An Astra lacking power

A 2003 Opel Astra 1.7DTI was lacking power, and the customer had been told that the engine ECU was suspected of being faulty, as it wasn't switching the boost control solenoid. Seamus Ryan of Ryans Automotive recounts how the true cause of the problem was easily determined and fixed.

On the initial test drive the Astra was indeed slightly low on power. A scan for DTC showed that no faults were present.

The next step was to check the turbo boost pressure on live data with the Tecnomotor Socio 600. The boost reading with the key on but engine off, was 1001 mbar, the atmospheric pressure, proving the sensor was at the correct starting point. The maximum boost pressure reading was checked while driving at full load, and reached 1400 mbar, showing the turbo was providing 400 mbar of boost above the atmospheric pressure of 1000 mbar. At the same time, the Socio 600 indicated the desired boost value was 1900 mbar, well below what the turbo was actually producing.

It is always a good idea to have a visual look around all of the parts and components. The turbo on this engine had a waste gate, and not the more popular variable geometry turbo. A waste gate dumps boost when demand drops rapidly, such as during gear changes. Most waste gate controlled turbos have a small boost pressure pipe connected to a waste gate actuator. When boost reaches the maximum desired pressure, the excess boost pressure overcomes the spring in the actuator, opening the waste gate and reducing boost pressure.

This Astra engine did not work on excess boost pressure to open the waste gate, it was controlled by vacuum operated boost control solenoid. When full boost was required, the solenoid has no vacuum, and the actuator keeps the waste gate closed. When boost reaches the desired pressure, the ECU provides vacuum to the control solenoid, causing the actuator to open the waste gate and reduce boost.

A quick test of the boost control solenoid and actuator confirmed they were working properly, confirming that the ECU and the boost control solenoid and circuit were working as designed.

The next step was to determine why the boost was so low. The next diagnostic step in a situation like this is to check for boost leaks with a smoke machine. The smoke machine was used to fill the entire air intake system with smoke. Any leak would have been visible by looking for smoke escaping from the intake

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system. But on this Astra, no leaks were seen, and the flow meter on the smoke machine see (fig.1) showed the system was tight. This proved that the EGR valve was making a good seal. If the EGR valve was stuck open, there would not have been any visible smoke from the intake system, but the flow meter would be high because of smoke escaping out the exhaust.

A smoke test is quick and very informative and can be performed in about 5 minutes. It can reveal leaks that would never be seen, unless you knew exactly what and where you were looking for.

The next step was to check the actual boost pressure with a digital turbo pressure tester. As there was nowhere to tap into the turbo system on this car, a small needle was inserted into the rubber turbo pipe. The needle was inserted in the direction of air flow (fig 2) through the pipe so that after the needle is removed, the turbo pressure closes the hole made by the needle, eliminating any risk of


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causing a leak in the system. The pressure tester showed that the maximum turbo boost reached was 820 mbar (fig 3) meaning that the turbo was actually generating 1820 mbar within the system. This proved that the turbo was working as it should, and that the problem

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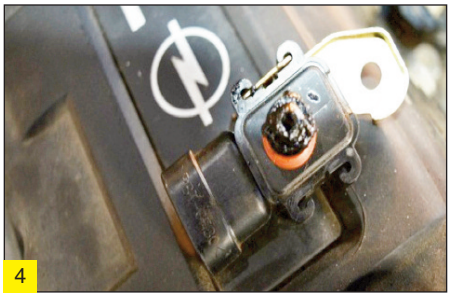
was most likely a sensor not reading the existing pressure correctly.

Because the turbo was developing much higher boost than shown on the diagnostic tool, and therefore the ECU, the next step was to remove and examine the turbo boost pressure sensor. The problem became instantly obvious on inspection (fig 4). The turbo boost pressure sensor was badly blocked with carbon, as was the intake manifold. On cleaning the manifold and replacing the boost pressure sensor, full power was restored to the car.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Conclusion

Its very important to spend time studying any system first, and understand how it works before diving in. Don't allow the customer to pressure you into making a decision on what they think is wrong, or make a quick, un-informed decision, just because they may not want to pay for your diagnostic time. Nine times out of ten, you will be saving the customer money by charging for your skilled diagnostic time, and changing fewer parts.

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