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Intelligent Engine Analyzer

Training

Impossible Dodge

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The white Dodge Stratus pulled into the parking lot not under its own power, but behind the tow truck. An elderly gentleman walked into the office with the tow driver. He explained that the Dodge dealer had diagnosed his 2003 2.4 liter DOHC Stratus for a no start condition and that the valves had been damaged due to a timing belt problem. A close friend of his had recommended our shop for a second opinion. We exchanged information and I told him that I would call him later that day.

We pushed the vehicle in and cranked it over. At first it sounded like they were right but cranking over the engine will only indicate the RPM is high, not the cause of the problem. If there is a compression problem the engine will increase its cranking speed. In turn one could associate this rapid RPM with a timing belt problem or bent valves. However; additional testing will need to be performed to determine the cause of the problem.

Until recently there was no testing sequence that could determine the exact cause of such a problem. With advancements in technology have come new diagnostic techniques that will astound you. These techniques use pressure transducers to make the impossible into the possible. With this new technology the technician can look inside the engine to determine the mechanical operating condition through the spark plug hole. How is this done? By removing the spark plug from the cylinder head and threading a compression test hose into spark plug hole a waveform can be generated by a pressure transducer attached to this compression hose. Figure 1 shows this compression waveform as the red trace. The yellow trace is produced from a pressure transducer connected to the intake manifold and represents the vacuum in the intake manifold. The green trace is used as a reference of 0 PSI. By analyzing these waveforms the engine condition can be determined

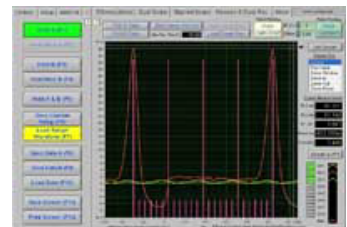


Fig. 1

Now let us analyze the compression waveform in figure 2. Starting at the left side of the chart the red trace starts to rise. This pressure rise is due to the piston moving toward the cylinder head. The closer the piston comes to the cylinder head the higher the pressure within the cylinder becomes. At the point the piston comes as close to the cylinder head as possible; this is where the peak pressure will occur and represents top dead center (TDC). This peak pressure during cranking should be greater than 95 PSI and is usually about 140PSI in a good engine. The peak pressure in this Dodge 2.4 liter engine is very low at 40PSI. If a conventional compression test were done using a gauge this peak pressure would be all the data that would be given. It indicates that the cylinder's ability to produce pressure is compromised but does not indicate why. Perhaps the Dodge dealer used this test to determine their conclusion. The problem with a traditional compression test is that there is not enough data to make a diagnostic conclusion.

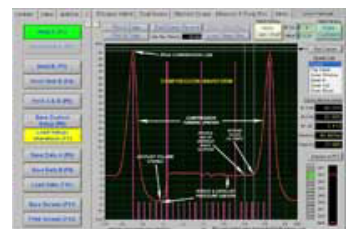


Fig. 2