

Sensor Plausibility – A missed diagnosis

When a technician starts the diagnosis process, one of the most common mistakes the Helpline sees is when a plausibility check of all sensors is not performed before any attempt to start the engine. After a basic test of the electrical health of the vehicle battery, the first step is usually to scan for fault codes, then concentrate on the system the error is indicating.

A common example we find is a fault with the turbocharging system, either under or over boosting errors. It seems most mechanics head straight to checking the turbocharger and associated pipe work, and checking to see how much boost is available on serial data. If under boosting, checking for a leak, testing the vacuum supply to the turbo and finally the mechanical condition of the turbo itself. If over boosting, checking the control arm is free in movement, vacuum control valve operation, or the electronic turbo actuator.

But the very first, and very important step is often overlooked: It is critical to determine what is the boost pressure data before the engine is even started. Vehicles can have multiple pressure sensors fitted for intake pressure, manifold absolute pressure and turbo charging pressure. These sensors work on the absolute pressure principle, which includes barometric/atmospheric

pressure. Before the engine is started, all these sensors should display the atmospheric pressure on that day, and all be within a very close range of each other. Barometric or atmospheric air pressure changes from day to day and region to region. Atmospheric pressure can be checked online at met.ie/latest-reports/observations to see what your regional pressure currently is.

After the atmospheric pressure is known and all pressure sensors are showing the same pressure level, only then can a pressure reading test begin. If any reading is off range with the key on and the engine off, this must be rectified first.

Possible problem could be from a wiring problem to the sensor, or a faulty sensor itself. Start by checking the reference supply voltage and ground to the sensor, normally 5 volts for most systems. The signal line, while disconnected, should also read 5 volts and then drop to the

signal voltage when reconnected to display barometric pressure. The use of a hand controlled pressure pump, like a Mityvac, can be used to test sensor plausibility over its operating range.

Applying a known pressure should alter the serial data at the same rate over the entire range of the sensor. This principle should be applied to all sensors before the engine is started.

Temperatures can also be compared, engine coolant, intake air and atmospheric air. They should all show similar data if the vehicle has been allowed to cool down over a long period of time. These can also include climate control system temperatures, for evaporator temperature, cabin temperature etc.

One thing to be aware of is that differential pressure sensors and AC pressure sensors work on a gauge pressure principal. Gauge pressure is the pressure above, or below, the barometric pressure. This means that without any pressure applied, a differential pressure sensor should read zero. This is not to be confused with the absolute pressure sensors previously mentioned, which always include atmospheric pressure.



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