



PEUGEOT 306 KDX MA 3.0

For this month's article I thought I would concentrate on the most feared of all problems "no not the wife's credit card bill", but the dreaded intermittent drivability error.

This particular vehicle came to us through a recommendation, the car and system are simple enough and this example was in good condition. The vehicle was subject to a warranty and this had to be taken into account when entering into the contract of work.

Previous History

The vehicle had recently been purchased and returned to the supplier in order to rectify the problem without success.

Nature of error

When driving the vehicle between 30%-50% throttle the vehicle would demonstrate hesitation, this could be quite severe at times.

Preparation

We examined the vehicle wiring connectors, vacuum hoses, ignition components and spark plugs. The ignition leads had been replaced recently with none O/E specification parts and the insulation and fit quality were poor, we replaced the leads and plugs for O/E spec.

Diagnostics

We examined the vehicle DTC Register without success; we then test drove the vehicle monitoring live data in an attempt to identify a change of state or value that may indicate the area of the problem, once again without success.

This point brings me nicely to comments made via an employee of a well-known serial tool manufacturer, "the oscilloscope is old technology, the only way to detect errors is via the serial port"

My response to this is quite simple, look listen and learn. I am often amused by comments made by salesmen and equipment manufacturers with little or no practical experience of modern diagnostic techniques advising the use only of equipment they happen to sell or supply.

We began specializing in vehicle diagnostics in 1985, since then I have personally been involved in excess of 16000 repairs, and find myself learning more now than ever before.

The one lesson I have learned above all others is that equipment does not replace the skilled technician, someone who is master over a range of diagnostic options, monitoring and evaluating data, the sensitivity or complexity of which is way beyond the ability of simple diagnostic tools.

"Enough of the soapbox on with fixing the car"

Back in the workshop we attached a break out box to the system BOSCH 3.0. After conducting wiring stress test without any negative response, we carefully checked the system critical inputs using our Tektronix 4 channel DPO.

For the diagnostic skeptics out there who don't believe in the application of oscilloscopes, this tool is one of the finest most powerful digital scope I have the good fortune to possess.

Concentrating on the type of errors that are difficult or impossible to detect via the serial port.

These can include fast transients, RF induction, power, ground and current errors and sensor inputs to the ECM> which are out of specification rather than range.

Procedure

The first task was to identify what was actually happening when the hesitation occurred.

Back on the road we began monitoring the major functional outputs, ignition primary and injector pulse profile.

To make this task easier we compressed the waveform data over a long time base, we can then view from a distance so to speak unusual events that take place, then **zoom in** for a more detailed look.

We noted that the drivability error was consistent and symmetrical with loss of the injector pulse (see wave form 1)

We have already tested the injector fully in our ASNU test bench back in the workshop, without fault. We then continued testing remaining focused on the injector circuit whilst monitoring key and critical inputs to the ECM that will effect the triggering of the injector.

Notable common causes, the idle motor contact switch was not to blame remaining fully open when the error occurred. The next observation concentrated on the outputs from the dual track potentiometer, critical for the correct fuelling of this system.

We noted a slight drop in the output of the second track symmetrical with the error (see waveform 2). We repeated this observation to rule out any change by our input through the throttle linkage.

Repair

Convinced of our evidence we advised replacing the component, only serviced by a base change or complete body exchange. After the physical repairs were concluded we validated the repair with several road tests before invoicing and returning the car to the owner.

Evaluation and Validation

It was interesting to note this error could not be repeated during static testing. Road and engine vibration combined with throttle dither during driving to produce a loss in signal quality to the ECM. The system was confused into overrun fuel cut off by the decrease in TPi voltage. This is a natural function to aid smooth transition between fuel on and off whilst driving.

So what was the key to a successful repair?

A skillful approach, the right procedure, the correct choice of tools at the appropriate time and last but not least communication with the customer.