

Non-Continuous Monitors, Mode \$06

and their importance in vehicle emissions...a brief tutorial

(By M. A. Forsyth, National Sales Manager, NEXTEK, Inc.)

Modern vehicles with sophisticated electronics are much more difficult to repair than they were ten or even 20 years ago. With these vehicles came the advent of the Scan Tool, which allows a technician to “plug into” the vehicle and interrogate it, in an attempt to figure out what is wrong, so repairs can be made.

Modern vehicles have computer controlled Powertrains (engine and transmission) and use a programmable PCM (Power Control Module), or ECM (Engine Control Module) to manage it, and ensure its operating efficiently. Since these modules are a rudimentary type of “computer”, they respond to electronic commands from the Scan Tool, in same way a computer would from a mouse or keyboard.

When a Scan Tool is connected to the power control module, though the vehicle’s diagnostic port or DLC, the purpose is to obtain data...data that can then be used to repair the vehicle. The Scan Tool inputs one or more commands into the module, in order to tell it the type of data that the Scan Tool would like to see displayed on its screen. These commands are also called “Modes” and are given numbers, depending upon what type of data is requested. Here are a list of the modes and the type of data that is associated with each one:

- Mode 01-Give live data stream (sensor readings and switch status)
- Mode 02-Give freeze-frame data (if one or more DTCs is present)
- Mode 03-Give diagnostic Trouble Codes (DTC's)
- Mode 04-Clear all codes and freeze-frame data
- Mode 05-Give oxygen sensor monitor data
- Mode \$06-Read non-continuous monitors (EVAP, catalyst, EGR, etc.)
- Mode 07-Read continuous monitors
- Mode 08-Allow bi-directional communication (onboard tests)
- Mode 09-Give vehicle VIN, PCM calibration, etc.

As you can see from the list, Mode \$06 is associated with the Non-Continuous Monitors, which are a part of the emissions system. These are also the same monitors that need to be in a "ready" status or completed condition in order to perform an emissions test.

Basically, Mode \$06 is a series of electronic component and system tests that are going on while a vehicle is being driven. That driving is also referred to as a "drive cycle". Non-continuous monitors are just like the label says, "non-continuous", and they only run under a specific set of driving conditions, i.e., a drive cycle.

As Mode \$06 is busily running its test in the background, it is reporting the status of those tests (pass or fail) to the appropriate non-continuous monitor, which acts as system supervisor, just like a monitor in a classroom, making sure that everything is in order. After all the Mode \$06 tests have been performed, and the monitor is satisfied, it will show its status on the Scan Tool as "complete", which again means its status is ready, and an emissions test can be performed.

A word or two about drive cycles, monitor status, and the emissions testing...

There are actually two types of monitors, (Mode 07) Continuous and (Mode \$06) Non-Continuous. Each one oversees the operation of a system in the vehicle's powertrain. They are named for the system they monitor, and there may be as many as 12. Depending upon the manufacturer, vehicles may or may not possess all 12 monitors. They are:

Continuous: Misfire, Fuel System, and Comprehensive

Non-Continuous: Evap., EGR, O2 Sensors, O2 Sensor Heaters, Catalyst, Heated Catalyst, A/C System, Secondary Air, and Warm-ups

In most states, a specific number of monitors need to be "complete" or "ready" in order to perform an emissions test. As an example, in Pennsylvania, all 2000 and older model-year vehicles will pass the emissions test if all but two monitors are complete and ready. 2001 and newer vehicles require that all but one monitor be complete and ready. Typically, monitors become ready through normal day-to-day driving, but if the car is driven for only short distances, is driven infrequently, or just underwent repairs, the needed number of monitors to perform the emissions test may not be set. In that case, the repair shop can "force" them to set by performing a drive cycle. A drive cycle is very specific way of driving the car and is pre-determine by the manufacturer of that car,

Ford, GM, Toyota, Volvo, etc. In addition, each monitor has its own type of drive cycle that needs to be performed to set it, and get it into a ready status. In other words, there is no one-size-fits-all drive cycle that takes care of all car types or all monitors. As an example, if an emissions test is to be performed on a Ford, and the Catalysts Monitor in that Ford needs to be set, the drive cycle that must be performed would be specifically for a Ford Catalyst Monitor.

This is where the NEXTEK Emissions Mate is such a valuable tool, in that it can easily show (in just a few seconds), the readiness status of each individual monitor. If a vehicle is not ready for testing, because a one or more monitors need to be run, the Emissions-Mate can guide the user, by displaying the status of each monitor, directing him to the type of drive cycle that needs to be run. In addition, some drive cycles are much faster and easier to run than others, which helps save time, by eliminating extra driving.

Note: if a vehicle was recently repaired, had its DTC's cleared by a Scan Tool, the positive battery cable was disconnected, or the battery went dead, ALL monitors in that vehicle will be reset back to square-one, and all will need to be set or made complete by regular driving, or by performing one or more drive cycles.

That leads us directly into the next part of this tutorial...the value of Mode \$06.

As I mentioned earlier, Mode \$06 is a series of component and system tests that are run as the vehicle operates and are overseen by the Non-Continuous Monitors. All the test performed by Mode \$06 are pass or fail, depending upon whether or not the component tested is working correctly and within factory specifications.

Being able to display the presence of a Mode \$06 failure record (and the Emissions-Mate does this) is invaluable to a shop or technician in reducing or eliminating customer "come-backs" after an emissions-related repair has been made.

Example: A customer comes into the shop for repair, with a Check Engine light on. The tech discovers that it's an Oxygen Sensor code, decides that the O2 sensor is bad, replaces the O2 sensor, and then clears the code. In order to verify that his repair was correct, he needs to run the vehicle's O2 sensor monitor, by performing an O2 Monitor drive cycle specifically for that vehicle. By plugging in the Emissions-Mate, placing it on the seat, and performing the drive

cycle, he can easily see (red LED changes to green) and hear (audible beep) when the O2 Monitor is complete and in a ready condition. At that point, if the Check Engine light remains off, he can return to the shop, assuming that his repair fixed the problem.

But...there may still be a problem here. A second look at the Emissions-Mate shows a red LED at Mode \$06. That means that there is a Mode \$06 test that failed, and that record is being stored. Mode \$06 failures are sometimes referred to as "two-trip" failures. That means that it takes two consecutive Mode \$06 failures (during two separate trips) to turn the Check Engine light back on. Unfortunately, the trip that the tech just took to run the O2 Monitor and verify that the O2 sensor repair he just made is correct, is only trip one! If he doesn't have an Emissions-Mate onboard to show him that there is a Mode \$06 failure, he will not know that the failure exists. He'll return to the shop, thinking that he's fixed the problem and all is well when it may not be. He turns the repaired vehicle over to his customer, collects payment, and everybody is happy? Now the customer drives the vehicle and may or may not complete another O2 Monitor drive cycle. When the customer finally does complete a drive cycle (just by chance, through the process of regular driving), the Mode \$06 test will run again, and if there is a second, consecutive failure, it sees the customer's driving as "trip two" and turns on the Check engine light. As you know, most customers would be pretty unhappy, if they took their car in for repair, and paid a \$400 repair bill, only to have the Check Engine light come back on one or two days later!!

Again, this is why the NEXTEK Emissions-Mate is such a valuable device; not only for pre and post Emissions testing, by checking a monitor's status or by monitoring the running a drive cycle to force a specific monitor to completion, but also for post-emissions repair verification, when performing a drive cycle to complete a monitor, and well as checking for the presence of any Mode \$06 test failures, which could result in a customer come-back.