**As mentioned in editorial on page 3, we must encourage or at least plant the seed to school students to seriously look at the motor trades as a career. When you hold your OPEN DAY and invite them to view your premises and talk to staff, why not organise some handouts similar to this by our correspondent, Matt Hardy of Futuretech Automotive Training.**

# Diagnostic Strategies

## - by Matt Hardy

Diagnosing faults within vehicles can be frustrating and time consuming though the stress is often caused by not having a familiar diagnostic strategy with equipment that you know and trust.

There are four systems you need to test; the type of engine and accessibility will determine what order you work in. Be 100% confident in your test results before you move to the next system!

### Ignition system

An ignition system must create enough energy to arc across the spark plug for a minimum of 1mS under compression. Using an adjustable spark gap tester you can see and hear if the system can create 30 - 40 KV by arcing 20-25mm. This is the amount of energy required to ignite the air/fuel mixture, a standard plug gap is not acceptable! This rule applies for single coil or multi coil systems. You can use you timing light pick up around the primary wires of your coil if you cant easily access the secondary wiring, this is handy for testing timing control.

### Fuel Injection system

A minimum of 9.5 volts is required for an ECU to control injection, this fact is often overlooked. Always ensure you have good cranking voltage first! To test for injection pulse you can use a noid light plugged into the injector harness, a stethoscope or even your fingers to feel the clicking of the pintle within the injector. If you get an indication of injection you can be assured fuel will be entering the cylinder; though only if the fuel supply system is operating correctly.

### Fuel supply system

The injection system is relying on a pre determined pressure and flow of fuel to the injectors, without this the injection system cannot function correctly. To confirm the integrity of the fuel supply a pressure gauge will be required. This can be time consuming to connect and even impossible if there are no connections available, but this must be done before you can be sure the system is acceptable.

35 psi or 250 Kpa fuel pressure will allow any engine to run. If unable to connect into the system you can use carby cleaner sprayed into the intake to see if the engine runs or performs better. If the engine runs you can be sure the other systems are operating and that you have a fuel delivery problem. In some cases you may need to bench test the fuel pump. Don't forget to use your ears to listen for the fuel pump running!

### Engine Mechanical system

Although manufacturers have been using timing belts for years, the occurrence of a damaged or broken timing belt seems to be increasing, and yes even before the specified maintenance interval!

If you have tested the previous three systems properly you should be confident that a no go situation could only be caused by a fault within the engines mechanical system. Cam timing faults are very common though don't forget that the engine must be able to draw air in and pump air out with very little restriction.

For no go situations checking the cam timing will be necessary, for poor performance a vacuum gauge can be used to determine how well the engine is creating vacuum. 18 - 20 inches of mercury is created in a healthy engines intake manifold, any lower and you may have cam or ignition timing issues.

All workshops have a quiet time where they can practice developing these strategies and get familiar with their equipment; this document has given you some ideas about how to get everyone in your workshop confident with diagnosing engine faults particularly in breakdown situations where limited equipment is available.

If you would like to improve your diagnostic skills Futuretech Automotive Training offer a range of seminars where you can get experience using various types of equipment during simulated fault scenarios.

**Call Matt On 07 3881 1951 or visit their website www.futuretechtraining.com.au**

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