Introduction

Take yourself back to the college classroom for a moment and think about Ohms law. Recall the volts amps and resistance triangle. Did it really mean anything to you? Or was it just theory gone mad? In this era of mass electronic system control in the motor vehicle, an understanding of Ohm's law and the like is more important than ever, especially where efficient and accurate system fault diagnosis is required.

A foundation point to understand is that all electrical devices work on the principle that they consume power (watts) in return for work. This work may be moving an injector, actuating an idle control valve, rotating a fuel pump or heating the hot wire of an air mass meter.

In many cases testing for voltage or resistance only gives us half the information needed for accurate diagnosis. Using these tests alone can lead to problems being mis-diagnosed or missed completely. Vehicle technology has progressed so far that the days of measuring single parameters (only resistance or only voltage) in circuits as the first step in the diagnostic routine are gone.

Most practising diagnosticians will tell you that before you get down to the nitty-gritty of probing and measuring, diagnosing faults in complex control systems requires a combination of assessments performed through a structured, logical approach.

The alternative is to practise the 'grease monkey logic' approach; it goes, the car is doing this, it has to be this, or this, or this, or that - arranged in order of cost, starting with the least expensive then working its way up the list to the most expensive, normally ending with a replacement control unit.

The logical approach starts at the beginning - stringent owner/driver interrogation, then utilise your god-given senses (look, listen, smell, feel) and road test. If necessary, basic engine condition checks follow (vacuum/compression and emissions), fuel pressure/flow tests. Retrieving diagnostic trouble codes (DTC's) is high up the order of assessment if the system malfunction indicator lamp has come on. It is recommended that you should follow a set procedure when dealing with DTC's – read, erase, re-test, read then review, although is depends greatly on the cause of the fault. After symptoms and data have been analysed, dynamic system testing can commence.

Dynamic system testing is where the technician assesses the control system under test in its 'real world' operating environment and, if possible, in the same environment that the fault is evident. Amongst the 'must have' tools for dynamic system testing is an oscilloscope allied with the relevant test probes.

This book has been designed and written to enable technicians new to scopes, as well as experienced users, to use this advanced tool in their diagnostic routine to enable quick, accurate diagnostics.

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