

Bump Steer or Bum Steer?

By Ray Vandersee

About 30 seconds. That would represent the total time I have personally given to thinking about bump steer and what it may mean to the handling of a car. Until recently that is.

What has made the difference is a book I ordered through the Internet call "Chassis Engineering" by Herb Adams. Suddenly bump steer sounded interesting and seemed quite important to the ultimate handling of my Westfield.

Imagine this; you have located the ultimate piece of road, a veritable Westfield owners dream come true, a road that twists and turns, climbs, descends and other traffic rarely use this road. Certainly the police don't know of it existence. Under these circumstances you are going to have a real go. No good owning one of these things if you don't make good use of it.

So you are hunting through a sweeping third gear left-hander when unexpectedly the bend tightens. The tyres are balanced on the limit of their adhesion as you back off to tighten your line. In the blink of an eye the tail comes out and you find yourself backwards into the shrubbery. Sitting there you contemplate taking up knitting, thinking this would never happen to Possum Bourne. But hey, maybe it wasn't you. Lets see if bump steer could be the culprit.

As you steer the car through the left-hand corner the body rolls to the right, transferring the weight and forcing the majority of the cornering force to be handled by the right hand tyres. As the body rolls, the RH suspension moves upward into the bump position. Being a top driver, you sense the fine movements in the car and constantly adjust your steering to compensate in order to maintain your line. But then you back off, causing a considerable weight transfer to the front RH suspension. As a result this suspension suddenly rises further into 'bump' and this is where bump steer can play a major role in the stability (or lack of it) in your car.

Bump steer refers to what happens to the toe of the front wheel as the suspension is raised and lowered. If the wheel turns outwards when the suspension is raised then it is considered that the car has bump understeer. That means that in order to correct, the driver must wind on more lock, as in 'understeer'. If the wheel turns in the car will have bump oversteer. Bump oversteer is quite an unstable condition as, in the situation described above, the driver must be always fighting the tendency of the car to want to turn into the corner ever harder, by winding off the correct amount of lock.

So what does all this mean in terms of a Westfield? Well it pretty much depends where you mounted your steering rack. I tested my car by removing the springs from the shock assemblies, replacing the shocks then blocking the chassis up to the normal ride height. Place a big flat rectangular board against the tyre so that it sits flat against the tyre, touching the front & back of the wheel. Lean the board away from the wheel at the top being careful not to allow the board to swivel on the ground. Now jack the suspension to full bump travel then carefully lean the board back against the tyre. If the car has bump steer there will be a gap between the board and the tyre at either the back or the front of

the tyre. Note that the board you choose to use should come to about half way up the height of the tyre.

If the gap is at the front you have bump oversteer (bad) and if at the rear you have bump understeer (stable).

During Targa 99 I spun out twice on LH corners that tightened. In 2000 I had a big slide in the same circumstance (different corner) but managed to catch it. I had made other stiffening improvements to the suspension between these events. So what were the results for my car? Right hand wheel – 3/8” bump oversteer, Left hand wheel – 1/16” bump oversteer.

I think that explains a lot about the twitchiness of my car also. The good news is that by moving the rack up by about a hole and a half and spacing it slightly forward, I was able to change it from bump oversteer to bump understeer.

My mind goes back to the day at Morgan Park where Leonce received the award for the most spins, always on the fast RH kink in the straight. I bet his car has excessive bump oversteer on the front left. What Bump Steer does your Westfield have?

(Ray this is terrific. Thanks so much for taking the time to share this with us – Ed)

HANDLING ADJUSTMENTS

<u>ADJUSTMENT</u>	<u>To Increase U/S</u>	<u>To Increase O/S</u>
Front tyre press	Lower	Raise
Rear Tyre press	Raise	Lower
Fr Wh Camber	More pos	More neg
Rear Wh Camber	More neg	More pos
Fr springs	Stiffer	Softer
Rear springs	Softer	Stiffer
Fr Sway bar	Larger stiff	Smaller softer
Rear Sw bar	Smaller softer	Larger stiffer

**Make only one change at a time and be sure the change makes an improvement.
Record the changes.**

Courtesy Brad Barber <http://bradbarber.com>.