be used to identify systems or components that are malfunctioning. The computer records codes for two types of problems:

- **"Hard" Diagnostic Trouble Codes**

  "Hard" DTCs represent problems that are occurring now and cause the instrument panel Malfunction Indicator Lamp (MIL) or Check Engine light to illuminate and remain on until the failure is repaired. A DTC is stored in the vehicle's computer memory for each fault detected. A Tool or Scanner can be used to retrieve DTCs that are stored in the vehicle's computer memory.

- **Intermittent/History DTCs**

  Intermittent/History DTCs are stored in the computer's memory for problems that occur intermittently, or for problems that happened in the past but are not currently present. Intermittent DTCs may cause the Malfunction Indicator light to flicker or stay on until the intermittent malfunction goes away. However, the corresponding fault code will be stored in memory as a history DTC. If the malfunction that caused the history DTC to set does not recur within a predetermined length of time (usually within 40-80 ignition key start cycles), the computer will automatically erase the related fault code from its memory.

CODE RETRIEVAL PROCEDURE

Retrieving and using Diagnostic Trouble Codes (DTCs) for troubleshooting vehicle operation is only one part of an overall diagnostic strategy.

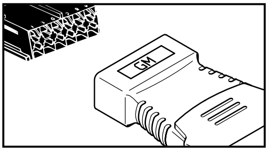
Never replace a part based only on the DTC definition. Each DTC has a set of testing procedures, instructions and flow charts that must be followed to confirm the location of the problem. This information is found in the vehicle's service manual. Always refer to the vehicle's service manual for detailed testing instructions.

Check your vehicle thoroughly before performing any test. See BEFORE YOU BEGIN on page 17 for details.

***ALWAYS** observe safety precautions whenever working on a vehicle. See Safety Precautions on page 3 for more information.*

1. Locate the vehicle's Data Link Connector (DLC). See DATA LINK CONNECTOR (DLC) on page 74 for connector location.

Some DLCs have a plastic cover that must be removed before connecting the Tool's cable connector.

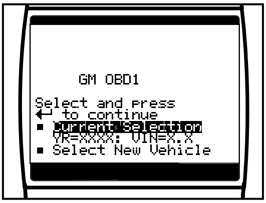


2. Connect the Tool cable (with the GM Connector Cable Adaptor attached) to the Tool, then connect the adaptor to the vehicle's DLC. Press the **POWER/LINK** button to turn the Tool ON, then press the **ENTER/FF** button to continue.
3. Select the model year of the vehicle from which you wish to retrieve codes:

If a previous vehicle selection is currently saved in the Tool's memory, the "Current Selection/Select New Vehicle" menu displays. If no previous vehicle selection is stored in the Tool's memory, "Select New Vehicle" displays.

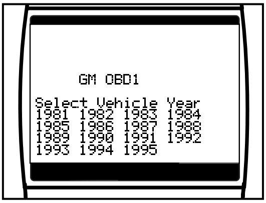
Use the ▲ and ▼ buttons, as necessary, to make menu selections.

- To retrieve DTCs from the vehicle selection currently in the Tool’s memory:
  - From the “Current Selection/ Select New Vehicle” screen, highlight **Current Selection**, turn ignition key ON (DO NOT start engine) and press the **ENTER/FF** ↵FF button.
  - Proceed to step 5 to continue.



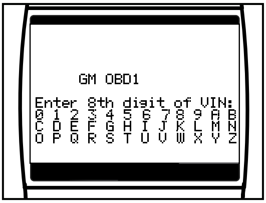
```
    GM OBD1
Select and press
↵ to continue
■ Current Selection
  YR=XXXX: VIN=X.X
■ Select New Vehicle
```

- To retrieve DTCs from a new vehicle:
  - From the “Current Selection/ Select New Vehicle” screen, highlight **Select New Vehicle** and press the **ENTER/FF** ↵FF button; the “Select Vehicle Year” menu displays.



```
    GM OBD1
Select Vehicle Year
1981 1982 1983 1984
1985 1986 1987 1988
1989 1990 1991 1992
1993 1994 1995
```

  - Highlight the desired year, then press the **ENTER/FF** ↵FF button; the “Enter the 8th digit of VIN” menu displays.
  - Highlight the 8th digit of the vehicle’s VIN, then press the **ENTER/FF** ↵FF button.



```
    GM OBD1
Enter 8th digit of VIN:
0 1 2 3 4 5 6 7 8 9 A B
C D E F G H I J K L M N
O P Q R S T U V W X Y Z
```

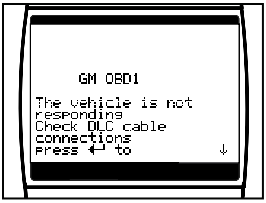
*If the “Enter 4th VIN Digit” screen displays (not applicable to all vehicles), highlight the 4th digit of the vehicle’s VIN, then press the **ENTER/FF** ↵FF button.*

  - The “Current Selection/Select New Vehicle” screen displays for your confirmation.
  - If the information shown in the “Current Selection” field is correct, highlight **Current Selection**, turn ignition key ON (DO NOT start engine) and press the **ENTER/FF** ↵FF button. Proceed to step 4 to continue.

*If the year shown is not correct, highlight **Select New Vehicle** and press the **ENTER/FF** ↵FF button to return to the “Select Vehicle Year” menu to make your corrections.*

4. When the Tool is in the process of retrieving codes, a "One moment please..." message shows on the Tool’s LCD display.

- If the Tool fails to link to the vehicle's computer, a "Vehicle is not responding" message shows on the Tool's LCD display. Do the following:

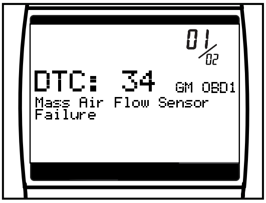


```
GM OBD1
The vehicle is not
responding
Check DLC cable
connections
press ↵ to          ↓
```

- Verify the ignition is ON.
- Check the cable connections at the Tool and at the vehicle's DLC.
- Turn the ignition OFF, wait 10-12 seconds, then turn back ON to reset the computer.
- Press the **ENTER/FF** button and repeat steps 4 and 5 as necessary.

5. If the Tool was able to link to the vehicle successfully, a "Code retrieval was successful..." message shows temporarily on the Tool's LCD display, followed by any retrieved DTCs.

- The Tool will display a code only of codes are present in the vehicle's computer memory. If no codes are present, a "No DTC's are presently stored in the vehicle's computer" is displayed.



```
                01/02
DTC: 34      GM OBD1
Mass Air Flow Sensor
Failure
```

6. If more than one code was retrieved, press the **DTC SCROLL** button, as necessary, to display additional codes one at a time.

In the case of long code definitions, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the △ *and* ▽ *buttons, as necessary, to view the additional information.*

Code 12 will always be present and it has one of the following meanings:

- If code 12 is the only DTC retrieved and your vehicle "STARTS OK" then code 12 indicates system "PASS" and all computer control systems are functioning properly.
- If code 12 is present and your vehicle "DOES NOT START", then it may indicate a problem with the ignition control system.

7. Disconnect the Tool from the vehicle and turn the ignition key OFF.

8. To prolong battery life, the Tool automatically shuts "Off" after approximately three minutes with no button activity. The DTCs retrieved will remain in the Tool's memory, and may be viewed at any time. If the Tool's batteries are removed, or if the Tool is re-linked to a vehicle to retrieve codes, any prior codes in its memory are automatically cleared.

- See VIEWING DTCs IN THE TOOL'S MEMORY on page 13 to view DTCs stored in the Tool's memory.

9. Follow the testing and repair procedures outlined in the vehicle's service repair manual to correct "hard" DTCs. Codes should be addressed and eliminated in the order they were received, erasing (see Erasing DTCs on page 88) and retesting after each repair is made to be sure the fault was eliminated. Code 12 will appear alone when no other fault codes are present.

- It may be necessary to test drive the vehicle to reset "hard" fault codes 13, 15, 24, 44, 45, and 55 after they have been erased.

Whenever codes 51, 52, 54, or 55 are displayed with other codes, troubleshoot and eliminate the "50 Series" codes first, then proceed with the lower numbered codes.

The green, yellow and red LEDs are used (with the LCD display) as visual aids to make it easier to determine engine system conditions. See Servicing DTCs on page 86 for information on interpreting LEDs and servicing DTCs.

ON-BOARD VEHICLE DIAGNOSTICS (OBD1)

- Beginning in 1988, California's Air Resources Board (CARB), and later, the Federal Government's Environmental Protection Agency (EPA), **required** vehicle manufacturers to include a self diagnostic program capable of identifying an emissions-related fault via the vehicles On-Board Computers (some manufacturers used OBD before it was required). The first generation of Onboard Diagnostics came to be known as **OBD I**.
- OBD I is a set of self-testing or self-diagnosing instructions that are programmed into the vehicle's on-board computer.
- The program is specifically designed to detect failures in the sensors, actuators, switches and wiring of the various vehicle emissions-related systems (fuel injection system, ignition system, EGR system, catalytic converter, etc.). If the computer detects a failure in any one of these components or systems, it alerts the driver by illuminating the "Check Engine" light on the dash.
- The computer also assigns a numeric code (OBD I systems utilized a 2 or 3 digit code) for each specific problem that it detects, and stores these codes in it's memory for later retrieval. The codes can be retrieved from the computer's memory with the use of a device called a "Tool" or a "Scan Tool".

*With the exception of some 1994 and 1995 vehicles, most vehicles from about 1982 to 1995 are equipped with **OBD I** systems.*

VEHICLES COVERED

The following tables identify the Toyota and Lexus OBD1 vehicles that are covered by the Enhanced OBD2 & 1 Tool.

DLC 1 Cars

Year	Model	Eng. Size	Eng. Code	DOHC/ SOHC	Other	DLC Type
1995	Camry Coupe	2.2L	5S-FE	DOHC		1
1992	Camry Sedan	2.2L	5S-FE	DOHC		1
1992	Camry Sedan	3.0L	2VZ-FE	DOHC		1
1993	Camry Sedan	3.0L	3VZ-FE	DOHC		1
1993	Camry Sedan	2.2L	5S-FE	DOHC		1
1994	Camry Sedan	2.2L	5S-FE	DOHC		1
1993	Celica	2.0L	3S-GTE	DOHC	Turbo	1
1993	Celica	2.2L	5S-FE	DOHC		1
1994	Celica	1.8L	7A-FE	DOHC		1
1994	Celica	2.2L	5S-FE	DOHC		1

Year	Model	Eng. Size	Eng. Code	DOHC/ SOHC	Other	DLC Type
1992	Celica Convertible	2.2L	5S-FE	DOHC	A/T	1
1992	Celica Coupe	1.6L	4A-FE	DOHC		1
1992	Celica Coupe	2.2L	5S-FE	DOHC	A/T	1
1993	Celica Coupe	1.6L	4A-FE	DOHC		1
1995	Celica Coupe	1.8L	7A-FE	DOHC		1
1992	Celica Liftback	2.0L	3S-GTE	DOHC	Turbo	1
1992	Celica Liftback	2.2L	5S-FE	DOHC		1
1993	Corolla Sedan	1.6L	4A-FE	DOHC		1
1993	Corolla Sedan	1.8L	7A-FE	DOHC		1
1994	Corolla Sedan	1.6L	4A-FE	DOHC		1
1994	Corolla Sedan	1.8L	7A-FE	DOHC		1
1993	ES-300	3.0L	3VZ-FE	DOHC		1
1993	GS-300	3.0L	2JZ-GE	DOHC		1
1993	LS-400	4.0L	1UZ-FE	DOHC		1
1993	MR2	2.0L	3S-GTE	DOHC	Turbo	1
1993	MR2	2.2L	5S-FE	DOHC		1
1994	MR2	2.0L	3S-GTE	DOHC	Turbo	1
1994	MR2	2.2L	5S-FE	DOHC		1
1994	Paseo	1.5L	5E-FE	DOHC		1
1995	Paseo	1.5L	5E-FE	DOHC		1
1995	SC-300	3.0L	2JZ-GE	DOHC		1
1991	Supra	3.0L	7M-GTE	DOHC	Turbo	1
1991	Supra	3.0L	7M-GE	DOHC		1
1992	Supra	3.0L	7M-GTE	DOHC	Turbo	1
1992	Supra	3.0L	7M-GE	DOHC		1
1993	Tercel Sedan	1.5L	3E-E	SOHC		1
1994	Tercel Sedan	1.5L	3E	SOHC		1

DLC 2 Cars

Year	Model	Eng. Size	Eng. Code	DOHC/ SOHC	Other	DLC Type
1989	Cressida	3.0L	7M-GE	DOHC		2
1990	Cressida	3.0L	7M-GE	DOHC		2
1991	Cressida	3.0L	7M-GE	DOHC		2
1992	Cressida	3.0L	7M-GE	DOHC		2
1993	Camry	3.0L	3VZ-FE	DOHC		2

Year	Model	Eng. Size	Eng. Code	DOHC/ SOHC	Other	DLC Type
1993	Supra	3.0L	2JZ-GTE	DOHC	Turbo	2
1993	Supra	3.0L	2JZ-GE	DOHC		2
1994	Camry	3.0L	3VZ-FE	DOHC		2
1994	Supra	3.0L	2JZ-GTE	DOHC	Turbo	2
1994	Supra	3.0L	2JZ-GE	DOHC		2
1995	Supra	3.0L	2JZ-GTE	DOHC	Turbo	2
1995	Supra	3.0L	2JZ-GE	DOHC		2
1992	SC-300	3.0L	2JZ-GE	DOHC		2
1990	ES-250	2.5L	2VZ-FE	DOHC		2
1991	ES-250	2.5L	2VZ-FE	DOHC		2
1992	ES-300	3.0L	3VZ-FE	DOHC		2
1992	SC-400	4.0L	1UZ-FE	DOHC		2
1991	LS-400	4.0L	1UZ-FE	DOHC		2
1992	LS-400	4.0L	1UZ-FE	DOHC		2
1993	SC-400	4.0L	1UZ-FE	DOHC		2
1994	SC-400	4.0L	1UZ-FE	DOHC		2
1994	SC-300	3.0L	2JZ-GE	DOHC		2
1993	SC-400	4.0L	1UZ-FE	DOHC		2
1994	GS-300	3.0L	2JZ-GE	DOHC		2
1993	SC-300	3.0L	2JZ-GE	DOHC		2

DLC 1 Light Trucks

Year	Model	Eng. Size	Eng. Code	DOHC/ SOHC	Other	DLC Type
1992	Previa	2.4L	2TZ-FE	DOHC		1
1993	Previa	2.4L	2TZ-FE	DOHC		1
1994	Previa	2.4L	2TZ-FE	DOHC		1
1994	T100	3.0L	3VZ-FE	SOHC		1
1995	4 Runner	2.4L	22R-E	SOHC		1
1995	4 Runner	3.0L	3VZ-FE	SOHC		1
1995	Pickup	2.4L	22R-E	SOHC		1
1995	Pickup	3.0L	3VZ-FE	SOHC		1
1995	Previa	2.4L	2TZ-FE	DOHC		1

DATA LINK CONNECTOR (DLC)

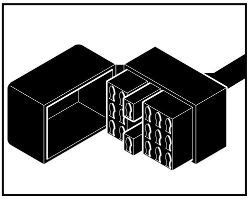
Toyota vehicles are equipped with special Test Connectors that make it possible to connect specialized testing equipment that communicates with the vehicle's onboard computer. This Tool is designed for use with two types of Toyota DLC connectors; DLC Number 1 and DLC Number 2, as described below.

The Tool's Toyota Connector Cable Adaptor is designed to match the vehicle's DLC. Make sure the adaptor mates properly before applying any force when making the connection. Applying force to the connector when not mated properly may cause damage to the connectors.

1. Type 1 connector is also known as Data Link Connector Number 1. The type 1 DLC connector is a rectangular connector and is usually black or gray in color. The connector is located under the hood (engine compartment) in the following general locations:

   - Front corner (right or left)
   - Front corner (right or left)
   - Fender well (right or left)
   - Fire wall (right or left)

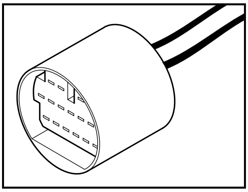
   It has a cover labeled "DIAGNOSTIC", "DIAGNOSIS", or "CHECK CONN", Use the square head of the Toyota Connector Cable Adaptor on vehicles with this type of connector.



2. Type 2 connector is also known as Data Link Connector (DLC) Number 2. The type 2 DLC connector is a round connector and is usually black or gray in color.

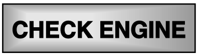
   - The connector is located "under the dash" on the left hand side.

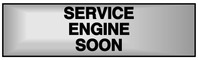
   It may have a protective cap that needs to be removed before connecting the Tool's DLC. Use the round head of the Toyota Connector Cable Adaptor on vehicles with this type of connector.



INSTRUMENT PANEL MALFUNCTION INDICATOR LIGHTS (MIL)

Your vehicle's instrument panel has a Malfunction Indicator Light (MIL) also called the "Check Engine" or "Service Engine soon" light. The MIL is an indicator to warn the vehicle operator of a problem in the computer control system.





If your instrument panel indicator lights do not come on when you turn on the ignition, please refer to your vehicle's service manual. You may have problems in the car's circuitry. It is recommended that you fix these problems before retrieving DTCs from your vehicle's computer.

DIAGNOSTIC TROUBLE CODES

Diagnostic Trouble Codes, or Fault Codes, can be used to identify engine systems or components that are malfunctioning. The computer records codes for the following two types of engine problems:

- **"Hard" Diagnostic Trouble Codes**

  "Hard" DTCs represent problems that are occurring now and cause the instrument panel Malfunction Indicator Lamp (MIL) or Check Engine light to illuminate and remain on until the failure is repaired. A DTC is stored in the vehicle's computer memory for each fault detected. A Tool or Scanner can be used to retrieve DTCs that are stored in the vehicle's computer memory.

- **Intermittent/History DTCs**

  Intermittent/History DTCs are stored in the computer's memory for problems that occur intermittently, or for problems that happened in the past but are not currently present. Intermittent DTCs may cause the Malfunction Indicator light to flicker or stay on until the intermittent malfunction goes away. However, the corresponding fault code will be stored in memory as a history DTC. If the malfunction that caused the history DTC to set does not recur within a predetermined length of time (usually within 40-80 ignition key start cycles), the computer will automatically erase the related fault code from its memory.

CODE RETRIEVAL PROCEDURE

Retrieving and using Diagnostic Trouble Codes (DTCs) for troubleshooting vehicle operation is only one part of an overall diagnostic strategy.

Never replace a part based only on the DTC definition. Each DTC has a set of testing procedures, instructions and flow charts that must be followed to confirm the location of the problem. This information is found in the vehicle's service manual. Always refer to the vehicle's service manual for detailed testing instructions.

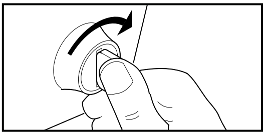
Check your vehicle thoroughly before performing any test. See BEFORE YOU BEGIN on page 17 for details.

***ALWAYS** observe safety precautions whenever working on a vehicle. See Safety Precautions on page 3 for more information.*

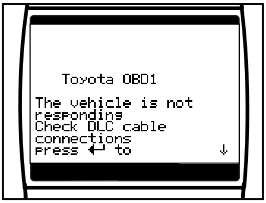
1. Locate the vehicle's Data Link Connector (DLC). See DATA LINK CONNECTOR (DLC) on page 82 for connection location.

Some DLCs have a plastic cover that must be removed before connecting the Tool's cable connector.

2. Connect the Tool cable (with the Toyota Connector Cable Adaptor attached) to the Tool, then connect the adaptor to the vehicle's DLC. Press the **POWER/LINK** button to turn the Tool ON.
3. Do the following before proceeding to step 4:
   - Turn ignition ON and start engine. Warm engine to operating temperature. (Shut engine off after warm up).
   - Make sure throttle is closed.
   - Set gear lever in "park" (for automatic transmissions) or "neutral" for manual transmissions.
   - Turn off all accessories.
4. Turn ignition ON. DO NOT start the engine. Press the **ENTER/FF** button to continue.
   - The Tool will begin the code retrieval process.

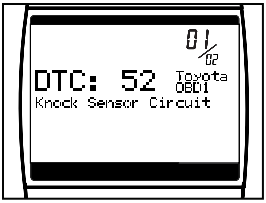


5. When the Tool is in the process of retrieving codes, a "One moment please..." message shows on the Tool's LCD display.
   - If the Tool fails to link to the vehicle's computer a "Vehicle is not responding" message shows on the Tool's LCD display. Do the following:
     - Verify the ignition is ON.
     - Check the cable connections at the Tool and at the vehicle's DLC.
     - Turn the ignition OFF, wait 10-12 seconds, then turn back ON to reset the computer.
     - Press the **ENTER/FF** button and repeat steps 3 and 4 as necessary.



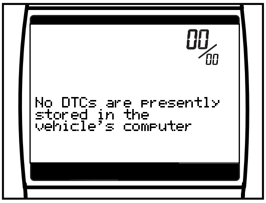
```
   Toyota OBD1
The vehicle is not
responding
Check DLC cable
connections
press ↵ to          ↓
```

6. If the Tool was able to link to the vehicle successfully a "Code retrieval was successful..." message shows temporarily on the Tool's LCD display followed by any retrieved DTCs.



```
                    01/02
DTC: 52        Toyota
               OBD1
Knock Sensor Circuit
```

- The Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No DTC' are presently stored in the vehicle's computer" message is displayed.



00
00

No DTCs are presently
stored in the
vehicle's computer

7. If more than one code was retrieved press the **DTC SCROLL** ▽, as necessary, to display additional codes one at a time.

In the case of long code definitions, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the △ and ▽ buttons, as necessary, to view the additional information.

8. Disconnect the Tool from the vehicle and turn the ignition key OFF.

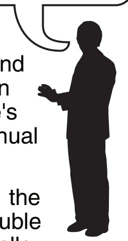
9. To prolong battery life, the Tool automatically shuts "Off" after approximately three minutes with no button activity. The DTCs retrieved will remain in the Tool's memory, and may be viewed at any time. If the Tool’s batteries are removed, or if the Tool is re-linked to a vehicle to retrieve codes, any prior codes in its memory are automatically cleared.
    - See VIEWING DTCs IN THE TOOL’S MEMORY on page 13 to view DTCs stored in the Tool’s memory.

10. Follow the testing and repair procedures outlined in the vehicle's service repair manual to correct "hard" DTCs. Codes should be addressed and eliminated in the order they were received, erasing (see Erasing DTCs on page 88) and retesting after each repair is made to be sure the fault was eliminated.

The green, yellow and red LEDs are used (with the LCD display) as visual aids to make it easier to determine engine system conditions. See Servicing DTCs on page 86 for information on interpreting LEDs and servicing DTCs.

SERVICING DTCs - OBD I

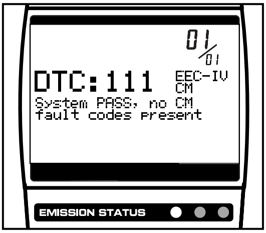
Retrieving and using Diagnostic Trouble Codes (DTCs) for troubleshooting vehicle operation is only one part of an overall diagnostic strategy.



Never replace a part based only on the DTC definition. Each DTC has a set of testing procedures, instructions and flow charts that must be followed to confirm the location of the problem. This information is found in the vehicle's service manual. Always refer to the vehicle's service manual for detailed testing instructions.

1. Determine engine system(s) condition by viewing the Tool's LCD display for any retrieved Diagnostic Trouble Codes, code definitions and interpreting the green, yellow and red LEDs.

The green, yellow and red LEDs are used (with the LCD display) as visual aids to make it easier to determine engine system conditions.

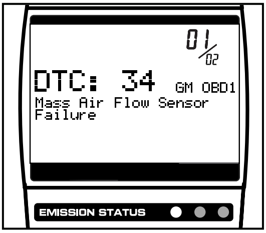


01/01
DTC:111 EEC-IV CM
System PASS, no CM fault codes present

2. **Green LED** - Indicates that all engine systems are "OK" and operating normally. No trouble codes are present. If you are not experiencing any vehicle problems NO FURTHER TESTING IS REQUIRED.
   - If you are still experiencing vehicle problems even through the green LED illuminates, the problem is not in the computer control systems. See the NO CODES troubleshooting section of your vehicle's repair manual for further troubleshooting instructions.
3. **Yellow LED** - Indicates an Intermittent or History DTC is present.

Intermittent/History DTCs are stored in the computer's memory for problems that occur intermittently, or for problems that happened in the past but are not currently present. Intermittent DTCs may cause the Malfunction Indicator light to flicker or stay on until the intermittent malfunction goes away. However, the corresponding fault code will be stored in memory as a history DTC. If the malfunction that caused the history DTC to set does not recur within a predetermined length of time (usually within 40-80 ignition key start cycles), the computer will automatically erase the related fault code from its memory.

- HISTORY DTC - On some vehicles, the computer will keep a record or history of DTCs that relate to problems that happened in the past but are no longer present. These DTCs will not command the MIL or Check Engine light "On", but the yellow LED will be illuminated.



01/02

DTC: 34 GM OBD1

Mass Air Flow Sensor Failure

4. **Red LED** - Indicates there is a problem with one or more of the vehicle's systems. The red LED is also used to indicate that DTC(s) are present (displayed on the Tool's screen). In this case, the MIL or Check Engine light on the vehicle's instrument panel will be illuminated.

   - If DTC's were retrieved and you are going to perform the repairs yourself, proceed by consulting the vehicle's service repair manual for testing instructions, testing procedures, and flow charts related to retrieved code(s).
   - If you plan to take the vehicle to a professional to have it serviced, complete the PRELIMINARY VEHICLE DIAGNOSTIC WORKSHEET on page 14 and take it, together with the retrieved codes and LED information, to aid in the Troubleshooting procedure.

Retrieved information can be uploaded to a Personal Computer (PC) with the use of an optional PC-Link Kit. For more information, see instructions included with PC-Link software.

ERASING DTCs (OBD I SYSTEMS)

When the Tool's ERASE function is used to erase DTCs from the vehicle's on-board computer, manufacturer specific data (where applicable) is also erased.

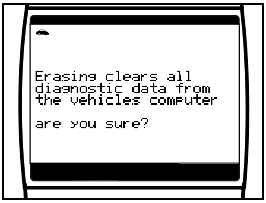
If you plan to take the vehicle to a service center for repair, DO NOT erase the codes from the vehicle's computer. If the codes are erased, valuable information that might help the technician troubleshoot the problem will also be erased.

Erase DTC's from the computer's memory as follows:

1. Connect the Tool to the vehicle's DLC. Press the **ENTER/FF** button to continue.
2. Turn the ignition ON. DO NOT start the engine.

*For FORD systems only, first perform step 3 below, then turn ignition "ON" and press the **ENTER/FF** button to continue.*

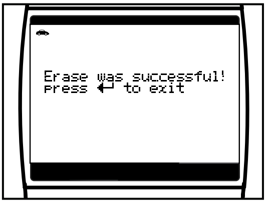
3. Press and release the **ERASE** button. A confirmation message shows on the LCD display.
   - If you are sure you want to proceed, press the **ERASE** button again to erase DTCs from the vehicle's computer.
   - If you do not want to continue with the erase process, press the **ENTER/FF** button to exit the erase function.



Erasing clears all
diagnostic data from
the vehicles computer

are you sure?

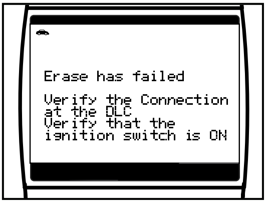
4. If you chose to erase DTCs, a status screen displays while the erase function is in progress.
   - If the erase was successful, a confirmation message shows on the Tool's LCD display. press the **ENTER/FF** button to exit.



Erase was successful!
press ↵ to exit

Due to the differences in computer systems, the Tool can be used to erase codes for some vehicles, while others require codes to be erased manually. If the "To erase DTC's consult the vehicle's service repair manual..." screen displays, you must consult the vehicle's service repair manual for procedures to erase DTCs.

- If the erase was not successful, an advisory message shows on the LCD display. Verify that the Tool is properly connected to the vehicle's DLC and that the ignition is ON. If the erase process still does not complete, turn the ignition OFF, wait 10 seconds, then turn back ON and repeat steps 2 and 3.



Erase has failed

Verify the Connection
at the DLC
Verify that the
ignition switch is ON

FORD systems will not display an erase was not successful message. If the "One moment please erase in progress" message on the display does NOT change after 3 minutes, it indicates that the erase function has failed. Check the DLC connections and make sure the ignition key is "ON". Perform the ERASE function again.

Erasing DTCs does not fix the problem(s) that caused the code(s) to be set. If proper repairs to correct the problem that caused the code(s) to be set are not made, the code(s) will appear again and the check engine light will illuminate as soon as the problem that cause the DTC to set manifests itself.

GLOSSARY OF TERMS AND ABBREVIATIONS

CARB – California Air Resources Board

CCM – Central Control Module

Computer Control System – An electronic control system, consisting of an on-board computer and related sensors, switches and actuators, used to ensure peak performance and fuel efficiency while reducing pollutants in the vehicle's emissions.

DIY – Do-It-Yourself

DLC – Data Link Connector

Drive Cycle – An extended set of driving procedures that takes into consideration the various types of driving conditions encountered in real life.

Driving Condition – A specific environmental or operation condition under which a vehicle is operated; such as starting the vehicle when cold, driving at steady speed (cruising), accelerating, etc.

DTC(s) – Diagnostic Trouble Code(s)

EGR – Exhaust Gas Recirculation

EPA – Environmental Protection Agency

EVAP – Evaporative Emissions System

Fault Code – See DTCs

Freeze Frame – A digital representation of engine and/or emissions system conditions present when a fault code was recorded.

FTP – Fuel Tank Pressure

Generic Code – A DTC that applies to all OBD2 compliant vehicles.

I/M Readiness – An indication of whether or not a vehicle's emissions-related system are operating properly and are ready for Inspection and Maintenance testing.

I/M Test / Emissions Test / Smog Check – A functional test of a vehicle to determine if tailpipe emissions are within Federal/State/Local requirements.

LCD – Liquid Crystal Display

LED – Light Emitting Diode

LTFT – Long Term Fuel Trim, is a program in the vehicle's computer designed to add or subtract fuel from the vehicle to compensate for operating conditions that vary from the ideal A/F ratio (long term).

Manufacturer Specific Code – A DTC that applies only to OBD2 compliant vehicles made by a specific manufacturer.

MIL – Malfunction Indicator Lamp (also referred to as "Check Engine" light

OBD1 – On-Board Diagnostics Version 1 (also referred to as "OBD I")

OBD2 – On-Board Diagnostics Version 2 (also referred to as “OBD II”)

On-Board Computer – The central processing unit in the vehicle’s computer control system.

PCM – Powertrain Control Module

Pending Code – A code recorded on the “first trip” for a “two-trip” code. If the fault that caused the code to be set is not detected on the second trip, the code is automatically erased.

PID – Parameter Identification

STFT – Short Term Fuel Trim, is a program in the vehicle’s computer designed to add or subtract fuel from the vehicle to compensate for operating conditions that vary from the ideal A/F ratio. The vehicle uses this program to make minor fuel adjustments (fine tune) on a short-term basis.

Trip Drive Cycle – Vehicle operation that provides the necessary driving condition to enable a vehicle Monitor to run and complete its diagnostic testing.

VECI – Vehicle Emission Control Information Decal

Notes

LIMITED ONE YEAR WARRANTY

The Manufacturer warrants to the original purchaser that this unit is free of defects in materials and workmanship under normal use and maintenance for a period of one (1) year from the date of original purchase.

If the unit fails within the one (1) year period, it will be repaired or replaced, at the Manufacturer's option, at no charge, when returned prepaid to the Service Center with Proof of Purchase. The sales receipt may be used for this purpose. Installation labor is not covered under this warranty. All replacement parts, whether new or remanufactured, assume as their warranty period only the remaining time of this warranty.

This warranty does not apply to damage caused by improper use, accident, abuse, improper voltage, service, fire, flood, lightning, or other acts of God, or if the product was altered or repaired by anyone other than the Manufacturer's Service Center.

The Manufacturer, under no circumstances shall be liable for any consequential damages for breach of any written warranty of this unit. This warranty gives you specific legal rights, and you may also have rights, which vary from state to state. This manual is copyrighted with all rights reserved. No portion of this document may be copied or reproduced by any means without the express written permission of the Manufacturer. THIS WARRANTY IS NOT TRANSFERABLE. For service, send via U.P.S. (if possible) prepaid to Manufacturer. Allow 3-4 weeks for service/repair.

SERVICE PROCEDURES

If you have any questions, require technical support or information on UPDATES and OPTIONAL ACCESSORIES, please contact your local store, distributor or the Service Center.

USA & Canada:

(800) 544-4124 (6:00 AM-6:00 PM, 7 days a week PST)

All others: (714) 241-6802 (6:00 AM-6:00 PM, 7 days a week PST)

FAX: (714) 432-3979 (24 hr.)

Web: www.innova.com

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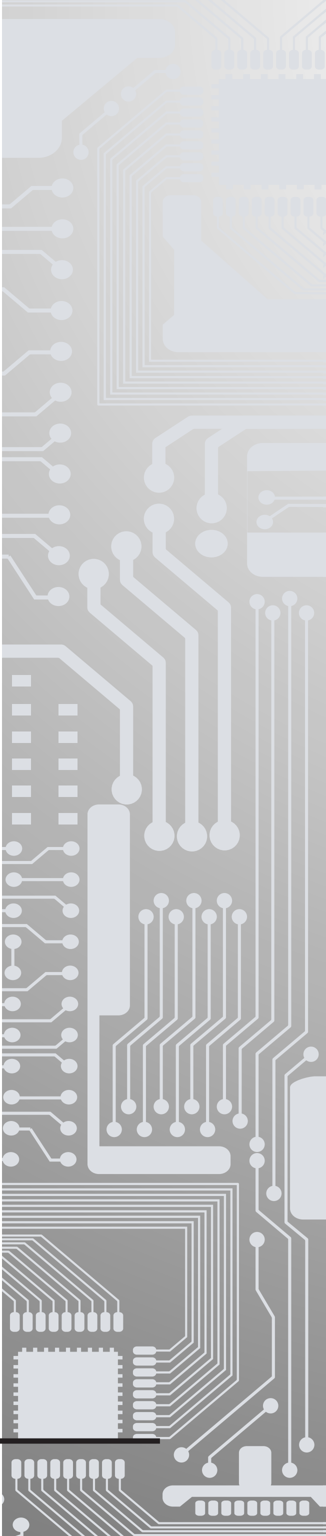

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