

Suspension Geometry

What?

Better known as or badly named as "wheel alignment". So called because on most road going cars all the suspension geometry is fixed somewhere within the manufacturers specifications and the only adjustable portion is the front wheel alignment.

This is not the case in a Mazda MX5. They are the same as any good single seater racing car. You can adjust all the geometry back and front. Many experts in chassis design and rolling vehicle geometry state that the MX5 especially the NC model with its multi link rear suspension is the best adjustable production vehicle.

The problem comes about that the assembly plants are notoriously bad at setting the suspension up and the settings, although within the manufacturer's specification, can vary considerably between the two sides of the car.

This problem becomes worse when we take the cars for "wheel alignment" because this is usually carried out at a tyre fitment centre and although they might have some of the best equipment the operator has only a rudimentary knowledge of suspension geometry and basically can only set the wheel alignment. Furthermore many fitment centres max out "toe in" within the factory specification. This is done to provide a more stable travel at highway speed and to counteract any other influencing factors in the geometry. If the car feels nice and stable they will not have any comebacks. Unfortunately this practise results in your tyres wearing out 2 to 3 times faster than they should. Coupled with the poor factory settings on the other geometry components and you get tyres wearing on one side faster than the other.

How many of us take our cars to these "wheel alignment" centres and they fiddle with a few things around the front of the car, print out a piece of paper, hand it to you and tell you it is all perfect. Do you know what all the figures on the paper mean and what they should be for your car?

Below is the recommended set up for the MX5-NC with standard* ride height. If you have that piece of paper, take it out and compare, you may be shocked. (It is assumed that your car is straight and both front and back axle lines are parallel)

Front

Caster - 6° (you won't be able to get 6° on all cars however the caster should be the same for both left and right hand front wheels)

Camber - 0,8 to 1,0° negative. (Choose what you want as a setting but both front wheels must have the same camber angle)

Toe - 1.6mm (1/16") or 9 minutes total negative. (0,8mm (1/32") or 4.5 minutes per side negative). (Here obtaining the total is important as your wheels may be slightly turned to one side)

Rear

Camber - 1° to 1,5° (Choose what you want as a setting but both rear wheels must have the same camber angle)

Toe - 0,0 to 0,8mm (0 to 1/32) or 0 to 4,5minutes negative each side (choose a setting and make sure both sides are the same the total is not the important one here as the rear wheels are not turning)

To get the best results your car should have a full tank and ballast for what ever driver and passenger load you normally have. I have written this with the NC in mind, both the NA and NB will benefit from similar set ups, best read up on the net there are endless articles on this subject - suggest <http://www.hummingbirds.net/alignment.html>

You should check your tyre wear at least once a month. You can get a high quality tyre depth gauge or use a cheap plastic vernier which has a depth gauge on the rear end. Check and make a note of the depth of your tread across the tyre - inside edge - centre - outside edge. Do this check 4 times - one quarter the way around the tyre. Use some graph paper and plot your tread

depths against time. You can easily see then if the difference between the lines for the inside and outside of a tire begins to widen then one side of a tyre is wearing faster than the other. Similarly if the slope of a graph for one wheel is steeper than another then that wheel is wearing faster. Recheck your geometry (not just your alignment).

Setting up your geometry will make a huge difference to the feel of your car. Read up you can do so much to these cars.

If you start changing components such as wider rims and tyres, lowered suspension, coil over spring/shock setups, etc. and/or intend doing any competition work then you will need to delve further into the world of suspension geometry and experiment to find your optimum settings.

MX5's are fun top to bottom – that is with the top down as well as to all those bolts and rods underneath.

*Standard being what you get in South Africa which is the same as Britton and Europe. The Mazda MX5 – NC was designed to have suspension 30 -35mm lower than what we have. At the time of the launch of the NC model the EU introduced new pedestrian safety regulations that stipulated minimum bumper and bonnet specifications. Without radical redesign Mazda was able to achieve these requirements by raising the height of the cars. This is why when you look at the brochures for the NC the wheels fit neatly into the wheel well space where as our cars have these large gaps between the top of the wheel and under side of the wheel arch.

Our standard cars are what are normally called the MX5 – NC – 4x4. 30 to 35mm lowering springs will bring the car back to design standard. To lower the car one would go more than 35mm reduction in spring height.