

Capella, problem

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

Vehicle: 2000 Mazda Capella 2 litre.

Problem presented to the help desk

The vehicle was presented to a workshop with the following complaint. The car would drive fine but every now and then, maybe two times in a day it misfires ever so gently. Sometimes there was a hint of pre-ignition, but not enough to really worry about. No need to say that this customer was precise, but he was worried about worse to come.

While driving the car and while idling in the workshop nothing would be noticed, not even while driving with the customer.

The workshop where the car had been previously had a scan tool used for diagnostics and found nothing wrong. The customer had been back to that workshop a number of times, every time the customer was charged (scan tool hook up charge) while the problem was not found. The customer decided to move up in the ranks and leave that workshop as a customer. For good...

The next workshop where the car was presented to has AECS technical support, a scan tool and an ATS oscilloscope.

So where do you start in a case like that?

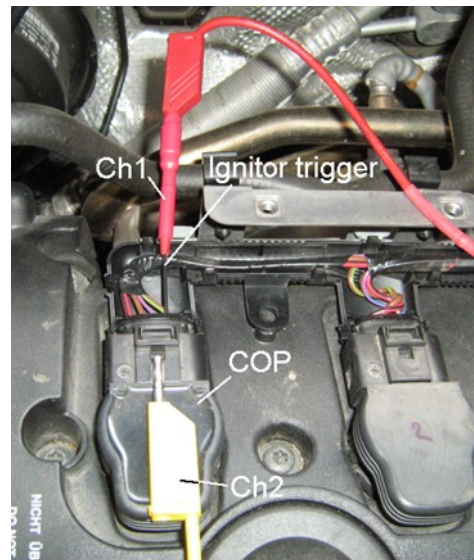
Measure

A misfire can almost always be made visible in studying either the ignition, the injection or the relation between the two patterns.

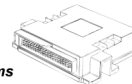
A recording was made while running the vehicle in the workshop. It was almost instantly visible that there was something wrong with the ignition pattern.

Before we go into the patterns, I need to explain that the vehicle has two DIS coils. Each coil feeds two spark plugs. The coil has the ignitor build in, so no primary pattern was measurable.

The highly sensitive ATS scope has the ability to record the magnetic field around a coil with no special adapters, effectively recording a secondary ignition scope pattern.



Hook up sample of the ATS scope on a 2007 VW coil, no special probes are needed



Equipment

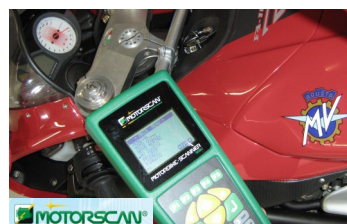
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Herbert Leijen



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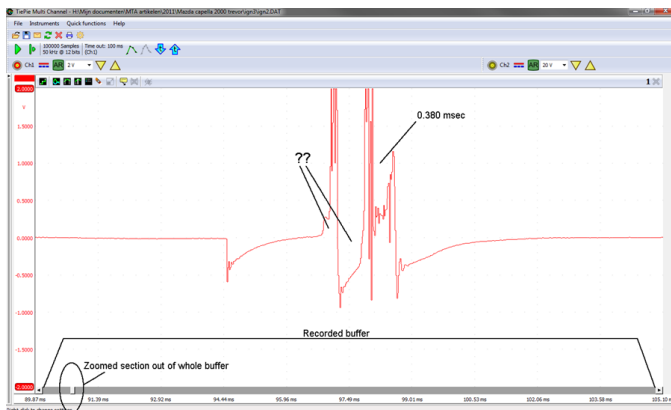
4 Gas emission analyser. Can be run stand alone or from PC.

AECS Equipment

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Interesting...

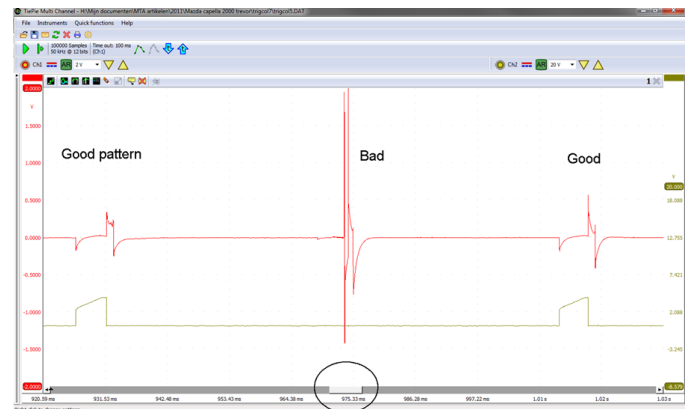
The recording revealed a very interesting signal, even though the car was not misbehaving. Displayed below are only a few portions of the recordings.



Zoomed in ATS scope recording of the induced ignition pattern while idling.

The ATS scope recording which was sent to the help desk shows to me an incomprehensible ignition pattern. It needs to be noted that the engine is running fine during this recording.

We asked to have the same recording done again in dual channel mode with the second channel connected to the ignition trigger signal (= signal between the ECU and ignitor inside the coil).



ATS dual channel recording of the induced ignition pattern on coil 1 vs. the trigger on coil 2.

The recording was accidentally made with channel 2 hooked up on the trigger of the good coil. This was good as it provided us with better insight as to what happened.

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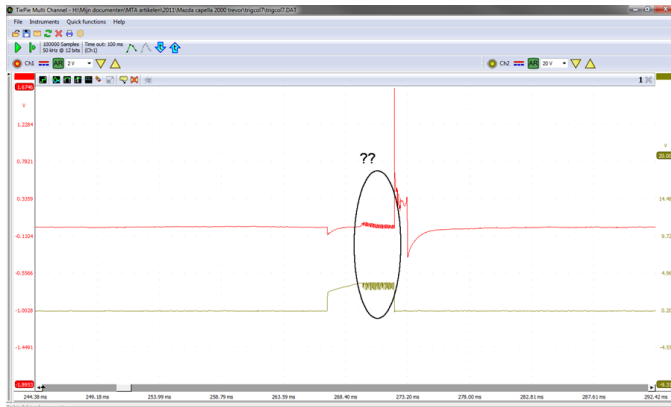
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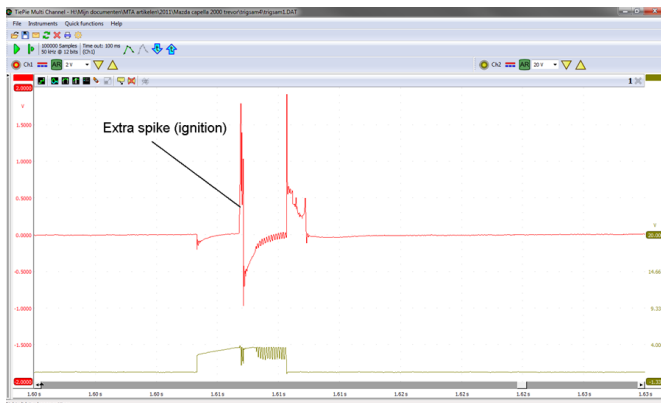
VTEQ

What is all that fuss about??

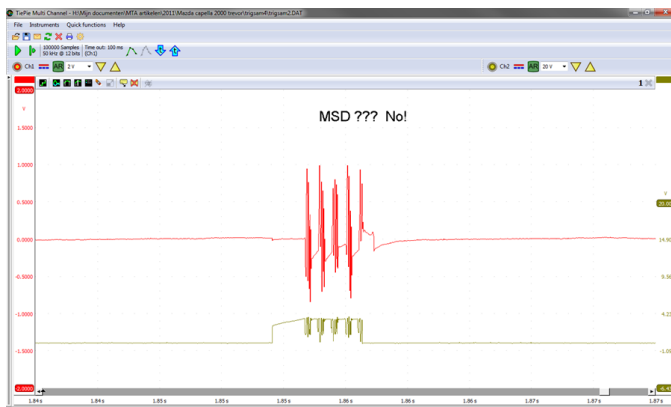


Same recording but now with Channel 2 connected to the faulty coil's trigger.

Bingo, there it is!



A bit further down in the recording, the weird extra spike comes back.



Until it even gets worse and multiple baby sparks are discharged.

No this is not MSD ignition; this is a bad ignitor in the coil pack.

It must be noted that the car is still running fine here!! I suspect that the knock sensor retarded the ignition a few degrees to make up for the pre-ignition, but I have no proof of that. That is: in three measurements and 15 minutes labour in the workshop, a phone call and an e-mail to the help desk; problem found.

A new coil was ordered, fitted and the car is going fine now

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Conclusion:

This job was easy and quick. The combination of quality equipment, training on how to use the equipment and AECS technical support via the internet made this job profitable. The first garage lost a customer. Where would you like to be?

It should once again be clear that attempting jobs like this without proper equipment and training makes a good workshop look bad.

Choose your equipment, training and support supplier with consideration for quality and track record.

Herbert

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

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