bump steer

Boy this is going to be difficult to explain...

How do you know if you have got it? Well if your car tends to self steer after it has hit a bump in the road even though you have not changed input on the steering wheel you could (there are other reasons!) be suffering from excessive bump steer. It is caused by the steering rack being positioned at the wrong height in the chassis relative to the point on the road wheel upright where the track rod end fits. In standard spec cars this rack height will have been decided by the designer and will usually be right but if you have a car whose suspension has been modified in any way you may have a problem in this area.

It's cure is simple...

(in theory) you either raise or lower the rack by use of spacers or machining of mounting lugs, or you raise or lower the point at which the track rod ends fits. On a Seven it is not really practicable to adjust the track rod end height even though this adjustment feature is almost invariably built into 750 formula race cars for instance. We have to adjust the height of the rack.

It may help to consider the following. Look at the front suspension of your car. The inboard end of the track rod (the bar connecting the steering rack to the road wheel) is unable to move relative to the centreline of the car whatever the front suspension does. Now consider the outboard end where it fixes to the road wheel upright via the steering arm. If you were to raise the front suspension to its maximum height (which is the sort of thing that happens when you hit a bump) I think that you will see that because the track rod end moves in an arc it will be nearer to the centre line of the car on full bump (all other things being equal). Following this through, if the track rod end moves inwards when the suspension moves, your road wheel will also move in exactly the same way as when you turn your steering wheel in normal driving.

The above is an oversimplification of the actual geometry of the front suspension because the upper and lower wishbones (which are fixed relative to the steering arm) also move on an arc and so tend to cancel out the road wheel 'bump steering' movement. The crux lies in the phrase 'tend to'. If your rack is positioned absolutely correctly you can synchronise the movements of the various suspension links so that the tendency to self-steer is practically eliminated.

If like me (and reputedly Jim Clark!) you are not very good at feeling problems in a car and tend to drive round them, the only way to find out if you have got bump steer built into your geometry is to measure it. For this you will need a special tool - a bump steer gauge. You can buy these (from Demon Tweeks for instance) but it is possible to construct one yourself fairly cheaply (details are explained in Fred Puhn's book 'How to make Your Car Handle'). The basic principle involves removing the front road spring, resting the chassis on blocks to replicate its normal ride height, jacking that suspension through its full range and measuring at regular heights what happens to the front edge of the road wheel.

From this information you can plot a graph showing the arc that the track rod follows. You then adjust the height of the rack and repeat the measurements. Eventually you will get a graph that shows that the track rod is moving in a vertical line (or very nearly) and this will be the correct height for your rack.

You might well say that this is all far too much trouble and anyway circuits are usually well surfaced now so why bother? Well, even if you are fortunate enough to avoid all bumps, one thing you can not avoid is applying the brakes. Think what happens to the front suspension when you brake and you will realise that it is moving in exactly the same way as if you had hit a bump. Given that you are usually turning into a corner after your braking manoeuvre (on a circuit at least) and that the suspension is also being moved by weight transfer to the outer wheels you will see that bump steer does not just apply in bumps.

The dialing out of bump steer is worthwhile because it removes an unknown in the handling of your car and enables you to drive with a little more confidence.

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