

Elf by Itself ISUZU

Problem presented to the Helpdesk

The customer who owned the truck was referred to the workshop (who owns AECS diagnostic equipment) by an employee, who had work done by this workshop before.

The truck had an original long term complaint of hard starting followed by a brief period of bad running and in some cases no starting at all (just winding over).

For the above issues the truck had been offered to a number of workshops.

Amongst others the following items had been replaced:

- Glow plugs (why? They should have been tested before replacement),
- A glow timer has been fitted.... (now that is just stupid! The ECU always knows best when to glow, if something is wrong with the glow time an ECU input is faulty),
- The injectors had been serviced.... These injectors are not serviceable, so we are not sure what was done for this customer. He was told that the injector service might not solve the issue. I am not sure if the customer had to pay for the service and labour.

All this work left the poor Elf "just by itself" as it was still not going any better.

Measuring

The workshop who subscribes to AECS diagnostic support, recorded what happened during hard starting with an ATS 5004d scope.

On common rail it is essential to have rail pressure and injection during starting. The technician deviated a little from that first measurement, he recorded Suction Control Valve (SCV), crank shaft sensor and rail pressure.

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

Vehicle
2003 Isuzu Elf,
Common Rail
Diesel 4HL1,
4.7 Ltr 4cyl.
Engine.



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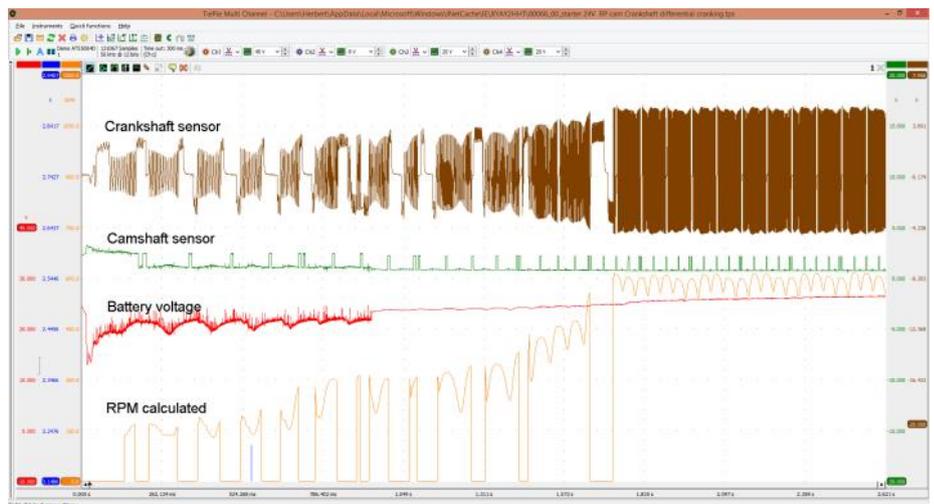
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Picture 1: ATS scope recording when the engine is hard to start and runs badly for a little while.

Picture 2: ATS differential recording of crank and cam shaft sensor with RPM calculated trace added. Please note that in this recording it only takes 1.3 seconds for the engine to kick into life.



Immediately clear in Picture 1, the very first recording is that the crankshaft sensor signal is not good. The rail pressure and SCV signals behaved fine. The areas where the crank shaft signal voltage rises intermittently is where the ECU gets into calculation difficulties. It cannot sense accurately where the pistons are anymore.

So where is the problem?

The signal voltage could be rising as a result of a broken sensor earth, a sensor issue or a problem with the ECU (least likely).



Picture 3: Zoomed in on the RPM trace

To determine if the sensor is faulty or okay a differential measurement needed to be made across the sensor: See Picture 2. Immediately it is visible in the calculated RPM line (!) that the signal is not correct. The ECU cannot calculate RPM from the crank sensor signal just like how the scope cannot. The technology in the scope is similar to the technology in the ECU.



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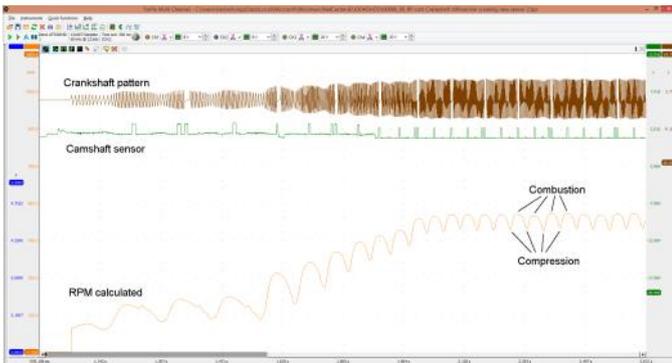
Found it!

Since the signal was still bad, while measuring at the sensor, you can safely conclude that the problem is inside the sensor.

A new sensor was ordered and fitted.



A recording (Picture 4) was made with the new sensor in place, for confirmation and since the scope was still connected:



Picture 4: ATS scope recording with new crank sensor. Please note that in this recording it took only 0.9 seconds for the engine to fire up.

In this recording (Picture 4) it is clear to see that the crank shaft sensor signal is absolutely perfect, and also that the engine despite its 400,000 km's still has nice even compressions and nice even combustion.

Conclusion

This vehicle was worth fixing! However it was not worth the endless months of running around from workshop to workshop.

Imagine how embarrassing it would be if you, for example, had fitted that glow timer! Imagine how let down the customer would feel in having to put up with this.

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It is not hard to diagnose electronic faults like this, it does not take long, nor should this be expensive. This is not highly trained specialist work. The workshop involved needed only minimal guidance from our help desk, they were really only after confirmation to see if their conclusion was the right one.

I cannot stress enough that equipment like the ATS scope, which goes hand in hand with AECS technical support and training, is mainstream equipment for modern (?) vehicles.

The icing on the cake for the customer is that the diagnostician could tell the customer that the engine was still in good condition. The workshop will have gained a commercial customer with perhaps a much wider range of vehicles that need work.

The customer has renewed confidence in the vehicle and feels great about the workshop they just discovered!



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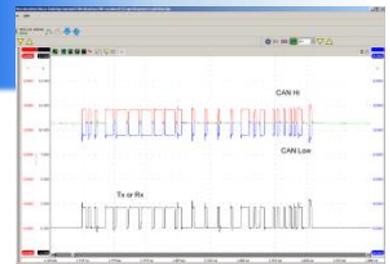
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