

## OBD Readiness Codes

*What They Are and How They Work*

Unlike traditional vehicle emissions tests, an on-board diagnostics (OBD) system monitors the engine, transmission and emissions control systems for malfunctions that may result in emissions increases. To predict when emissions limits may be exceeded, the OBD system compares electrical signals from various sensors (e.g., engine coolant temperature, intake air temperature) and actuators (e.g., solenoids, fuel injectors) to a stored record of what those signals should be. If the signal readings fall outside of a specified range and the vehicle emissions are likely to be exceeded, the OBD system alerts the driver by illuminating the malfunction indicator lamp (MIL), commonly referred to as the check engine light.

To help ensure the OBD system is working properly, "readiness codes" are used to indicate whether or not monitored emissions control systems have been tested by the OBD system. Each emissions control system has its own monitor and related readiness code. If any of the readiness codes are set to "not ready" or "not complete," depending on the scan tool used, the OBD system has not yet completed testing of that particular component or system. A component failure may exist, but has not yet been identified because the system

testing has not been completed.

Some emission control components are tested continuously and others are tested intermittently when predetermined operating conditions are met. Three continuous monitors are found in all newer OBD vehicles: comprehensive components, fuel system and misfire monitors.

Non-continuous monitors include those vehicle systems that are directly related to emissions control such as the oxygen sensor and the catalytic converter. Non-continuous monitors are tested once per "trip" when the predetermined operating conditions are first met.

The definition of a "trip" varies by manufacturer and monitored component. A definition of a "trip" is a period of vehicle operation beginning with an engine start in which specific driving conditions are encountered, which allow the testing of all OBD related components followed by an engine shut down. The engine shut down is an important part of the "trip" definition because even though a trouble code may be stored during the drive cycle, the check engine light may not be illuminated until the end of the next trip.

**Reminder:** *The presence of unset readiness codes does not mean that a vehicle will fail the OBD test. Unset readiness codes indicate that the vehicle cannot be fully OBD tested because the information needed to make a pass/fail determination is unavailable. After making emissions related repairs, please advise your customers to drive normally for one week prior to having an emissions test. On average, 12 percent of vehicles returning for a retest are rejected from testing for having too many unset readiness monitors.*

### **Inside this issue:**

<i>OBD Readiness Codes</i>	<i>pg. 1</i>
<i>Unset Readiness Codes</i>	<i>pg. 2</i>
<i>VEIP Statistics</i>	<i>pg. 2</i>
<i>Test Your OBD Knowledge</i>	<i>pg. 3</i>
<i>Known Readiness Issues</i>	<i>pg. 4</i>





## Unset Readiness Codes

*How Many are too Many?*

The presence of unset readiness codes does not mean that a vehicle has failed the OBD test. Unset readiness codes indicate that a vehicle cannot be fully OBD tested because all the information needed to make a pass/fail decision is not available.

The most common reasons for unset readiness codes are a recent vehicle battery disconnect, a low or dead battery or a recent vehicle service in which the OBD information was cleared using a scan tool.

### VEIP Testing Policy

For vehicle model years 1996 to 2000, two unset readiness codes are the maximum number allowed to complete OBD testing. If three or more unset, non-continuous readiness codes are present, vehicles are designated as "Unable to Complete OBD Testing" and owners are asked to return for testing after one week of normal driving.

For vehicle model years 2001 and newer, one unset readiness code is all that is allowed. Vehicles with two or more unset, non-continuous readiness codes are designated as "Unable to Complete OBD Testing."

There are, however, a few exceptions to the rule. Listed on page 4 are a small number of vehicles with known OBD readiness issues. The known issues include:

- Vehicles clearing readiness at key off.
- Vehicles with a high degree of "not ready" due to monitoring software strategies. For example, some monitors require two back-to-back trips with the same conditions in order for the monitors to set.

If a "fix" is not available, these vehicles will be tested normally without regard to their readiness status.

Issue # 4

## VEIP Statistics

*From July 15 through September 14, 2002*

### Initial Tests

Test Type	# of Tests	Fail Rate	Avg. Test Time (min.)
Idle	27,977	7.75%	9.18
IM240	116,746	12.2%	8.17
OBD	105,334	4.4%	5.21
<b>Total</b>	<b>250,057</b>	<b>8.4%</b>	<b>6.72</b>

### Retests

Test Type	# of Tests	Fail Rate	Avg. Test Time (min.)
Idle	3,595	34.4%	9.67
IM240	11,082	57.0%	9.71
OBD	1,651	18.9%	5.26
<b>Total</b>	<b>16,328</b>	<b>48.2%</b>	<b>9.25</b>

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## Test Your OBD Knowledge *continued on page 4*



1. What does an illuminated MIL indicate?
  - a. it's time for routine vehicle maintenance
  - b. it's not safe to drive your vehicle
  - c. an engine malfunction exists that may cause the emissions to exceed state mandated standards.
  
2. What is the first model year that vehicles were required to be fully OBD II compliant?
  - a. 1996
  - b. 1998
  - c. 2002
  
3. In what year did VEIP initiate OBD II testing?
  - a. 1996
  - b. 1998
  - c. 2002
  
4. What is the most common location of the data link connector?
  - a. underneath driver's side dashboard
  - b. in the glovebox
  - c. behind the ashtray
  
5. For vehicle model years 1996-2000 (excluding vehicles on EPA's list of vehicles with known readiness issues), what is the maximum number of unset readiness codes a vehicle can have before being designated "Unable to Complete OBD testing"?
  - a. 2
  - b. 3
  - c. 4
  
6. For vehicle model years 2001 and newer, what is the maximum number of unset readiness codes a vehicle can have before being designated "Unable to Complete OBD Testing"?
  - a. 0
  - b. 1
  - c. 2



## Test Your OBD Knowledge

*continued from page 3*

7. What emissions related repair costs should be counted toward the \$450 waiver limit for the emissions test?
  - a. parts only
  - b. labor only
  - c. parts and labor including diagnostic time
  
8. Upon completion of an OBD related repair, how long should the vehicle be driven prior to emissions testing/retesting?
  - a. one day
  - b. three days
  - c. one week

Answers: 1. c, 2. a, 3. c, 4. a, 5. a, 6. b, 7. c, 8. c

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## Vehicles with Known Readiness Issues

*From EPA OBD Guidance Document 420-R-01-015 and Colorado State University-NCVECS*

**1996 Chrysler vehicles** - Vehicles may clear readiness monitors at key off. If monitors are found to be “not ready,” they should be referred to a qualified service provider so the OBD software can be updated.

**1996-1998 Mitsubishi vehicles** - These vehicles may have a high degree of “not ready” for the catalyst monitor. See Technical Service Bulletin #00-13-005 for drive cycle information.

**1996-1997 Nissan vehicles** - These vehicles may have a high degree of “not ready” for catalyst and evaporative monitors. See Nissan Technical Service Bulletin #NTB98-018 for drive cycle information.

**1996-1998 Saab vehicles** - These vehicles may have a high degree of “not ready” for catalyst and evaporative monitors. See Technical Service Bulletin #248-9037 for drive cycle information.

**1997 Toyota Tercel and Paseo** - Vehicles will never set the evaporative monitor to “ready.” At this time, no fix is available.

**1996 Volvo 850 Turbo** - Vehicles will clear emissions at key off. At this time, no fix is available.

**1996-1998 Volvo vehicles (excluding 850 Turbo)** - These vehicles may have a higher degree of “not ready” for catalyst and evaporative monitors. See Technical Service Bulletin #SB 2-23-0056 for drive cycle information.

**Certain 1999 3.8L General Motors vehicles** - Vehicles report the continuous monitors as “unsupported”, rather than ready.