

# Hopping Hatch

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

**Vehicle:** 1998 Toyota Camry Station wagon

## Problem presented to the help desk

This case was actually not directly addressed to the tech help desk; it was more a concern from a technician who was related to the person owning the car. The car was brought in for a warrant of fitness, and failed because of a leaking right rear shock absorber. The Garage where the warrant was knocked back proceeded with fitting one brand new shock absorber, and subsequently passed the car for it's WoF check.

In passing, this was mentioned to the related technician who felt uneasy about this situation.

It transpired that the vehicle's suspension was checked with a bounce test, as in just looking at the amount of rebounds and see with 'expert eye' if the vehicle moves even on the left and right hand side.

The vehicle was then taken to a shop where a VTEQ brake test lane is installed, including a suspension tester.

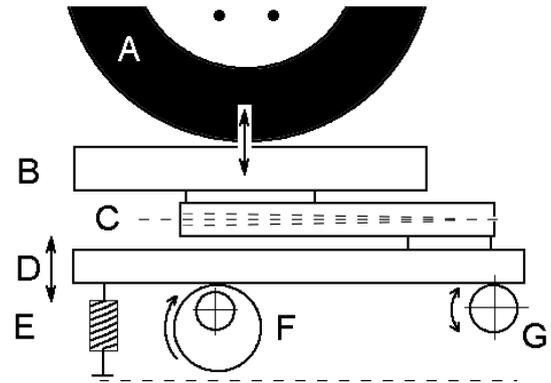
AECS became involved because our opinion was sought by looking at the results produced by the test-lane we installed.



VTEQ test lane with car on the suspension tester

## Suspension tester

The suspension tester has platforms with weight sensors fitted underneath. The platform is brought into a state of vibration by a camshaft. The weight variations are measured by the sensors and recorded on the screen of the PC. See picture below from a previous article.



VTEQ Eusama type suspension tester.

- A = Car tyre
- B = Platform
- C = Weight sensor
- E = Spring
- F = Excenter (camshaft)

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

**VTEQ**

From  
\$25.000.00 + gst  
(digital brake tester)

- Backed up with training, technical support and onsite annual calibration service, by **AECS** training and equipment providers.

See our website [www.AECS.net](http://www.AECS.net)

**VTEQ 3080**



Digital Modular  
Test lane that can  
be adapted to suit  
your needs

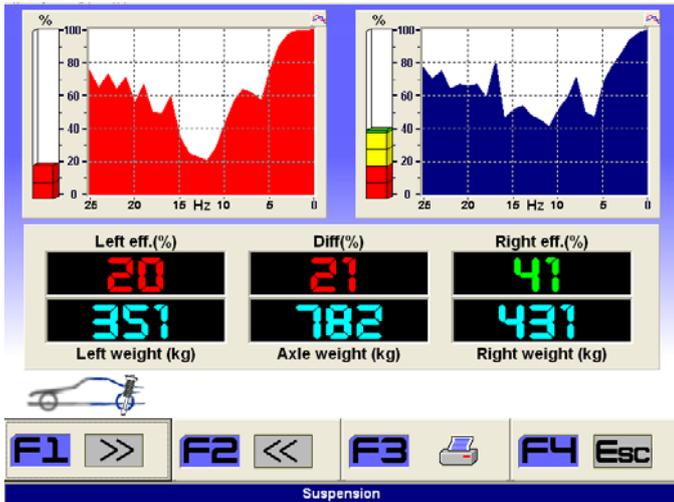
- Choose your colour to match your shop.
- Extra accessories available, like emission testers and electronic beam setters.
- Hard wearing rollers.



WoF testlane approved by the  
NZTA for WoF Testing

## Shocking results!

The results recorded on the tester were bad. The technicians operating the VTEQ testlane ran the rear axle twice across the machine. It looks in the result page as if it is front axle/rear axle, but in fact it is twice rear axle results. One with the vehicle's standard weight and one with two adult people extra in the back.

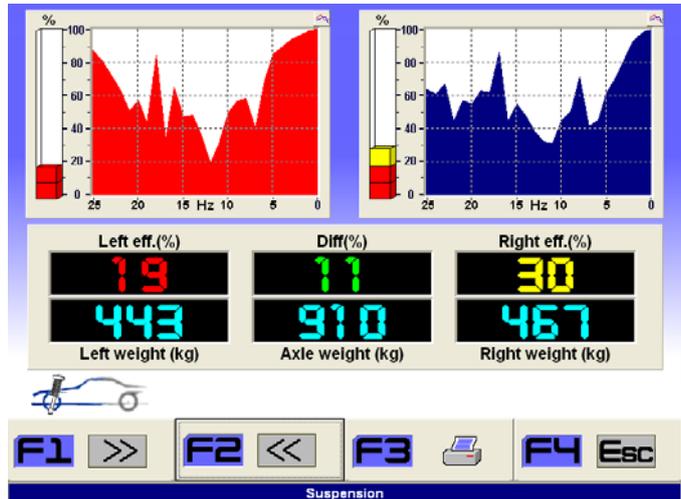


*Recording of rear axle before the repair, with no extra weight in the vehicle.*

At a bounce, frequency of around 12 oscillations per second (Hz) the Left suspension has an efficiency of only 20%, this means that if you hit a bump at exactly that speed the max. brake force or cornering force is reduced to 20% of what you are used to (at bounce frequency 0 Hz the efficiency is 100%). Compare this to the new shock where the efficiency is still 41%.

The higher contact force on the right hand side at the 12Hz bounce rate makes the car swerve and lose control when the car is used under hard braking or cornering conditions. These conditions are all present during an emergency, where the driver does not want to be bothered by unexpected loss of traction or unintended change of direction of the vehicle!

With the car loaded it is not much better.



*Recording of the same REAR axle before the repair with extra weight in the vehicle.*

The LH suspension efficiency has fallen back to 19%, but the repaired side has fallen back to 30%. The difference is better (only 11%) which increases the chance that the vehicle stay's straight in an emergency. But still overall a very poor result. Remember the vehicle had received a brand new warrant! The lady owner would not know that anything was amiss with her vehicle.

## Replace the Left hand shock

The related technician proceeded by replacing the LH side shock absorber as this situation was deemed to be unsafe.

The recordings below where made the following day after the repair.

It is clear that the suspension still has issues, but the results between left and right are even, that makes at least the straight line hard braking safe.



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- ETNZ Approved (www.etnz.co.nz)
- The AGS-688 has a higher rating than the current LTNZ OIML class1 import inspection emission tester
- INTERGRATED WITH THE ONLINE DATABASE OF ETNZ

OIML R 99 - ISO 3930 CLASS 0

ELECTROMAGNETIC CLASS E2

Integrated with the online database of ETNZ




# brake testers

VTEQ

VTEQ



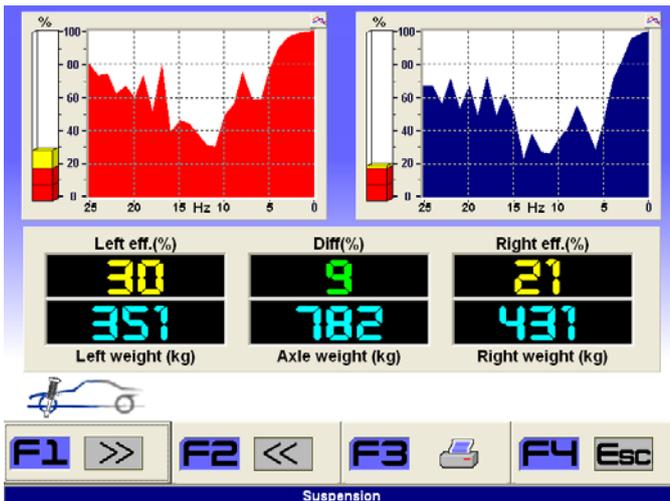
VTEQ Equipment:  
 - Brake tests,  
 - Suspension tests,  
 - Alignment tests.

AECS  
Equipment

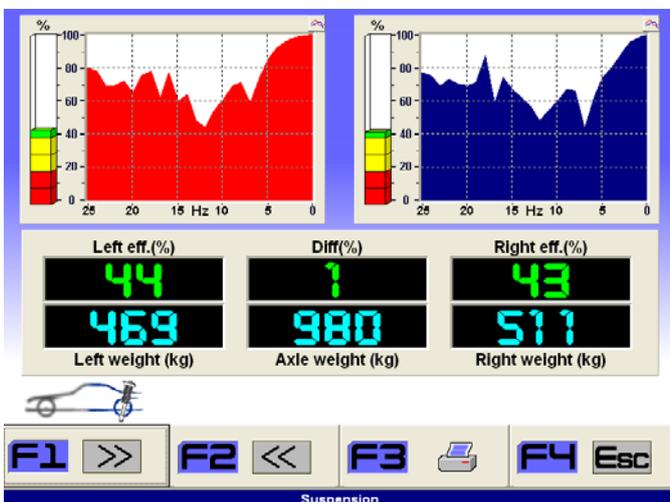
Choose a full testlane or start with just a brake tester and build up this modular system as the requirements of your shop change. The VTEQ brake testers enjoy having a very high quality and strong durability reputation throughout the world.

Prices and details available on request.

[www.aecs.net/products/vteq/](http://www.aecs.net/products/vteq/)



Readings with new shocks and no extra weight in the vehicle. Results are still poor but almost even (9%).



Rear suspension reading with new Left Hand shock, with extra weight in the vehicle

## Better

The difference of 1% under load is what we wanted to see!

## Considerations

With all the readings it needs to be considered that the vehicle's whole suspension gets tested on an Eusama tester, not just the shocks!

Loose bushes (sloppy or with free play), incorrect tyre pressure, different weight wheels (!), ball joints and sway bar connections all have an effect.

Another factor to consider is that the left hand suspension has a minor effect on the right hand suspension, and vice versa.

This explains why in the unladen situation the RH efficiency changed from 41% down to 21%, even though there were now two new shocks fitted.

Also shocks need to be run in. In this case it was a matter of days between the fitting of both shocks, so that should not have an effect on the unevenness measured.

## Even more shocking

We have been involved with numerous cases where owners of VTEQ test lanes have picked up a serious suspension faults, and knocked back a WoF for that reason. Yet the vehicle owners were not prepared to pay for the repair. They took the car to a different WoF testing station that passed the vehicle as the shock did

not leak, and the bounce test showed up fine! I find that incomprehensible.

I thought that it was fixed in the WoF system, where people could not shop around to finally get a WoF pass.

### Conclusion

To find serious suspension faults requires sophisticated equipment. The vehicle needs to be taken throughout a frequency range as a simple bounce test only tests at one frequency, the road and vehicle speed does not provide bumps at that exact frequency.

Proper test equipment is available from a range of equipment providers, but make sure the equipment you look at tests throughout a frequency range, not just at one frequency.

There is also a myth out there that loss of grip will be corrected by the ABS systems.

NO! an ABS system cannot correct a loss of wheel contact with the road.

*Herbert*

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AED	Automotive Electronic Diagnostics	29th & 30th July	AUCKLAND
ATS 3.04	ATS Scope owners comprehensive scope training	21st July	AUCKLAND
ATS 4.02	ATS Scope owners comprehensive scope training	22nd July	AUCKLAND
DMS1 1	Diesel Management Systems 1 (module 1)	27th & 28th July	AUCKLAND
AED	Automotive Electronic Diagnostics	3rd & 4th August	WELLINGTON

See our website for more details or enrol online

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