

# SAGGY SSANGYONG



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# SAGGY SSANGYONG

VEHICLE: SSANGYONG ACTYON 2011  
Q100 2.0LTR TURBO DIESEL

By Herbert Leijen

This diagnostic article takes you through the process our technical support team use with problematic vehicles. We look at the issues involved and share how we resolved the problem. This is an inside look, from the profound to everyday issues automotive workshops encounter.

## **Problem presented from the workshop to our Technical Support Team:**

This vehicle presented itself to a Diesel specialist workshop in Australia with an intermittent misfire when under load. Injectors were replaced before it got to us. It is in for a replacement turbo as this was diagnosed by the other shop.

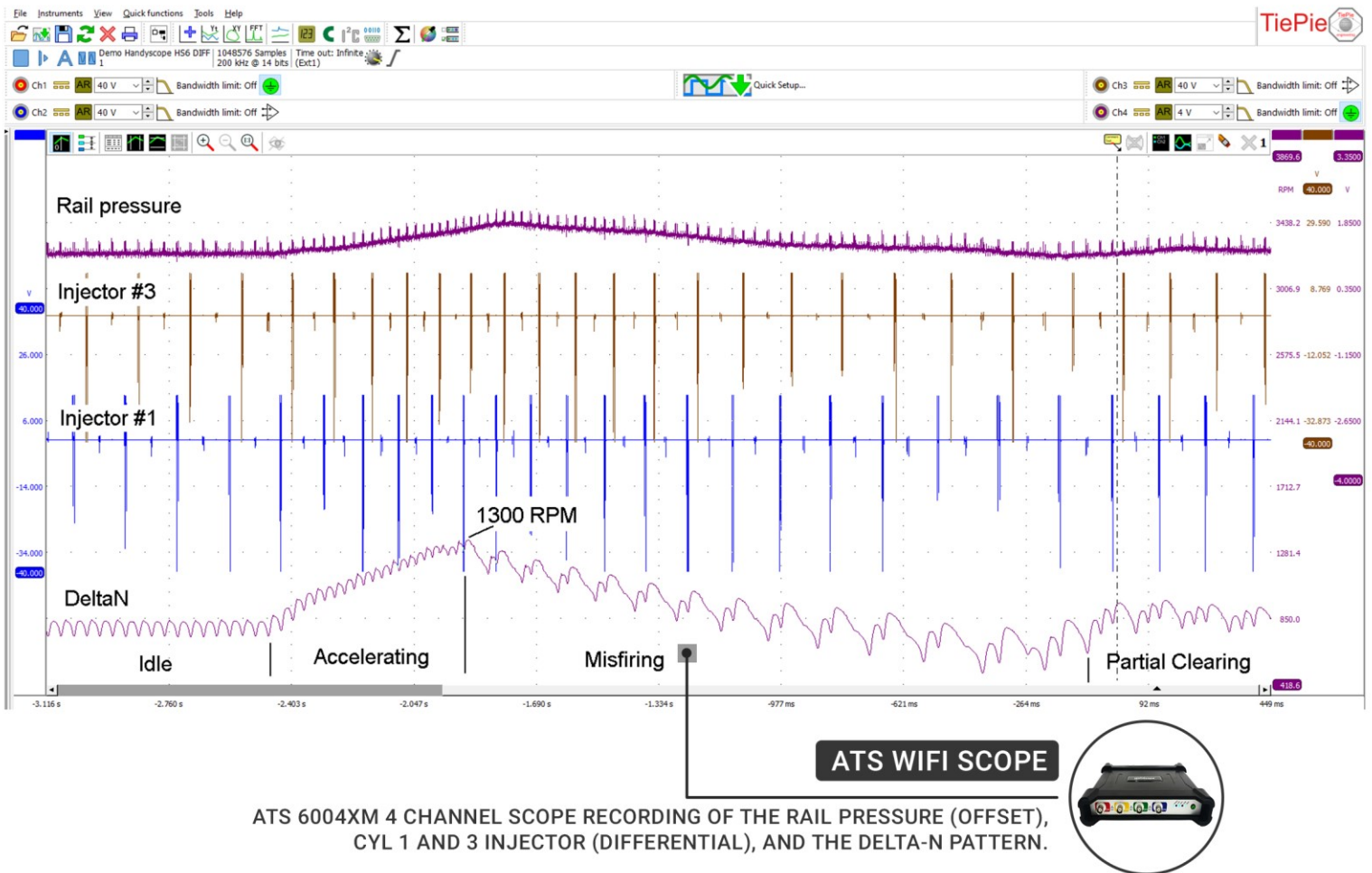
Before we replaced the Turbo we decided to measure and diagnose. The engine is misfiring on Cylinder 3 and 4 when things go wrong. It seems to be affected by boost pressure.

When we have the VNT turbo vacuum hose to the actuator disconnected the misfire appears at 3000 RPM with the vacuum hose connected we can accelerate up to 1300 RPM before it starts to misfire in the workshop.

I have attached some of the scope recordings we made with the ATS 4 channel scope we bought from AECS.  
Could you please assist with diagnosis?

## **Measure**

By far the quickest way to get to the bottom of any misfire is to record the crank shaft sensor and convert this into a DeltaN (speed difference) recording.



ATS 6004XM 4 CHANNEL SCOPE RECORDING OF THE RAIL PRESSURE (OFFSET), CYL 1 AND 3 INJECTOR (DIFFERENTIAL), AND THE DELTA-N PATTERN.



The crank shaft signal has been transformed into the DeltaN pattern after which the actual crankshaft signal has been removed from the screen to unclutter the screen. Technicians like this Diesel specialist, who have been to AECS training seminars know what the offset and differential measurements are, and some will also know how to switch each individual channel on the ATS scope from one measurement method to the other. Any scope recording becomes pointless if you do not know how to measure correctly.

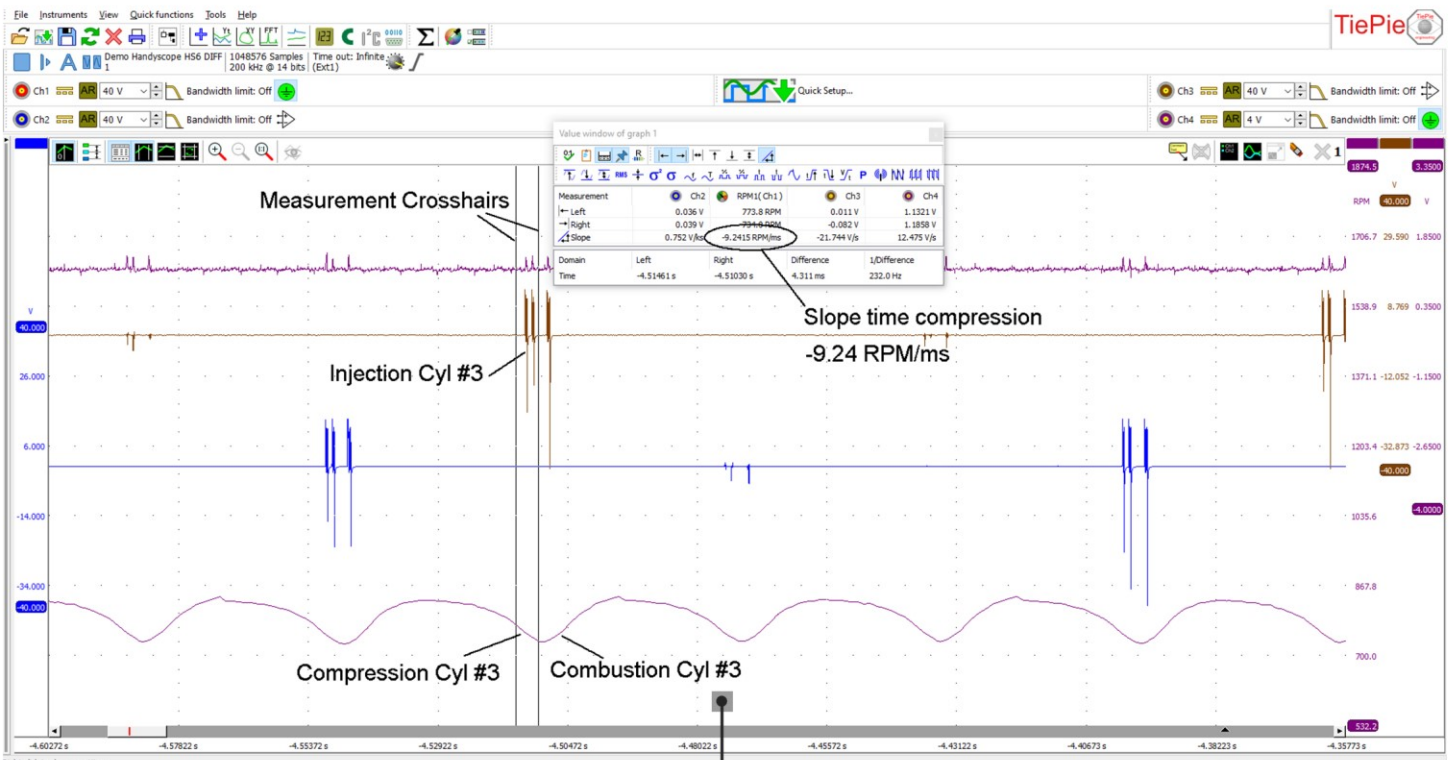
## Misfire

During idle the engine is not misfiring, that is clearly visible in the DeltaN trace, nice even RPM fluctuations from compression and expansion. When the engine is accelerating it is still running on all four, until it hits approximately 1300 RPM. This is the point where 2 cylinders drop out and where the engine RPM drops due to a lack of power. In the latter part of the recording the misfire is reduced to only one cylinder instead of 2 cylinders misfiring.

## What is going on?

All sorts of solutions have been tried by the previous garage, such as EGR blocking off, exhaust removal, injectors servicing, turbo removal, and many more typical tricks. They gave up.

In the above scope recording we can see a beautiful transition from no misfire to 2 misfiring cylinders back to only one misfire. To get a better picture we need to zoom in and deal with the detail... Yes DETAIL is boring, anyone always likes to quickly get the picture from a quick look. No such thing in modern diagnostics. Yes it is still quick, however very detailed!



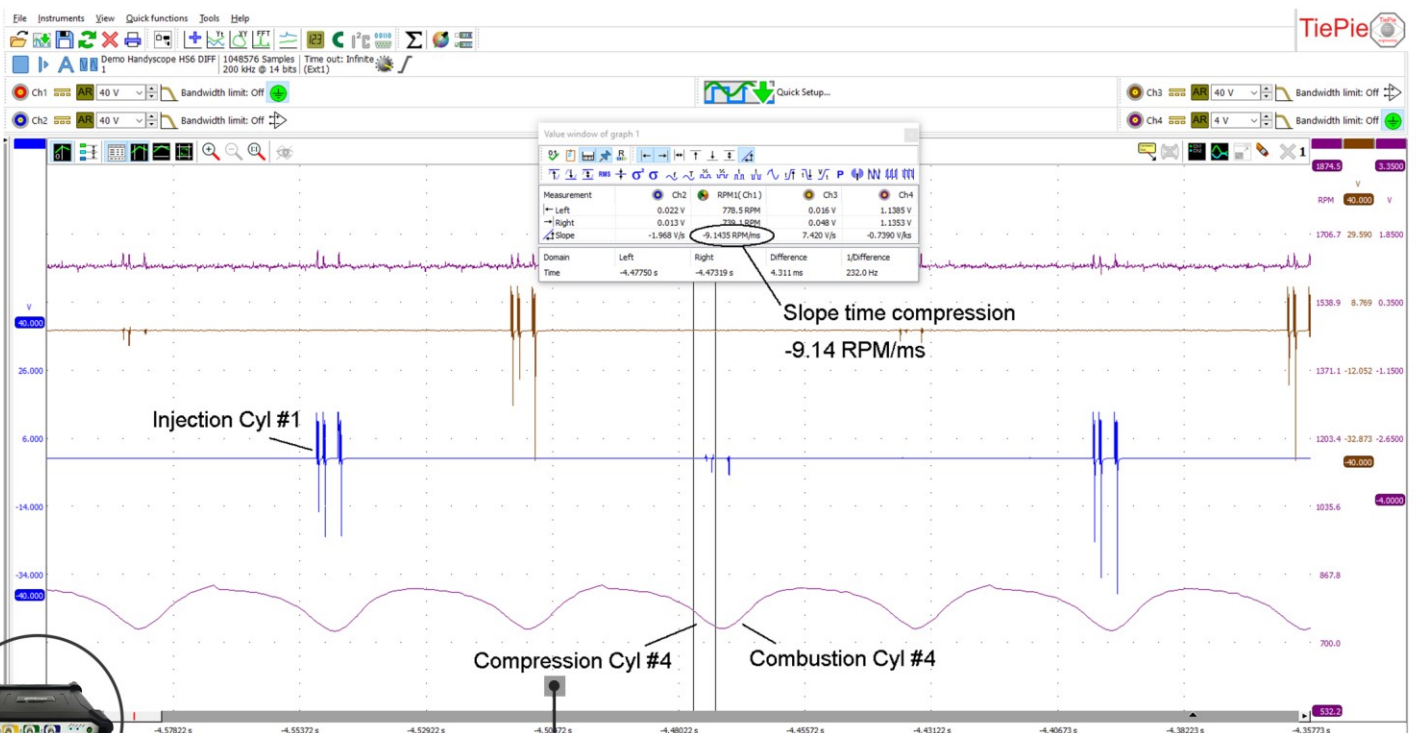
**ATS WIFI SCOPE**



ZOOMED IN - ATS 4 CHANNEL 6004XM SCOPE RECORDING ON THE IDLING SECTION, FOCUS ON CYL#3.

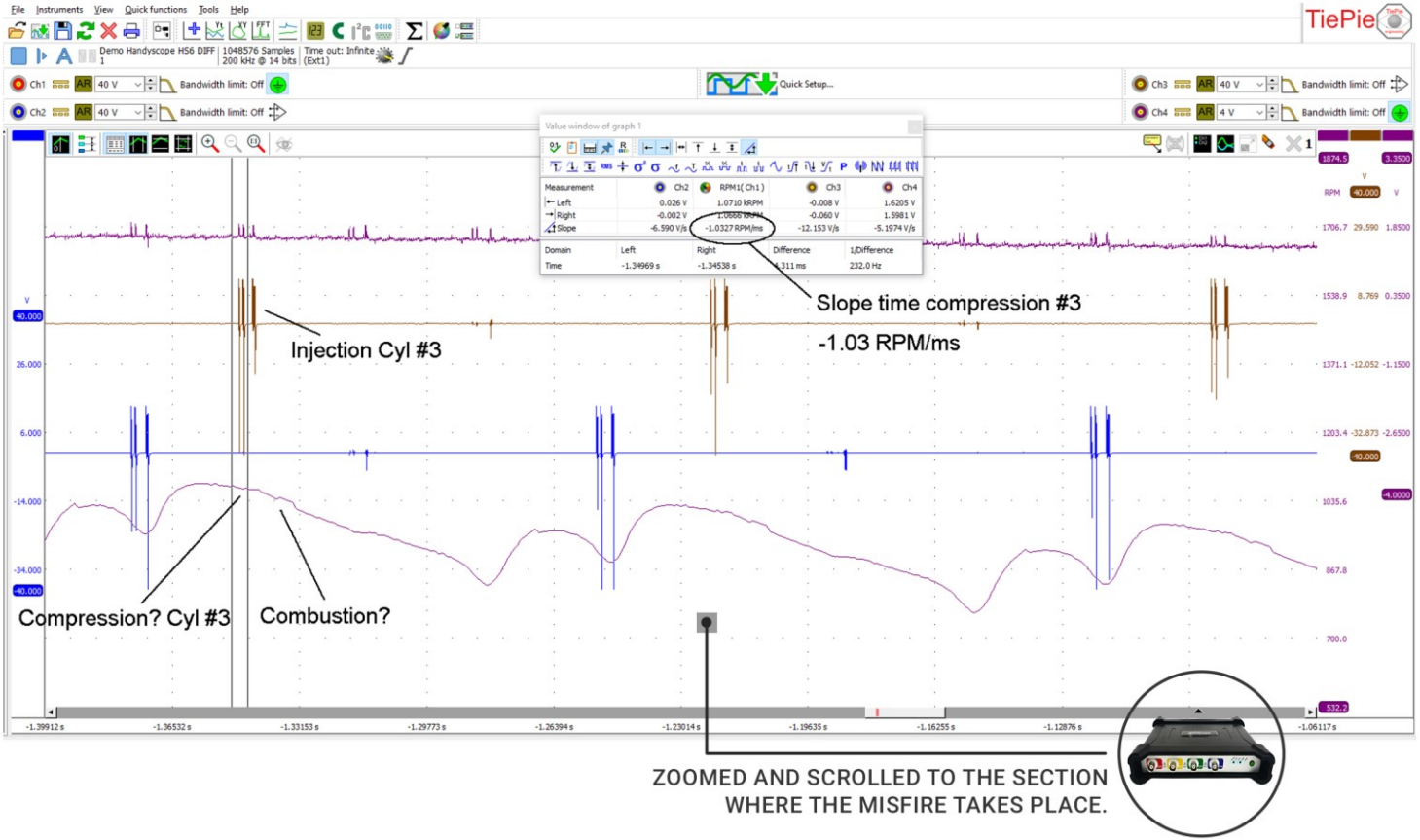
In the section where the engine is idling correctly the DeltaN slope time is -9.24 RPM/ms. This value is the slowing down of the crankshaft as a result of the compression in Cylinder3. Under normal circumstances, with a good engine, the compression slope time hardly changes. As a result of boost pressure, the compression and therefore the slope time alter a bit.

When we measure the slope time on the DeltaN line representing the compression and expansion of cylinder4 we can see very similar values.

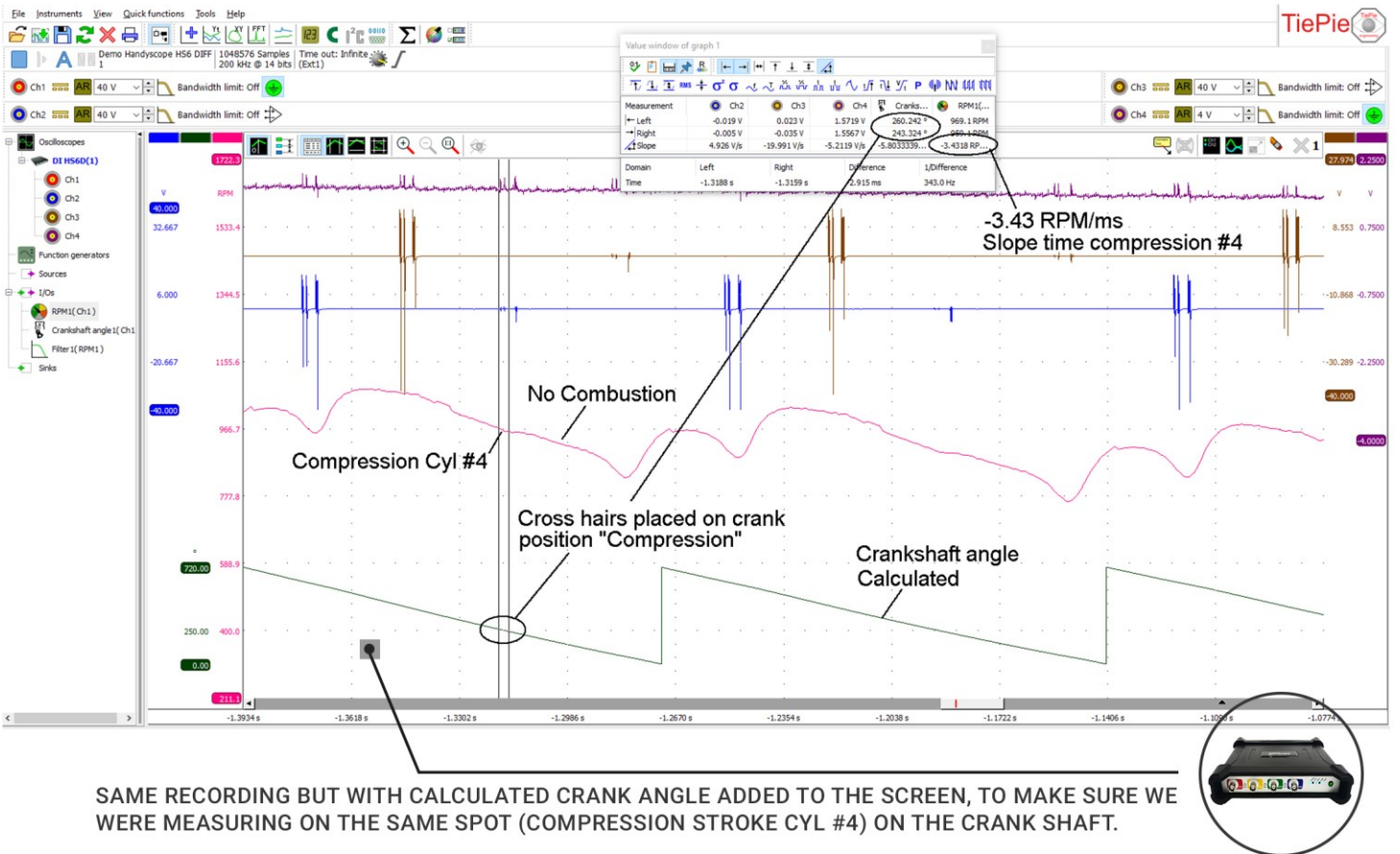


ZOOMED IN ATS 4 CHANNEL 6004XM SCOPE RECORDING ON THE IDLING SECTION, FOCUS ON CYL#4.

If we scroll to the section where the misfire takes place, we can see something very interesting!



That is weird! How can the compression under full boost suddenly disappear? The compression slope time drops from a healthy -9.24RPM/ms to a properly sick -1.03RPM/ms! Let's see what cylinder #4 is doing.



The compression on Cylinder #4 seems also to have almost disappeared at -3.43RPM/ms. Not as bad as Cylinder #3, but a full misfire.

### How does compression disappear?

Now back to the reset menu, we still had to regenerate the DPF (Diesel particulate filter).

How is this even possible? Under load when there is boost pressure in the manifold the amount of air in the combustion chamber has increased, which should increase the effort required for the crankshaft to push the piston up. Not decrease! If we just quickly look at the Slope time during the compression in healthy cyl. 1 right next to the misfiring cyl. 3 measurement we measure -10.19RPM/ms. That is more like it!

Let's run a few scenarios for the compression to disappear, no matter how ridiculous:

- Big end bearing free play, the scales rotating around under pressure due to lack of oil (really?),
- Piston rings broken and intermittently sealing and not sealing (nah?),
- Head gasket leaking (intermittently?),
- Valve seat bad, (intermittent?)
- Valve clearance, heat in the engine expands the exhaust valve leaving the valve open under load.
- Weak or broken valve springs, being pushed open by the boost pressure.
- Broken intake swirl flaps closing the intake ports in the cylinder head intermittently taking away air to compress.

We could not dream up anymore potential causes.

### Get to work

So we asked the diagnostician to inspect for broken swirl flaps, upon which he returned with that this engine does not have swirl flaps in the intake manifold. That leaves valve clearance and valve springs, so the rocker cover needed to come off.

All valve springs where present and did not look broken.

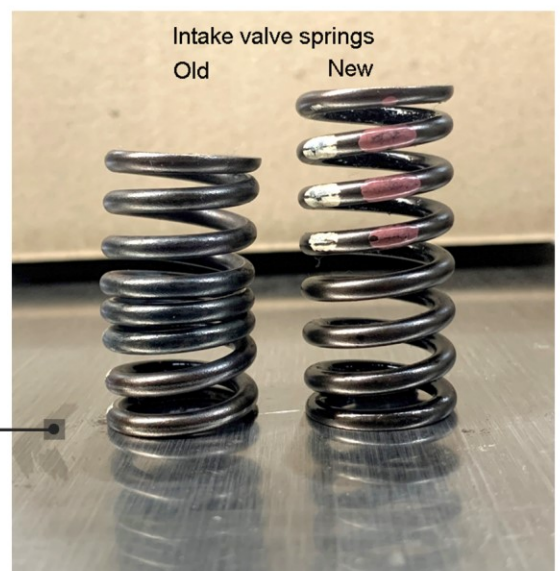
### Screw driver

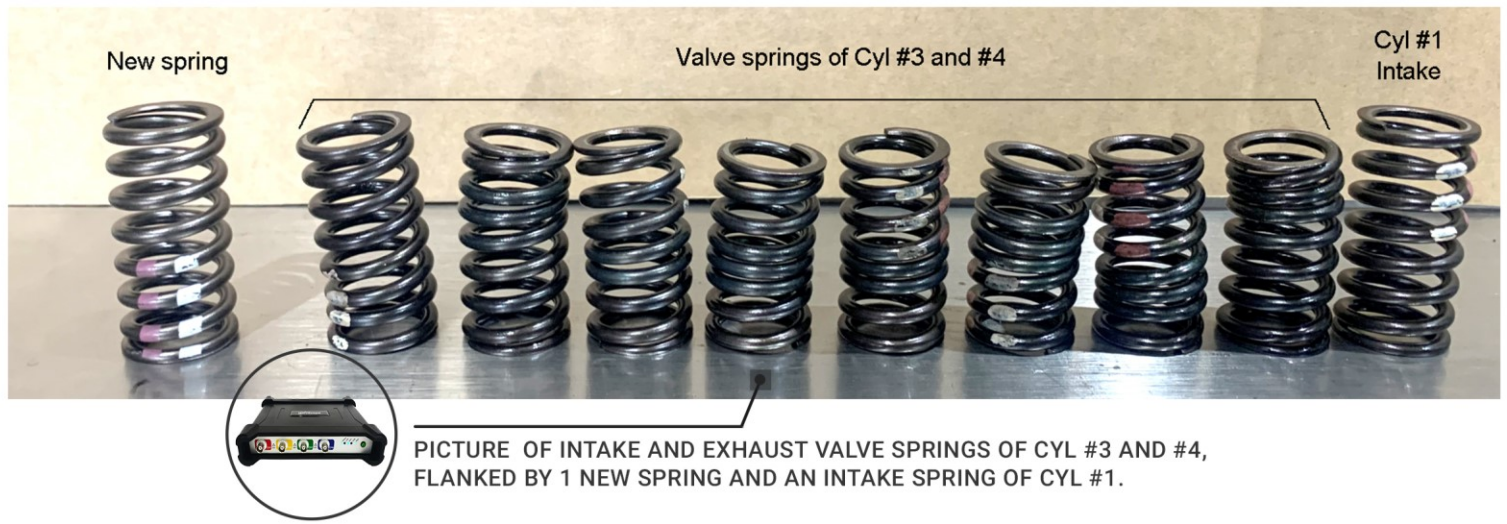
However while checking valve clearance, a quick push on each valve dish with a screw driver revealed that on cylinder 3 and 4 the valves were depressed (opened) with virtually no effort at all. The customer was contacted and permission was sought to replace the valve springs in situ.

The diagnostician was so kind to send us pictures of the old and new springs.



PICTURE OF THE OLD AND NEW INTAKE VALVE SPRING





## Perfect

The engine is running perfect with a set of new intake valve springs.

How could this have happened? Maybe something wrong with the hardening process of the springs, or unlikely severe engine overheating (high carbon steel needs more than 1100°C to reform). We will never know but this vehicle is on the road again.

## Conclusion

Beat that! How would you diagnose weakened valve springs in this short period of time without the aid of an ATS scope? How many parts would you have replaced to try to get rid of the misfire before you would have even considered the valve springs? Be mindful of the fact that the springs were looking fine when just looking at them in situ. What dollar figure is a job like this worth?

There are tons of scopes on the market, some real cheap and some very expensive scopes (many times more expensive than the ATS scope). None of them are capable of what the ATS series scopes can do. Realise that we have utilised only a very small portion of the diagnostic capabilities of the ATS scope (DeltaN and crank angle). In the field and during technical support we use many more ATS scope ability tricks to assist our customers with fast and accurate diagnosis.

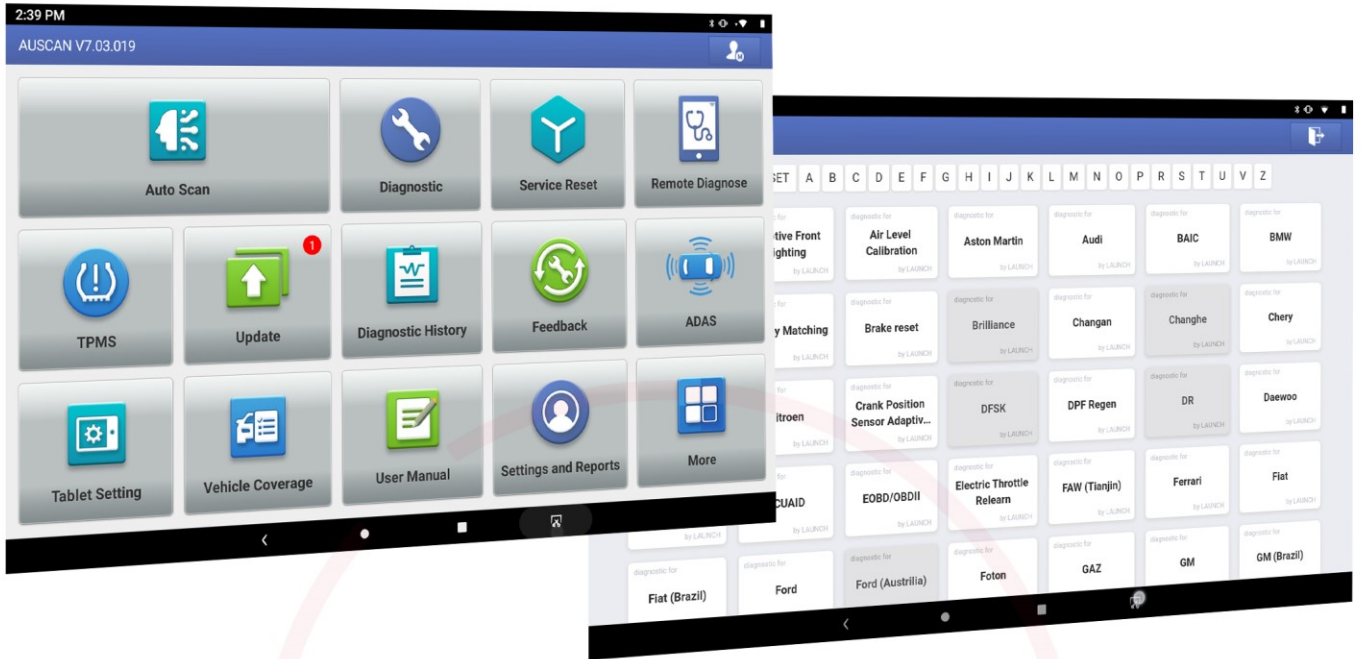
It is easy to earn good money with diagnostics. But make sure you purchase quality equipment which is supported by AECS engineers whom understand your work. Engineers that face New Zealand and Australian automotive technicians almost daily through training seminars and technical support.

We are here to make diagnostics Easy!

Thanks for reading!

Herbert Leijen

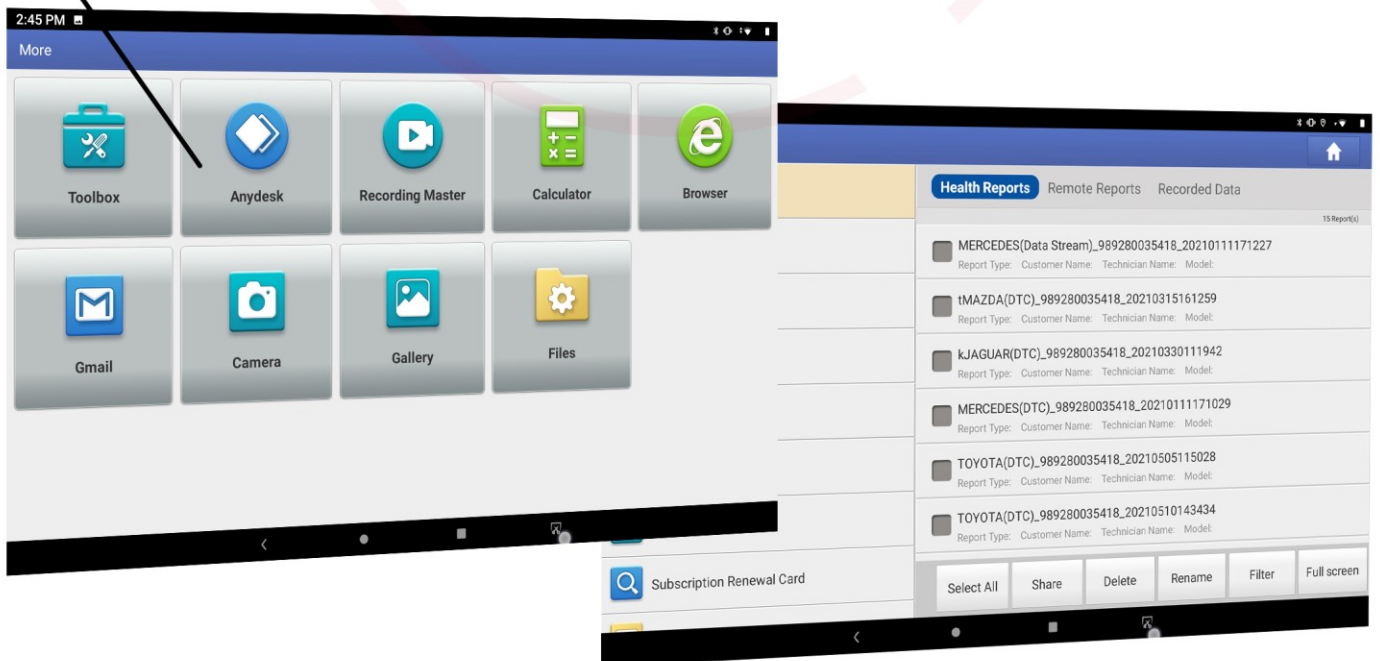
Director AECS Ltd



**New Auscan 3 Layout**

Auscan 3 has had a makeover, with the launch app redesigned and looking fresh. From the new home screen, Launch has made it easier to find the info that you need such as vehicle coverage and also a quick home button and doubles as a toggle to pre/post reports.

When we provide Technical Support it is now easier to access Anydesk for remote support. If you haven't got it yet, be sure to run to the latest updates for your tool.



**4 Weeks to go!**

There's only 4 weeks until Xmas to get your 3 year update on Launch Auscan 3 and Eurotab 2. Get your order in before Christmas... 06 874 9077



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