

iea™ Intelligent Engine Analyzer Training

Hidden Pressure Hunt

James Garrido - Have Scanner Will Travel

This month we will use our in cylinder pressure transducer to take a look at a defect that many shops have trouble nailing down even by other more time consuming methods. This defect is a clogged catalyst on only ONE bank of a 2 bank engine equipped with a dual catalyst system.

When only one catalyst on one bank has become restricted the typical complaint is a lack of overall engine power. And if the restriction is severe enough miss firing on only one bank and not necessarily on the bank with the defect! This bank isolated miss fire is due to the effects on airflow through the engine with one side of the engine restricted. When one bank is flow restricted the result is less than 50% of the total air entering the engine ends up being passed through the restricted bank. Yet 50% of the fuel mass is still delivered via the injectors to that restricted bank. As a result one bank ends up very lean and the other bank over rich. The first telling sign of an unequal airflow due to restriction on a V-type engine are the fuel trims. If the fuel trims are moving in increasingly opposite directions bank to bank as engine speed and load increase you need to check for a restriction.

Figure 1 is a P0300 Failure Record captured on code set from a 2003 Chevrolet pick up with a 4.8L cam in block V8. Notice the fuel trims in the capture. Bank one is the side with the clogged catalyst and as such has a negative total fuel trim (STFT+LTFT) correction of -21% while bank 2 is showing a positive total fuel trim correction of +25%.



Fig. 1

How would you diagnose this condition to be a clogged exhaust before purchasing that expensive catalyst? Drop the exhaust and test drive with an open system? And risk needless broken bolts, not a great idea in the rust belt states. A vacuum gauge reading at idle and 2500 RPMs is only useful on severely restricted catalyst systems and will not show a partial restriction on only one bank. You could install a back pressure gauge in place of the front oxygen sensor and then power brake the engine under load at a specific RPM. Then move the back pressure gauge to the other side and compare at the same load. My experience with this is unless the catalyst is severely restricted the gauge bounces around so quickly it is difficult to see if the average needle movement is higher side to side. Pulling hard to get at O2 sensors on a hot engine is no picnic either.

I prefer removing one spark plug from each bank in turn and installing a pressure transducer. Then look at the saved pressure waveforms so that you can get an easily acquired and highly accurate comparison of in cylinder conditions bank to bank.

To do this test start at idle speed so that you have a relatively slow crankshaft speed and a plenty of engine vacuum. Then snap the throttle open. The engine vacuum drops as outside air rushes in to fill the low pressure area in the intake. Initially the

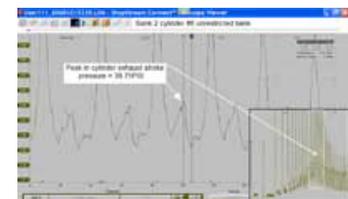


Fig. 2