

quick reference

It is difficult for any single technician to know all the answers. Most major automobile manufacturers have online resources available to help in the diagnosis and repair of those tricky vehicles. Some sites charge a fee for the service, but others have limited information available at no cost. The following websites are excellent technical resources as laid out by the specific vehicle manufacturer.



But don't forget...

Clean Air Car Check's Diagnostic Technician is also available to assist you. He can be reached through our customer service hotline at 1-888-240-1684 or on his direct line at 219-661-5456.

- Acura** <https://techinfo.honda.com>
- Audi** <https://erwin.audi.com/>
- BMW** <http://www.bmwtechinfo.com/>
- Chrysler, Dodge, Plymouth, Jeep, Eagle** <http://www.techauthority.com/>
- Ford, Lincoln, Mercury** <http://www.motorcraft.com/>
- General Motors** <https://www.acdelcotds.com/>
- Honda** <https://techinfo.honda.com/>
- Hyundai** <http://www.hmaservice.com/>
- Infiniti** <http://www.nissan-techinfo.com/infiniti/>
- Isuzu** <http://isuzusource.com/>
- Jaguar** <http://www.jaguartechno.com/>
- Kia** <http://www.kiatechno.com/>
- Land Rover** <http://www.landrovertchno.com/>
- Lexus** <https://techinfo.toyota.com>
- Mazda** <http://www.mazdatechno.com/>
- Mercedes-Benz** <http://www.startekinfo.com/>
- Mini** <http://www.minitechno.com/>
- Mitsubishi** <https://www.mitsubishitechno.com/>
- Nissan** <http://www.nissan-techinfo.com/nissan/>
- Porsche** <https://techinfo.porsche.com/>
- Saab** <http://saabtechno.com/>
- Scion** <https://techinfo.toyota.com>
- Subaru** [http://www.subaru.com/\(Click on "Owners" then "Technical Information\)](http://www.subaru.com/(Click on 'Owners' then 'Technical Information))
- Suzuki** <http://www.suzukipitstop.com/>
- Toyota** <https://techinfo.toyota.com>
- Volkswagen** <http://ebahn.bentleypublishers.com/>
- Volvo** <https://www.volvotechno.com/>

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technicallyspeaking.



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Take the Mystery Out of Mode \$06

Taking the Mystery out of Mode \$06

**Thursday,
April 17, 2008
6 - 10 p.m.**

Envirotest Systems
Training Center
1171 Breuckman Drive,
Suite B
Crown Point, IN

Class materials and dinner
will be provided.

Seating is limited.

Call to register by
April 11, 2008.
1-888-240-1684 (toll-free)
or
219-661-8269 (local)

Mark your calendars and plan to attend a Tech Night event on Thursday, April 17th that will take the mystery out of Mode \$06 and teach you how to access this information with your current scan tool.

The class will cover a brief overview of all 9 modes of OBD II before covering an in-depth description of the Mode \$06 section of OBD II diagnostics. This class will provide a thorough understanding of the subject, as well as the identification of the TID and CID hexadecimal coding.

The class will be presented by John Forro, an ASE Master Certified auto technician who has authored 12 automotive manuals, produced several automotive training videos and appeared in many industry trade magazines. John continues to work full time as an automotive instructor and technician, which enables him to relate to his students' needs as technicians. John has taught for several of the country's leading companies such as Snap-On, Firestone, Mac, OTC, A/C Delco and many others.

"You will not leave this class without having the knowledge needed to start using Mode \$06 to help diagnose and repair 96 and newer vehicles," according to Forro.



John Forro

Knock Out Tips for knocking out NOx

A vehicle running near the 14.7-1 A/F Ratio is a great NOx producer. So how are these emissions reduced? The two main NOx controllers are the

EGR system and ignition timing control. An engine at light throttle cruise produces a large amount of NOx.

During cruise conditions most vehicle operating strategies allow for timing advance and somewhat lean A/F Ratios. This is the EGR valve's point of greatest flow.

By introducing inert exhaust gas back into the intake manifold we can displace some of the fuel air charge. This in turn lowers combustion temperatures and reduces NOx production.

Engine ignition timing is also crucial. It takes only a few degrees of base timing advance to start increasing NOx output. So technicians must be very aware of EGR system function and correct flow. Take into account factors such as aftermarket exhaust systems that may reduce exhaust backpressure as well as flow. And be mindful of EGR passage restrictions and EGR control devices. Ensure correct ignition timing at base and advance, as well as cam to crank timing and variable valve timing issues.

In all likelihood a vehicle that we have repaired for an HC and/or CO issue may return and fail for NOx. Keep in mind that during your baseline tests, a car that is not in fuel control will not be producing a large amount of NOx. It is only after initial repairs are made that we can begin to look at NOx levels.

When performing baseline tests, be sure to verify PCM load input sensors. An erroneous reading load sensor can not only affect A/F Ratios but also ignition timing and advance. One of the factors helping to reduce NOx is the catalytic converter; in order to do its job properly it needs very quick fuel control. We need to verify not only proper minimum and maximum voltages from our Oxygen sensors but sensor switch times as well.

Other contributing factors to consider are A.I.R. injection proper function. Air being added to the exhaust stream will prevent proper catalyst operation. That being said we should always be sure that the exhaust system from manifold to cat inlet is leak free.

Engine decarboning is often used in NOx repairs. The reduction of combustion chamber and valve deposits may improve combustion efficiency and engine performance. But care should be taken that we are not contaminating the converters or the O2 sensors in the process. One way to avoid this issue is to wait until the cleaning service is performed and the vehicle road tested and cleared out before catalyst or O2 sensor replacement is performed.

To summarize, the two ways to control NOx are preproduction, with proper EGR system operation and correct engine mechanical timing, ignition base and advance timing control as well as proper load input signal verification. Good O2 sensor function and switch speed as well as a leak free pre-catalyst exhaust system.

In post-production it is important to remember the catalyst can only handle a certain amount of gas conversion in the reduction bed and it will easily be overwhelmed by a large NOx producing engine.

Myths and Facts About NOx

Myth: A hot running vehicle will fail for NOx.

Fact: An engine's combustion chamber temperature has a greater impact on NOx formation than overall engine temperature. Some NOx is produced through engine temperature, this is called Thermal NOx. Thermal NOx usually plays a small part in total NOx production.

Myth: NOx is only produced under heavy vehicle loads.

Fact: In general some NOx is generated at high loads, but under heavy loading or hard accelerations the vehicle's PCM goes into fuel enrichment mode. These conditions will definitely raise combustion chamber temperatures, but the lack of available Oxygen inhibits NOx formation. In fact, most of a vehicle's NOx emissions are produced at light throttle cruise.

Myth: A new catalytic converter will greatly reduce NOx readings.

Fact: NOx is the hardest gas to reformulate in a converter and the catalyst's role in NOx reduction is not as great as perceived. The first section in a converter is known as the reduction area. Here Nitrogen and Oxygen are split apart. The catalyst sends the Oxygen down stream and attaches Nitrogen molecules together returning them to their original state. A catalyst is easily overwhelmed by NOx, and in cases of major NOx failures it is suggested that you look at the engine and other contributing factors first.

Myth: A lean running vehicle produces a large amount of NOx.

Fact: This myth is partially true. As a vehicle leans out past 14.7-1, NOx production peaks but then quickly drops off. As the engine leans out, its ability to support complete combustion diminishes and the conditions needed for NOx production are reduced as well.

techtalk

Spotlight on: Mode \$06

By John Yelkich,
Diagnostic Technician,
Clean Air Car Check



In this installment of Tech Talk, we are going to continue our Mode \$06 discussion from last month's newsletter. Mode \$06, as you may recall, is nothing more than the on-board monitoring test results for non-continuous monitored systems such as the catalyst, EGR and EVAP systems. It is a way for the service technician to compare actual test values to test limits in order to determine how continuous monitors fail tests of on-board vehicle systems. Mode \$06 was once explained as a way to "predict" which component was the cause of a specific failure.

When a technician uses a scan tool to access Mode \$06 information he is actually requesting PID information. PID stands for Parameter Identification and is expressed in a hexadecimal language. Hexadecimal is a numeral system with a base of 16, that is it employs 16 different symbols for digits and is usually written using 0-9 to represent digits zero through nine and A, B, C, D, E and F to represent digits 10 - 15. Because the symbols start with 0, there is no representation for 16. Therefore when you request or access a PID in Mode \$06 your request will be a combination of the above 16 characters. For instance, when you are requesting Vehicle Speed (km/h) your request is stated as "OD", for Ignition Advance Timing (in degrees) your request is actually "OE", and so on. These PID designations can be found on a number of websites and posted with or near your scan tool for easy access if your scan tool does not display them in English. More of a problem, however, is the fact that the response is also in the hexadecimal language and can be difficult to interpret

if it is not translated for you by your scan tool. A decoder of the hexadecimal response is crucial or the Mode \$06 data is useless. We will discuss this decoding a bit later.

Once the decoding process has occurred the technician can, by deciphering trends, determine when a monitor that has not failed may and why a monitor that has failed did so. This trending is done by interpreting the response from a given sensor and determining where that response lies in the corresponding parameter. This can also aid us in diagnosing intermittent problems. If a

"Mode \$06 was once explained as a way to "predict" which component was the cause of a specific failure."

sensor is noted as being high or low in an assigned parameter, it may lead us to believe that sensor, or an input to that sensor, is causing a code to set or a monitor not to run intermittently. Another specific example would be a hard code P0440. If the technician believed the gas cap were at fault, he could access the information and determine if the code was set because the pressure in the tank was too low or too high. If the pressure was too high, the gas cap could not be at fault because a loose gas cap would cause the pressure to be too low. This information can be a real benefit to the technician in diagnosing those very difficult EVAP codes.

In April, Clean Air Car Check is scheduled to provide a Tech Night on Mode \$06 for technicians. That Tech Night will provide the "secret decoder ring" that is necessary to interpret hexadecimal coding found on your scan tool. It will also cover how access to Mode \$06 on your current scan tool. See the article on the front page for more information.