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VOL. 7

# ON THE MOVE

**The Usual Suspect:  
Common causes of Ignition Coil  
failure in Ford six cylinder engines**

It's no secret that the ignition coils of many late model Ford vehicles using six cylinder engines are the usual suspects when misfires are identified as an engine performance concern. Specifically, vehicles using the 2.5L, 3.0L, 3.8L, and 4.2L six cylinder power plants from the early to mid 2000's are the models for which we are going to focus on in this article.

The secondary ignition circuit is commonly defined as the part of a vehicles ignition system that conducts the extremely high voltages of the ignition coil to the sparkplugs. One of the most prolific killers of ignition coils is high secondary ignition circuit resistance. Typical causes of this condition are fouled spark plugs and faulty or loose spark plug wires on a direct ignition system such as the one we are discussing here. (Always check the easy

things first!) But some not so easily identified causes of high secondary ignition circuit resistance are lean fuel air ratios which could be a result of vacuum leaks, fuel injector concerns, and E.G.R. concerns.

One prime example of a vacuum leak which could lead to a coil damaging lean misfire condition is referenced in Ford TSB 03-16-1. The body of this service bulletin addresses the replacement of gaskets which may leak on the phenolic intake manifolds often used by Ford in their modern engine designs. The root of the issue deals with the amount of oil brought into the manifold by the PCV system which causes the deterioration of rubber gasket material; however a side effect is a constant abnormally lean fuel trim condition due to unmetered air entering the engine.

But what is it about a lean air fuel mixture that can be so damaging to the ignition coil? First and foremost is the concept that

electrical energy can be thought of like water. Voltage is sometimes described as the "pressure" of the energy and Amperage is likened to the "volume" of flow. Ignition coils create a tremendous amount of Voltage when fired, typically in excess of 20-30 thousand volts on modern distributorless systems. With that much "pressure" the energy sent to the secondary side of the coil will seek the path of least resistance to ground, even if that "path" is not the one leading to the spark plug because of higher than normal secondary circuit resistance. In some cases the discharge of electricity will burn straight thru the body of the coil to the outer housing of the coil or to a metal bushing on one of the mounting tabs causing catastrophic damage to the unit. Next we need to know why it is that leaner mixtures are harder to ignite than rich mixtures and how the air/fuel ratio within the combustion chamber affects resistance values of the secondary ignition circuit.

*Continued on Page 2...*



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