



Working Smarter

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

Vehicle

Audi RS5 2011 4.2 V8 FSI



Audi RS5 2011 4.2 V8 FSI (picture sources from internet).

Problem presented to the Technical Support Team

We have an Audi 2011 RS5 4.2 FSI with crank/cam correlation fault code for the left side engine bank.

We have checked with the Launch Scanner and tried in vain to reset the code and do a cam re-learn, but unsuccessful.

Can you guys from the AECS help desk please help us set up our scope to check for timing chain stretch?



LAUNCH Auscan3 in action

Straight forward

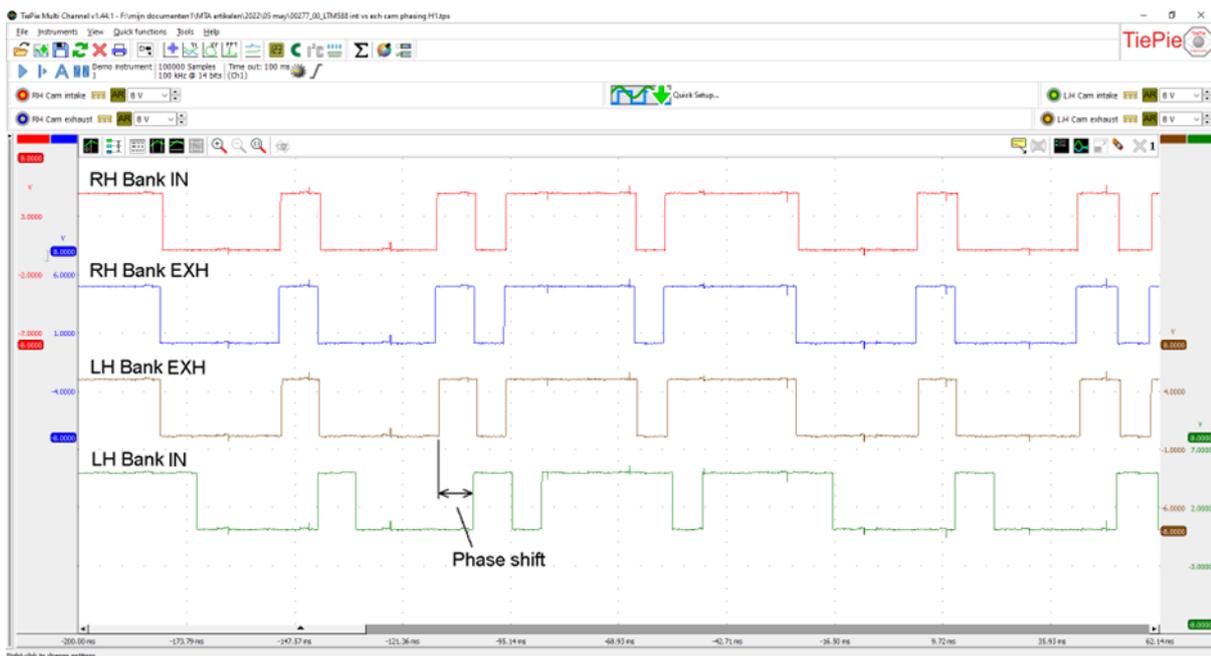
I am sure it is a fairly straight forward procedure once you have done it a few times but we can do with some professional help.

Assistance from the AECS engineers makes the job quick and results in a confident diagnosis.

Solution

We suggested to measure all 4 camshafts by measuring camshaft hall sensors' signals. This to see if the phasing of the left and right banks on this vee engine, were matching.

The left bank should be the same as the right bank. Particularly when we disconnected the camshaft adjuster solenoids (VVT) to lock the hydraulic advancers in the fully retarded position. This is to eliminate possible cam phasing fluctuations created by the ECU.



ATS 6004XM WiFi scope recording of the 4 cam shaft sensors



We can see in the first recording that in fact the top two scope traces for the right bank intake and exhaust camshafts of this engine are aligned with each other. That is just what we wanted to see. The left exhaust camshaft is in alignment with the two right bank shafts. All as we would expect. However, it is clear that the left intake camshaft is not in alignment and is advanced compared with the other camshafts.

What could be wrong?

When looking at a recording like this we need to go through all sorts of possibilities, in the AECS trainings we teach to consider EVERYTHING! For example, it is possible that the left intake camshaft has jumped on the timing chain or the camshaft advancer on one of the left side bank camshaft is seized.

The diagnostician was keen to see the phase shift in crank angle degrees so we could see immediately if there was a cam chain issue. The 4 channel scope was connected to the crank shaft and the two intake cam shafts.

Maths

Added to the 3 traces of recording was a ‘Maths’ channel, a trace that can be added to a live recording if you wish. In this article we have static pictures so it does not show so nicely as in the real workshop world.



ATS WiFi 6004XM scope recording with added crank angle math trace.

The Maths channel calculates the crankshaft teeth (rising and falling slopes) and adds or subtracts for each change in the crankshaft signal an amounts of crank angle degrees. The outcome of the ‘maths’ is displayed as a trace (crankshaft angle (calculated) in the below picture). This is only one of the unique and super useful functions of the ATS scope.

6 Channels?



Compared to the previous (4 cam) pattern we could have asked the diagnostician to connect an extra 2 channel ATS scope to record the crankshaft as an extra trace with the than available 6 channels.

However his second scope was being used on an other vehicle, so one of the cam shaft channels was disconnected and connected to the Crankshaft sensor.

ATS 6004XM WiFi scope



ATS WiFi 6004 scope rear



Highlighted above are the mini HDMI 'scope link ports' through which multiple scopes (up to 128) can be linked to be single source triggered.

Quote

Now this is just great information to know from less than 30 minutes of work. Simply access the 4x cam- and crank shaft hall sensors, record, analysis, quote client.

Oh and knowing what variations to quote on, parts availability (included gaskets and other small materials), workshop time engaged, scheduling, etc. before going any further with confidence. A job like this can run into thousands of dollars of work to resolve if not done professionally.

Labour for just the timing chain replacement according to a data base system is 12 hours plus either remove and install engine, including degas and regas the AC, or remove/install the transmission, you be the judge on the size of this job!

It is important your clients know with accuracy the costs, as only then the bill will be paid.

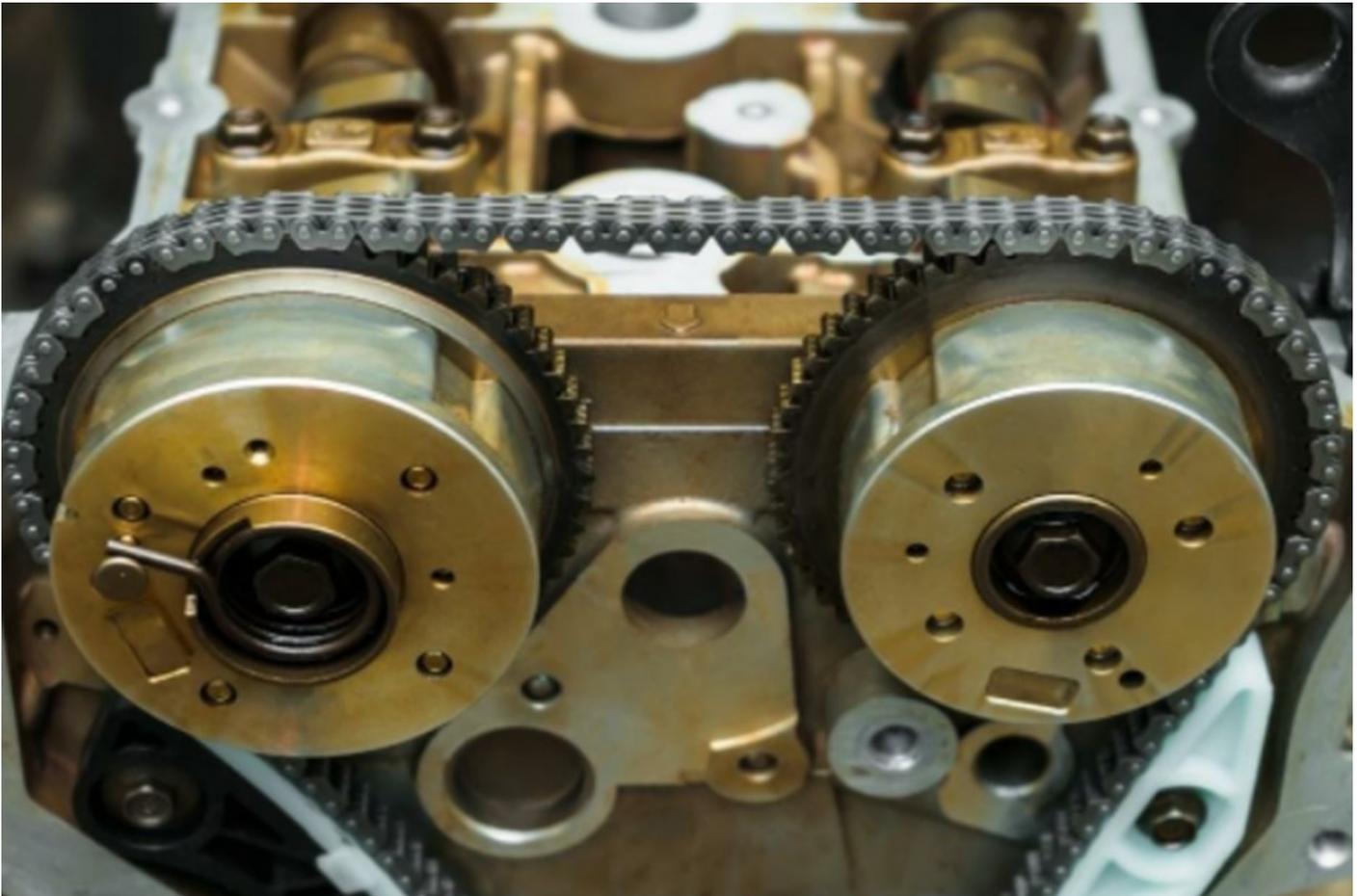
Found it



After accepting estimate of quote, the engine was disassembled and timing components inspected. The mechanical timing was all correct, all cams where on the marks.

However the left bank intake camshaft advancer was seized, even after removing it, we could not get movement. We see this more often in engines with super long service intervals, where the oil has been left in for too long.

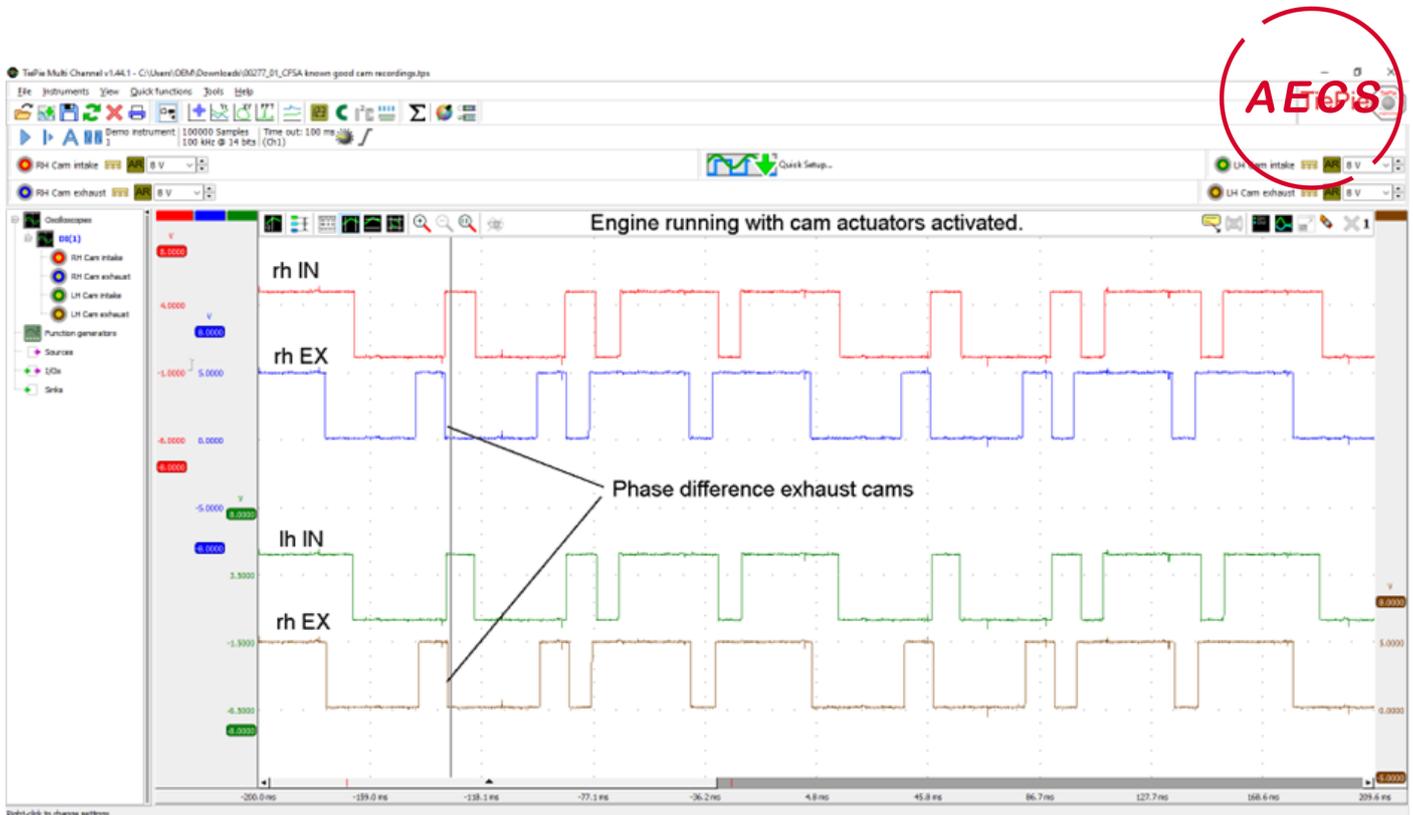
The sludge will seize the actuator by filling its cavities through which you cannot flush.



Cam actuators in an Audi Engine

Fixed!

The actuator was replaced and the intake VVT solenoid was also replaced. Engine reassembled and the following recording taken after the work. The diagnostician was kind enough to share the recording with us.



ATS 6004XM WiFi scope recording of the 4 cam shaft sensors, after the repairs

We can clearly now see the left bank exhaust camshaft is in line with the right bank exhaust camshaft, just like the intake can shafts after the repairs.

Prime Job

The vehicle owner was presented with a bill that was well under potential estimated costs as we significant reduced diagnostic time with the right tools and support.

There was no swapnognstics done so also no unnecessary parts where used;

A Prime Job!

We suspect very happy and likely to refer others to this workshop as a result.

Conclusion

The speed and ease a quality diagnostic oscilloscope and top quality scan tool, can make to repairing cars is not to be underestimated. Good quality equipment does cost good money. Why not have the best equipment for your operation? Do not be fooled by cheaper, inferior products that claim to do this work properly, we at [AECS tech Help](#) deal almost daily with customers who have bought other brands of scopes with all the promises in the world, they are simply victims of non-existent, empty support services.

Put your self in our shoes

How would you explain the above to the workshop if you perhaps worked for us? It is never an easy conversation to have, as we want to help!

Just bluntly telling the customer:

“you bought the wrong tool, it can not diagnose what you need to diagnose”

simply gets people’s back up, don’t worry I have tried...

It never gets us a happy customer and strangely the sales man that sold the inferior tool in the first place is never nowhere to be seen.

Supermarket



It is important that suppliers thoroughly understand how the diagnostic equipment works and can prove that they have a history of successfully supporting their clients in doing so.

Can they successfully apply this equipment to automotive repairs and prove a record of doing so with their clients? If they cannot, how will you?

I suggest you ask these questions before purchasing equipment or will have a very expensive door stop in your office. If they ever guide you to “this guy or this website” you know it’s time to run.

Important money generating and workshop credibility maintaining equipment like this, you simply don’t just buy in a supermarket.

For **AECS Ltd**
Hamish v Lier
Technical trainer and workshop advisor
www.aecs.net

AECS Equipment used for this case:



*Launch Auscan3
Professional scanner
\$4,224+gst*



*ATS 6004XM
4 channel differential
WiFi scope
\$5,875+gst*

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