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DIAGNOSING NOx FAILURES PART II

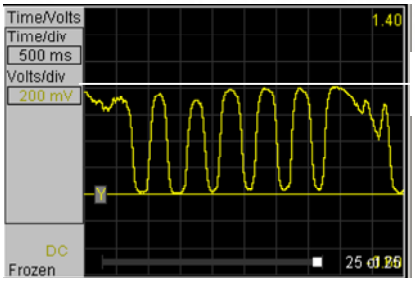
Gary Stamberger – Training Director
Magnaflow Exhaust Products

This month we continue to look at the causes of NOx failures. In our last Bulletin we discussed the EGR system, its design and how to determine if it is working properly. We also listed other causes of high NOx emissions and would like to address some of those in this issue.

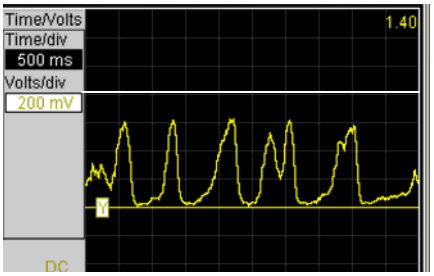
As was discussed, the main cause of high NOx emissions is mostly due to increased temperatures in the combustion chamber. Certainly anything that would cause these temperatures to rise, such as blocked coolant passages or excessive carbon deposits, is suspect and needs to be considered during any diagnosis.

Another problem source is anything that would create a lean running condition. Ignition misfire, advanced ignition timing or clogged injectors are a few examples that will contribute to this condition. Lean conditions cause the exhaust stream to be high in oxygen content. Although high O2 content is beneficial in reducing CO and HC emissions in the catalytic converter, this same excessive oxygen is detrimental to NOx reduction.

The challenge to the technician is to first determine if indeed the vehicle is lean and secondly what exactly is causing it. One way is to closely monitor the upstream oxygen sensor(s). Remember these sensors are there to help the PCM maintain fuel control and should send out a varying voltage signal between .2 and .8 volts. (Refer to TB-80003)



800mv



800mv

In the example on the left we are peaking at 800mv or .8volts (Normal Operation). The one on the right shows the same vehicle under a lean condition. Notice the peak voltage barely reaches 600mv (.6volts) indicating a system that is bias lean. This condition may not cause the PCM to trigger an O2 code but the extra oxygen could affect the converters ability to reduce NOx.

One of the most overlooked problems is that of an air leak upstream of the converter. I know the first reaction is “Who can’t find an exhaust leak”? There have been many documented situations where a leak as small as a pin hole in a weld has caused a vehicle to fail an emission test for excessive N0x. Two of the common methods used to find this type of leak are 1) Filling the exhaust with smoke (via a Smoke Machine) and check for any escaping out or 2) Applying air near a suspected leak while monitoring the Oxygen sensor voltage. A leak would cause the O2 sensor to go dead lean (near zero volts).

Too many times something that seems so minor can have the greatest impact when it comes to repairing a particular problem. The wave forms in the examples above were created by adjusting the MAF frequency by only 300hz. This deviation did not set a code and the vehicle for the most part ran OK. The PCM is programmed to maintain drivability and this can leave the technician thinking “since the car is running OK, all must be well”. This false assumption could lead to the replacement of a perfectly good Converter.

Cleaning up the environment…one converter at a time

Gary