

Sorento Sorrow

This article is a true description of an AECS technical help desk problem and how it was solved.

Vehicle

2007 Kia Sorento Common Rail Diesel.

Problem presented to the Helpdesk

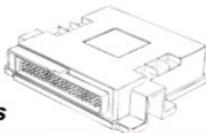
This vehicle was presented to us with a massive oil leak (oil everywhere) as a result of a cracked rocker cover. We replaced the rocker cover and gasket, but found that after starting the vehicle was smoking really badly.



The actual car, while in the workshop being accelerated.

We (the garage) looked at the airmass sensor as there was a fault code and loss of power (code was not noted down). The airmass sensor was covered in oil looking like blow by, and we expected a loss of compression. Cylinder 2 and 3

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were low in compression, and number 4 was not checked as the glow plug was seized solid.

After investigation we noticed that the technician who replaced the rocker cover did not torque the injectors in properly, which were leaking and causing the blow by.

After torquing the injectors down properly the engine starts better, but is missing when it is running. It emits a lot of smoke when it is running.

We have not done your common rail Diesel training (DMS1-3) yet, can you please help?

This shop has got an ATS scope and Launch scantool from AECS, so of course we are willing and able to assist. Little did we know how much they had gotten into trouble though!

Technical support help desk.

We suggested, if perhaps they could disconnect the breather, to make sure that there was no blow by, after all why was the rocker cover split?

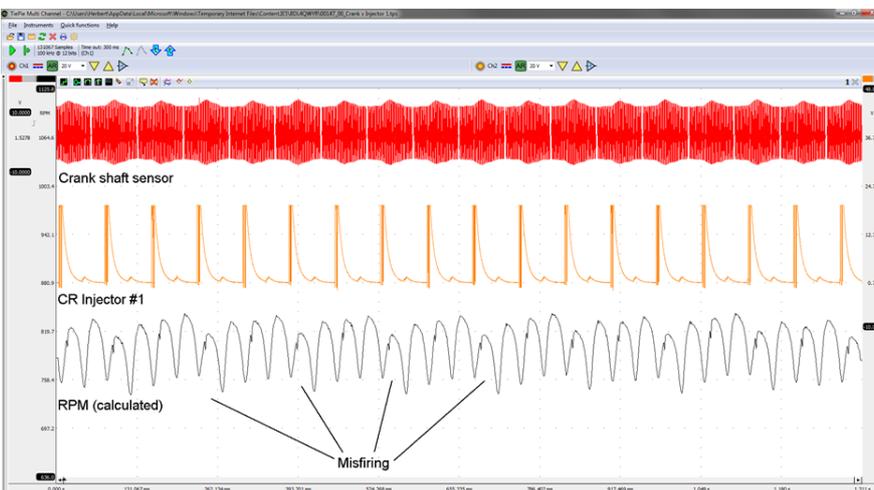
With the breather pipe disconnected there was no noticeable difference in smoke and misfire.

The next logical solution was to check the EGR valve. A stuck open EGR valve displaces the air in the intake manifold, which makes the engine smoke. The EGR was blocked off for now, despite the possible fault codes, with no effect.

We asked him to record injector vs crankshaft with his ATS scope to see if the misfire was on one cylinder or random on all cylinders.

In the recording of the crank shaft vs injector, the crank pattern was converted by the ATS scope to an analogue line. It was instantly clear that every time after injector 1 had fired the crank shaft did not speed up as much as the other cylinders. This was surely not a random misfire, something is wrong with one cylinder.

Coding injectors



Recording of crank vs injector.



We asked the technician if it perhaps was possible that the injectors were swapped around without recoding. The technician responded that indeed the sequence of the injectors was not noted and that they were placed randomly in the head. However, they had re-coded the injectors correctly into the ECU with their Launch scanner.

I asked him to do that again but now about half an hour after the car was placed on a battery charger, while the charger is still connected.

The recoding of the injectors made a small difference, but by no means was the car driveable, the misfire on cylinder one was still present.

Test injectors

Time to take the common rail injectors out and get them tested. The Bosch injectors were sent to a Diesel specialist who has all the common rail test gear. The injectors were returned with one nozzle replaced and the other three overhauled. 2 new injector codes were supplied, to be programmed into the car's ECU.

The engine was still pouring out smoke as bad as before!

We proceeded with trying to simulate different engine temperatures, different air mass values, and different boost pressure sensor values, all to no avail, except

adding time to the job.

Frustrated

A Diesel engine can only smoke as a result of Timing problems, injection quantity problems or breathing problems. Out of frustration, we wanted to make sure that there was no actual breathing problem like blocked intake manifold or blocked catalytic converter. The engine's intake and exhaust manifold were removed to have it running unrestricted.

The engine was still smoking badly on the exhaust side.

On the intake side you could still see the engine, and it seemed as if out of the intake valves of number 1, a bit of spit back happened (exhaust gas leaking back). The decision was made to remove the cylinder head and look for leaking intake valves or broken valve spring (remember the compression test showed 1, 2 and 3 good). Only the exhaust valve had a bit of carbon on the valve seat, maybe because of the extreme smoking, the intake seat was clean. This did not explain the spit back or the smoke. The hydraulic lifters were swapped between cylinders, just in case. After putting the head back on, the engine still smoked as bad as before.

Now what?

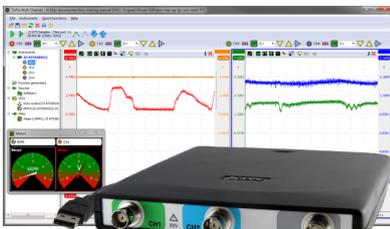
Sticking SCV's on common rail Diesel engines is a real problem at the moment; the AECS help desk gets presented with SCV problems weekly. With the scope's signal generator and solenoid driver, we got this technician to control the SCV on a running engine. Regulating it slowly to its closed position has an immediate effect on the rail pressure, and after a while, the engine speed would drop together with the smoke. This told us that the rail pressure was controlled correctly by the ECU and that there were no funny rail pressure sensor issues.

Headache

We knew it was not breathing problems, nor was it timing problems, subsequent scope measurements revealed that the injection timing on all cylinders was the same.

After a few days break from this now "headache problem" I asked, the technician to either buy new injectors or get another (AADS) Diesel specialist to test the injectors, for a second opinion.

We discussed this with the second Diesel spe-



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cialist who was willing to run the test.

We got from both specialists the test sheets of the injectors. However, the test criteria in the test protocol were under certain circumstances unbelievable; the target fuel quantity 40ml plus or minus 40ml..... This leaves lots of room for interpretation!

The difference in results on the test bench was significant, so were the injector codes given by the second specialist!

The technician fitted the injectors (without any work done to the injectors) and entered the new calibration codes with his Launch.

Perfect!

The car runs fine now.

Conclusion

There really is no conclusion other than, that this has been utterly costly. This has been one of the most frustrating jobs I have been involved in, all because of a set of incorrect calibration codes. How do you diagnose that over the phone??

We gave our customer our best effort here at AECS, but I

cannot say that we have made a very big difference.

However the tooling used, did.

Just imagine, how this job would have gone without the ATS scope (for the misfire detection) or the ability to enter the injector codes with the Launch Scan tool...



Herbert

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6	6	6 ChCh - AED
7	7 Auckland Scan	7 ChCh - AED
8	8 Auckland Scan	8 ChCh - DMS13
9	9 Auckland AED	9 ChCh - DMS13
10 Taranaki Anniversary	10 Auckland AED	10
11 Auckland AED	11	11
12 Auckland AED	12	12 Dunedin - SCAN
13 Auckland ATS	13	13 Dunedin - SCAN
14 Auckland ATS	14	14
15	15	15 Nelson - EMS11
16	16	16 Nelson - EMS11
17	17	17
18 Auckland DMS 1-3	18	18
19 Auckland DMS 1-3	19	19
20 AED - Full	20	20
21 AED - Full	21 Easter Monday	21
22	22	22
23	23	23 Auto SS conference Auckland
24 otago anniversary	24	24 Auto SS conference
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