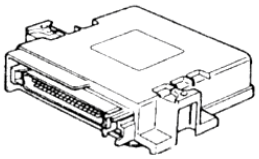
September 2010
Technical Newsletter

AECS Ph:+64 (6) 874 9077 Fax:+64 (6) 874 9078

Automotive Electronic Control Systems



AECS
Training, Equipment and Data for Automotive Diagnostic Specialists

www.aecs.net
E-mail: info@aecs.net

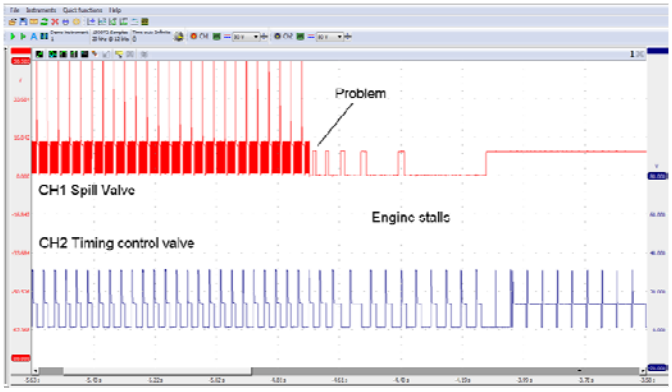
Towed Toyota

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

Vehicle:
1996 Toyota Prado 3.0Ltr Turbo Diesel.

Problem presented to the help desk
This vehicle had been around several garages and ended up in a workshop that owns the ATS scope and could rely on the back up from the AECS' help desk.
The vehicle starts fine and runs fine but intermittently stalls, sometimes it runs for several minutes and sometimes it stalls immediately after start up.
There are no fault codes present, the vehicle does not have an immobiliser. The previous shops had the fuel filters replaced and even the tank removed plus cleaned. The fuel lines had been blown out, as a fuelling problem like Diesel bug was suspected. This was determined by cracking one of the injector lines while running, the diesel stopped coming out when the engine died……

Measuring
On a Diesel vehicle, you need to have the injection quantity and injection timing correct for it to run, so that always seems to me the best place to start.



ATS scope recording with the new multi-channel software when the problem occurred

This recording sorts straight away out that there is no lack of fuel coming into the injection pump.
For example, a blocked filter, fuel intake or air leaking in, reduces the internal pump pressure. The reduced pump pressure retards the injection

Did you know AECS promotes these brands?

AVL DITEST

Scan tools, emission testers and scopes (Austria)

BrainBee AUTOMOTIVE

Emission testers, Scan tools, Scopes, injector cleaner & tester (Italy)

aeroservice Equipments

Retractable and fixed work-shop extraction equipment. (Italy)

ECOTECHNICS®

High quality air-conditioning equipment. (Italy)

GMTO

ATS automotive scopes, and ATIS data base manufactured by GMTO. (Holland)

VTEQ

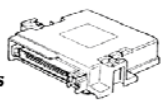
Top of the line brake roller/ test lane equipment from VTEQ (From Spain)

LAUNCH X-431

Scan tools. (China)

The equipment is supported with our well known, recognised training system and our technical support.
For annual calibration and regular service there is no need to send the equipment away, in most cases we can pick up and return the equipment the same day or perform the service on site.

Automotive Electronic Control Systems



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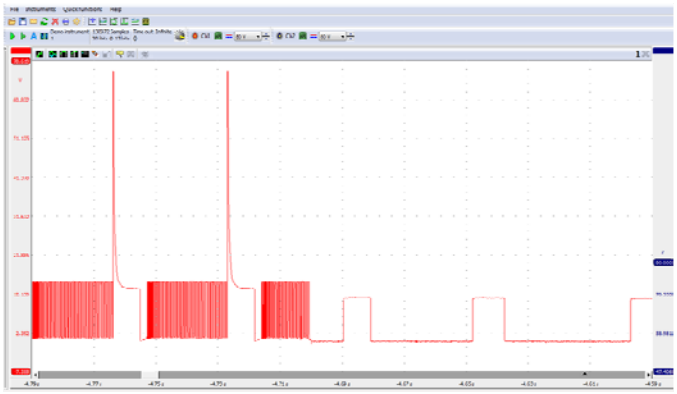
timing. The ECU will try to compensate by reducing the TCV duty cycle.
In this pattern, the TCV Duty Cycle stays unaffected except a frequency shift.
During our DMS 1-1 training seminar we build this straightforward conclusion making skill.
In the same pattern, you can also see that the Spill valve signal changes dramatically. The current control and inductive spike disappears, just before the engine stalls.



Zoomed in detail on the spill valve pattern

The current control only appears when the current is high and the inductive spike only appears when a magnetic field collapses. It was clear from this pattern that the current through the spill valve was suddenly reduced, stopping a magnetic field from being built up, leaving the spill valve open. An open spill valve stops Diesel injection immediately, stalling the engine.

AECS Training coming up:

ECAC1
Electronic Controlled Air-conditioning 1
19th & 20th October CHRISTCHURCH

DMS1-3
Diesel Management Systems 1 – 3
(Denso common rail system is covered in great detail)
21st & 22nd October CHRISTCHURCH

AED
Automotive Electronic Diagnostics
25th & 26th October GREYMOUTH
(On a **Public Holiday** for those who are too busy to be away from the workshop)

See our website for more details or enrol online
www.aecs.net
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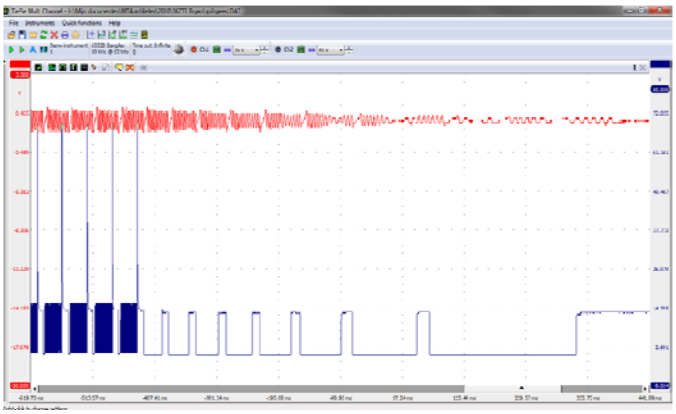
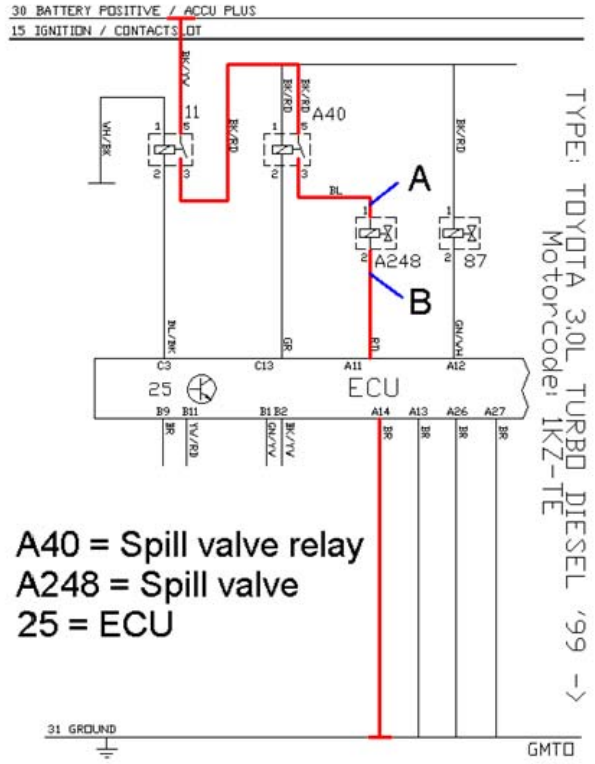
Better be sure

To make sure the diagnostician measured the spill valve signal vs the pump shaft sensor. The pump shaft sensor is the key input the ECU needs to activate the spill valve. This measurement was not necessary, but it only involved moving the position of one test probe.



ATS scope recording of Pump shaft sensor vs Spill

The pump shaft signal stayed fine all the way, until the engine had stopped.



ATIS scope wiring diagram with the circuit high lighted in red. A and B are measurement points.

Current flow

The current through the spill valve of this vehicle flows through a system relay (11), a spill valve relay (A40), through the Spill valve itself (A248), through the switching circuit in the ECU (25), and then on to earth.

The easiest was to measure on the power supply side of the spill valve (A) vs the signal side (B). This recording was not saved, but revealed a reasonable quality power supply, which did not collapse when the spill valve signal faulted.

For sure

This meant that the diagnostician had found the problem for sure, power supply intact, switched side properly switched to earth, but no current flow. The combination of these facts can only mean one thing, an almost open loop circuit in the spill valve circuit between where the probes are connected (A&B).

The external wiring to the valve looked fine so we had to assume it was in the spill valve itself.

After removing the pump and replacing the spill valve (recalibration required), the vehicle ran fine.

It has done more than 1000 km's now and is still running fine.

Conclusion:

This job was real easy, it did not take more than about 30 minutes to locate the fault. No modern technician should struggle with this.

The AECS training seminars instill the needed skill to get there quick and direct.

The AECS skill building seminars are held throughout the country and Australia and are very well attended. We are building up the number of technicians who obtaining these diagnostic skills steadily, don't get left behind.

It should also be clear that attempting jobs like these without a proper scope like the ATS 5000 makes a good technician look bad.

Choose your equipment, training and support supplier wisely.

Herbert

For **AECS Ltd**:
H.P. Leijen
(trainer/research)
E-Mail: hpleijen@aecs.net

P.S. I will be away attending diagnostic training seminars in Europe my self from the 9th of Sept. till the 3rd of Oct.
I will bring back valuable diagnostic information.

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