Tech Talk ...

Thinking of lowering? *Think again!*

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If you're thinking of lowering your "street-driven" MX-5 as part of a suspension upgrade – think again.

At the outset may I say that this article is directed to street-driven cars and not "track cars" or cars that the owner drives on the "road and track" and is therefore prepared to put up with a suspension compromised in favour of being suitable for the race track.

Those people contemplating modifying their MX-5 suspension to "improve handling" need to appreciate that Mazda spent millions designing, refining and testing the vehicle's suspension to produce a great compromise between handling and ride comfort. A well-researched suspension modification program should be able to improve handling with only a slight compromise in ride quality ... but the opposite is easily possible *and probable,* where a very small improvement in handling is achieved at the expense of a huge reduction in the ride comfort.

Before starting any suspension changes ensure that your standard components are in good condition – by 60,000km your shockers are past their best and by 120,000km are probably completely "shot". In addition, are your tyres and wheel alignment OK? ***New shockers, good tyres and an accurate full wheel alignment might be the solution to any unhappiness with your suspension.***

However, for many people, nothing looks better than a car which has been lowered – removing the large gap between the top of the tyres and the wheel arches of the car. This is often the driver for modifying the suspension.

So you are still intent on lowering the ride height of your car? Before proceeding don't ignore the legality issue relating to minimum ground clearance due to the reduced ride height, nor any issues with your comprehensive car insurance or any warranty implications.

What are the technical pros and cons of reducing the vehicles ride height?

Lowering the car lowers the vehicle's "centre of gravity" which is beneficial to handling as it reduces weight transfer during cornering. This is good because the loss of grip experienced by the inside tyres when cornering is NOT made up by the increase in grip of the outside tyres, thereby the overall cornering capability of the tyres is reduced due to weight transfer. In addition, a lowered MX-5 will allow additional negative camber to be set during a wheel alignment, more in line with what is needed for improved cornering. Also, the car is made more aerodynamic but the benefits are only best realised at speeds exceeding those that are road legal.

The disadvantages are plentiful:

- It changes your suspension geometry affecting jacking properties, camber gain and roll when cornering.
- It can increase the angle of the CV joints, increasing wear and marginally reducing power.
- It reduces bump travel, which is already very limited, and more than likely will bring the bump stops into effect.
- Your MX-5 will tend to scrape on speed bumps.
- Your wheel clearance under the guard will be compromised particularly if larger/wider rims/ tyres are fitted and some rubbing may be frequently evident.

Try driving this over a speed bump!

Upgrading your suspension needs to be thoroughly researched and is not simply a matter of fitting a range of items from the "suspension candy shop" which can include: springs (different height & stiffness), shock absorbers (stronger and/ or adjustable), front and rear sway bars, (stiffer and adjustable), more compliant suspension bushes and bump stops (length and stiffness).

Lowering your MX-5 generally goes hand-in-hand with shorter and stiffer springs (do not simply cut your springs to shorten them). Front spring rates on a NA/NB are approximately 160 lbs/ inch with performance springs starting at 250 and going all the way through to over 500 lbs/inch. These springs are designed generally to give a ride height reduction of 25 to 35mm.

The stiffer springs will need stronger shock absorbers to stabilise the suspension oscillations. The natural frequency on the NA front suspension increases from approx 1.2 Hz to well over 1.4 and more as the stiffness exceeds 250 lbs/inch.

Front and rear spring stiffness needs to be kept within a tight " bounce frequency ratio" range to ensure satisfactory handling and similar issues exist with sway bars (front to rear stiffness ratios), remembering that a sway bar's stiffness increases dramatically with diameter. For example, 21mm vs 19mm diameter front bar is approx 50% stiffer.

In trying to minimise the likelihood that the car will hit the hard original bump stops due to the reduced ride height, many people are tempted to cut down the length of the standard stops or fit shorter aftermarket units.

There are obviously many decisions to be made when upgrading your suspension as part of lowering your vehicle's ride height. It is essential that you do your research and talk to people in the Club who have been down this road before.

Remember that ***public roads are not racetracks*** and if you intend to use the potentially improved handling capabilities that go with your modified suspension as part of reducing the ride height of your street driven car, please try it somewhere away from me, my family and friends ... instead, benchmark yourself and your car against other MX-5s on the racetrack. ■

Looks cool ... but what about tyre wear on the wheel arch?