$02 Takes on Mode $06

Using Ford Mode $06 Data

By Mike Cleary

Some techs swear by Mode $06, while others see no value in it. Both views are extreme, but we believe it's quite useful in certain circumstances.

Just about every technician has encountered intermittent driveability issues on Ford vehicles from time to time. Sometimes they're verified, sometimes they're not. Using the various OBD II monitor criteria and Mode $06 data can be a big help in identifying intermittent concerns.

Main Monitors

A review of the main monitors is in order at this point. Over the years, monitors have been added as the requirements and complexity of vehicles has changed. Main monitors means that most are present on Ford vehicles since OBD II was first implemented in 1996. Some of the enabling criteria for these monitors to complete have changed as the systems have evolved. For exact criteria, consult the manufacturer's publications, or visit the International Automotive Technicians' Network. (www.iATN.net)

Misfire Monitor

This tests continuously, and is used to detect any emission-related problem that could cause unacceptable emissions levels as well as premature catalytic converter failure. Engine speed, load and temperature inputs must meet a specified value. The fuel tank level must be within a specified range, as well as a time since engine start-up.

Screen Capture #1

Profile correction must also be learned. This is software that's programmed into the PCM that corrects for minor errors in crankshaft position sensing. The misfire monitor will not run if the profile correction is not learned. The profile correction, once learned by the PCM, is stored in Keep Alive Memory (KAM). If KAM is

cleared, Profile Correction must be restored. This is done by three 60 MPH to 40 MPH closed throttle decelerations without brake application. Using the Datalogger function (screen capture #1) on Ford's Integrated Diagnostic Software (IDS) Platform, it can be determined if the Profile Correction has been learned (MP LRN). Screen capture #2 was taken after a KAM reset. Screen capture #3 shows that the Profile Correction has been learned. This was after the vehicle had been driven through the required three decelerations. This can be particularly useful during diagnostics when a misfire code is not being set. Remember, if the Profile Correction hasn't been learned, the Misfire Monitor will not run.

Screen Capture #2

Screen Capture #3

Fuel System Monitor

This is also continuously testing. It compares the results of short-term fuel trim and long-term fuel trim to a set of pre-programmed values within the PCM calibration. If SFT or LFT goes out of range, the PCM detects a fault and the MIL is illuminated. The system must be in closed loop operation for this monitor to be running.

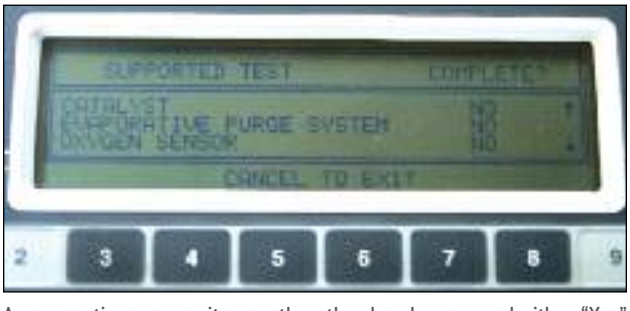
The FICM is tucked in by the firewall on this F-150.

Comprehensive Component Monitor

Another monitor that is constantly running. It checks all the electrical components that provide one of two things: input information to the PCM, or receive command information from the PCM. It can be running either KOEO or KOER.

You'll always see "Yes" for the three continuous monitors.

It is important to note that because all three of the above monitors are constantly running (and only the above three), on Ford scan tools such as the NGS, and on the IDS, the monitor status will always read "YES," or "COMPLETE." The following monitors, because they are not continuous, will read either "YES" or "NO", or "INCOMPLETE." If a non-continuous monitor reads "YES," it indicates that it has run and completed, but it doesn't mean that a repair has been validated.



A non-continuous monitor, on the other hand, may read either "Yes" or "No" depending on whether or not it has run and completed.

Oxygen Sensor Monitor

The response and switch rates of both the front and rear sensors are monitored to determine proper operation. Proper O2 heater function is also monitored. Load, speed, throttle angle, intake air temperature, coolant temperature, engine start-to-run time, and vehicle speed parameters must all be met for this monitor to run. Closed loop operation is also required.

EGR System Monitor

Used to determine the proper operation of the EGR system, including flow requirements. For this monitor to run, the engine must be warm, and the following must be in a specified range: engine start-to-run time, engine speed, engine load, throttle angle, and short term fuel trim.

Evaporative Emissions Monitor

Tests the proper operation of the evaporative emissions system, including checking for leaks and restrictions. The following must meet certain parameters for the monitor to run: engine start-to-run time, intake air temperature, barometric pressure input, engine load, vehicle speed, purge duty cycle command, fuel tank level, and fuel tank pressure. The engine must be off for a minimum of six hours ("Soak Timer"). This timer can be bypassed by hitting the "CLEAR" button on the scan tool even when no fault codes, or a P1000 code are present. See screen capture #4.

Screen Capture #4

Catalyst Monitor

Used to determine the efficiency of the catalytic converter. During steady-state vehicle operation, such as cruising down a highway, the PCM compares the switch rates of both the front and rear oxygen sensors to determine the efficiency of the catalyst. Vehicle speed, coolant temperature, intake air temperature, load, throttle angle, MAF/MAP voltage, and engine start-to-run time must all meet the necessary parameters.

Moving to Mode $06

Selecting Mode $06 as a diagnostic test mode on a scan tool is an opportunity to retrieve the diagnostic monitor test results for all those systems that are monitored, continuously and non-continuously. This can be particularly helpful when trying to diagnose an intermittent problem, or when monitoring a trend that may be leading up to a failure. Mode $06 data will show the test results of any particular monitor.

This data is also very useful in the area of repair verification. After making a repair, it can be verified during a road test while waiting for the monitor to complete. Once this occurs, the technician can rest assured that he can access the Mode $06 data and determine if a pending code is about to set based on the data he receives. Screen capture #5 shows the technician that all of the monitors have completed except for the Evaporative Emissions Monitor. At this point he could access Mode $06 data to determine if any failures are impending.

Screen Capture #5

Scenarios

Examination of a couple of specific situations will further clarify how useful Mode $06 data can be, particularly when diagnosing an intermittent problem.

The first scenario involves a 2003 Ford F150 pickup with a 5.4L engine and automatic transmission. The vehicle had a concern of an intermittent misfire, but the MIL wasn't illuminated. The vehicle was put through the normal diagnostic routine. No fault codes were stored,

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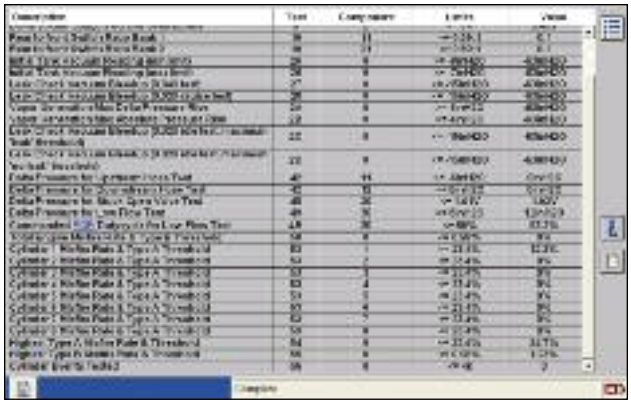
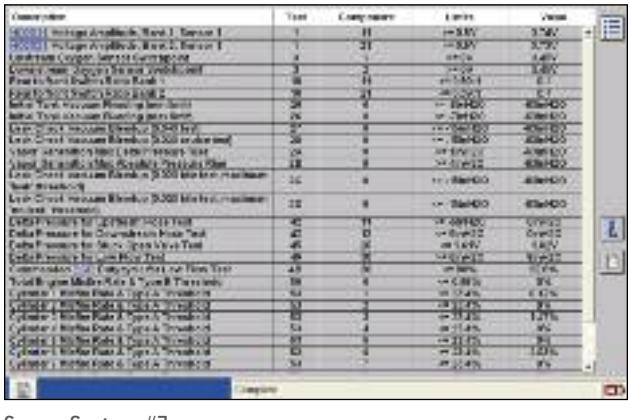


Screen Capture #6

and the problem could not be verified during a road test. Fuel pressure and ignition systems tested out perfectly. Relative compression tests and power balance tests revealed nothing conclusive.

At this point, the Mode $06 data was retrieved (screen capture #6). By looking at the misfire data, it was observed that the value for cylinder number one is high, particularly when compared to the remaining seven cylinders. At this point a stress test was performed, which revealed a weak coil-on-plug for that cylinder. Replacing the offending coil-on-plug resolved the customer's concern.

The next scenario involves another Ford F150 with a suspected catalytic converter failure. As stated earlier, a useful feature of Mode $06 data is monitoring a trend that may indicate a potential failure. Suppose a catalytic converter was suspected of becoming degraded. By observing the Mode $06 data (screen capture #7) for the switch rates of the front and rear O2 sensors, we could possibly determine an impending converter failure. On this particular vehicle, the values for the front and rear O2 sensors for both banks are well below the limits imposed by the particular PCM calibration, and suspicion of a failed converter was ruled out, precluding the possibility of mistaken (and expensive) parts replacement.



Screen Capture #7

Mode $06 Data and monitoring information is one more asset in a technician's inventory to help solve intermittent diagnostic dilemmas. By obtaining experience working with this information, today's technician will be more capable of dealing with electronic engine control systems as they become even more complex.