



## READINESS FAILURE FACT SHEET

Beginning September 2004, New York will implement a new motor vehicle emissions testing program in 53 of New York's upstate counties. Under the New York Vehicle Inspection Program ("NYVIP") an on-board diagnostics (OBD II) inspection will apply to most model year 1996 and newer light duty vehicles. Exemptions from the OBD II inspection include:

- vehicles with weights in excess of 8,500 lbs,
- diesel-powered vehicles,
- electric-powered vehicles,
- vehicles less than 2 model years old.

### WHAT IS A MONITOR?

To complete an OBD inspection, the NYVIP test equipment makes an electronic request for information to the vehicle being inspected through a standardized diagnostic link connector. The subject vehicle responds back to the NYVIP equipment with data including vehicle information, the on/off status of the Malfunction Indicator Light (MIL), Diagnostic Trouble Codes (DTC) and the status of the vehicle's monitors. As discussed below, the "monitors" verify the OBD system has completed testing each system.

***An essential component of every NYVIP OBD II inspection is the readiness check of each applicable monitor. The readiness evaluation is part of the final OBD II inspection result, and it could possibly be the only reason why a vehicle fails New York's emissions inspection.***

As noted below, there are a total of 11 possible monitors, but currently no vehicle has all 11 monitors present.

- Misfire (continuous)
- Fuel Trim (continuous)
- Comprehensive Components (continuous)
- Catalyst (CAT)
- Exhaust Gas Recirculation (EGR)
- Evaporative (EVAP)
- Oxygen (O2) Sensor
- Secondary Air
- Heated Catalyst
- Air Conditioning (AC) System
- O2 Sensor Heater

The exact number of monitors in any vehicle depends on the motor vehicle manufacturer's emissions control strategy. Note that the misfire, fuel trim, and comprehensive components monitors are referred to as being "continuous." These three monitors are found in every gasoline-powered OBD II vehicle, and are very different in design from the other eight monitors. The Powertrain Control Module (PCM) through the use of its three "continuous monitors" is constantly testing and evaluating their assigned emission components and/or emission system while the vehicle

is running. Conversely, the other eight monitors are commonly referred to as being “non-continuous” monitors, as certain conditions need to occur before a test or series of tests can be completed by the PCM.

The conditions necessary for the monitor to run testing are referred to as the “enabling criteria.” Some monitors require the vehicle to follow a prescribed “drive cycle” routine as part of the enabling criteria. Drive cycles vary among vehicles and for each monitor in any particular vehicle. Some non-continuous monitors require two drive cycles to complete testing due to the need for a cool down and warm up periods in between. For more information on drive cycles, see the discussion below. Depending on the non-continuous monitor, variables such as speed, engine and ambient temperatures, load, fuel level, as well as other conditions must be met for the monitor to perform its test.

***It is very important to realize that the NYVIP unit does not force the vehicle to perform any monitor test. Rather, the NYVIP simply asks the vehicle for information. The NYVIP unit makes the readiness determination based on the information supplied.***

### **WHAT IS MEANT BY MONITOR STATUS?**

Motor vehicle manufacturers follow standardized protocols when reporting monitor status to scan tools or emissions inspection devices (i.e., NYVIP). When a particular monitor is not applicable to the vehicle being tested, the monitor is reported as “Unsupported.” The vehicle cannot report the results of this monitor simply because it does not exist. Most gasoline-powered OBD II vehicles have at least a few unsupported monitors. Unsupported monitors have no role in the overall readiness evaluation or the overall OBD inspection result.

Those monitors incorporated into vehicle manufacturer’s emissions control design are referred to as being “Supported.” Supported monitors need to be evaluated by the vehicle’s PCM. For most gasoline-powered light duty vehicles, the common range of the number of “supported” monitors is six to eight. When the vehicle’s PCM’s monitor completes testing, the readiness system status will be reported as “Ready” or “Complete.” Once a monitor is set as “Ready” or “Complete” it will remain in this state unless diagnostic trouble codes (DTCs) are cleared by a scan tool or if the PCM’s short term memory is erased by a power failure (i.e., disconnecting the battery). Since the three continuous monitors are constantly evaluating, they will be reported as “Ready” all of the time. If testing of a particular supported non-continuous monitor has not been completed, the monitor status will be reported as “Not Complete” or “Not Ready.”

New York has adopted the federal Environmental Protection Agency (EPA) guidance concerning readiness during OBD inspections. A vehicle will fail the NYVIP OBD II inspection if enough monitors are reported as “Not Ready.” Generally, OBD II vehicles from model year 1996 to model year 2000, inclusive, will fail if 3 or more monitors are set as “Not Ready;” while model year 2001 and newer vehicles will fail when 2 or more monitors are reported as “Not Ready.” There are a few vehicle exceptions to these guidelines, but the NYVIP inspection software makes these cases transparent to the inspector. Consistent with federal guidance, the three continuous monitors are not considered in the readiness determination as these are anticipated to be Ready. ***In summary, the readiness status of all supported, non-continuous monitors are only considered in making the OBD II pass or fail determination. For most gasoline-powered vehicles, this involves 3 to 5 monitors.***

It is not always required, nor practical in some cases, for **ALL** monitors to be set as “Ready” for the NYVIP inspection. This condition is, however, highly recommended for the confirmation of effective repairs. In general, the EVAP and CAT monitors will be the most difficult monitors to set as “Ready.” When a vehicle fails the NYVIP readiness evaluation, the test equipment will display a screen to the inspector listing all monitors found “Not Ready” and the Inspection Receipt will also note these findings to the motorist. Should a motorist present a vehicle for inspection with an expired emissions/safety inspection and then fail the OBD inspection for readiness only, the NYVIP unit will allow a one-time 10-day extension.

The following guidance is offered for motorist information and for effective OBD repairs.

### **GENERAL READINESS GUIDANCE**

1. Motorists should be advised against disconnecting their battery in an attempt to bypass the NYVIP OBD inspection. This practice is counterproductive as it will lead to a NYVIP readiness-related failure.
2. Motorists should be encouraged to have emissions-related repairs completed when they are first identified by the illuminated MIL. A delay in effective repairs may result in increased fuel cost due to reduced fuel economy and potentially more costly repairs for the motorist in the future.
3. Motorists should be encouraged to have their annual inspection completed prior to the last week of their valid inspection sticker. Some vehicles are more difficult to make “Ready” than others and multiple attempts at completing a recognized drive cycles may be necessary.
4. Motorists receiving a 10-day extension should be cautioned that the extension is for one time only. Either the inspector or motorist should drive the vehicle for several days in an attempt to set monitors, and then have the vehicle re-inspected several days in advance of the 10-day expiration.

### **OBD II - REPAIR SUGGESTIONS**

1. Consult technical service bulletins (TSBs) before attempting repairs. If it is a common problem that has already been documented, it will save you a lot of time and frustration.
2. Use a professional grade scan tool to verify that the MIL is not commanded on. Confirm that there are no diagnostic trouble codes (DTCs) which may prevent a monitor from running to completion.
3. Use the “OBD generic” function on the scan tool, as these results may differ from the manufacturer specific protocols.
4. The practice of “clearing codes” should be used as sparingly as possible, as all monitors will be re-set as “Not Ready” when this occurs. Whenever possible, instead of clearing codes after completing a repair, drive the vehicle sufficiently to allow the PCM to extinguish the MIL.
5. Know how your customer drives. If they drive infrequently or avoid speeds greater than 50 mph, they may or may not get a sufficient number of monitors to be “Complete” before their first NYVIP inspection or after repairs were made. If in your estimation the motorist will not be able to drive the vehicle adequately to pass re-inspection, you may assist customers in re-setting monitors by completing the appropriate drive cycle(s) for a reasonable fee.

6. Verify that the most current version of manufacturer's firmware (PCM software) is installed on the vehicle's computer, as the vehicle may need an upgrade to operate correctly.
7. Follow recommended diagnostic practices and procedures. Aimlessly replacing parts in an attempt to remove a DTC is generally ineffective and potentially very costly for the motorist. For example, an oxygen related DTC could actually be the result of an exhaust leak upstream of the O2 sensor. In this case, replacing a properly functioning O2 sensor will not resolve the problem.
8. Check the fuel level in the vehicle. Some monitors, in particular the EVAP monitor, may require the fuel level to be between 35% and 85% of full to initiate diagnostic testing.
9. Continuing education and training related to OBD repairs is recommended.

## **RUNNING AN OBDII DRIVE CYCLE**

The purpose of completing an OBD II drive cycle is to force the vehicle to run its onboard diagnostics. Some form of a drive cycle needs to be performed after DTCs have been erased from the PCM's memory or after the battery has been disconnected. Running through a vehicle's complete drive cycle will "set" the readiness monitors so that future faults can be detected (and potentially to pass the NYVIP re-inspection). Drive cycles vary depending on the vehicle and the monitor that needs to be re-set. Whenever possible, follow the drive trace prescribed for the specific vehicle/monitor in question. Some vehicle-specific drive cycles can be found in the vehicle's Owner's Manual.

The following "universal" drive cycle can be used as a guide to assist with re-setting monitors when a vehicle specific drive cycle cannot be located. This generic OBDII drive cycle begins with a cold start (coolant temperature below 122 degrees F and the coolant and air temperature sensors within 11 degrees of one another). This condition can be achieved by allowing the vehicle to "sit" overnight, and then by beginning the drive cycle the next day. Most drive cycles will be difficult to follow exactly under normal driving conditions, so the driver should exercise caution, road safety, and courtesy to others.

1. Start the engine. Idle the engine in drive for two and a half minutes with the A/C and rear defroster on.
2. Turn the A/C and rear defrost off, and accelerate to 55 mph at half throttle.
3. Hold at a steady speed of 55 mph for three minutes.
4. Decelerate (coast down) to 20 mph without braking or depressing the clutch.
5. Accelerate back to 55 to 60 mph at  $\frac{3}{4}$  throttle.
6. Hold at a steady speed of 55 to 60 mph for five minutes.
7. Decelerate (coast down) to a stop without braking.

If you would like more information on OBD or monitors, visit the following websites:

[www.obdclearinghouse.com](http://www.obdclearinghouse.com)

[www.obdiicsu.com](http://www.obdiicsu.com)

[www.iatn.net](http://www.iatn.net)

[www.obdii.com](http://www.obdii.com)

<http://autocenter.weber.edu/OBD-CH/vehicleoems.asp>

[www.ncvecs.colostate.edu/](http://www.ncvecs.colostate.edu/)

[www.nastf.org](http://www.nastf.org)