

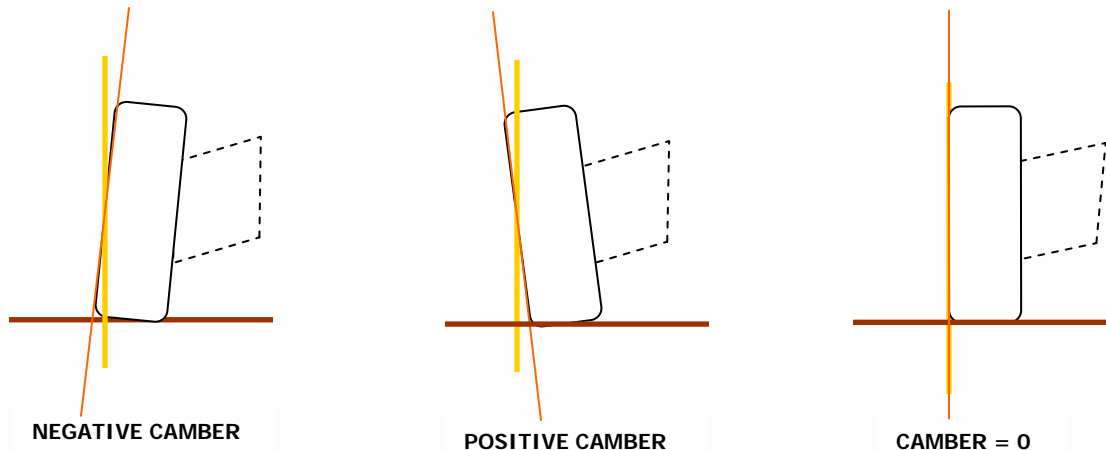


## Tech Bulletin # 07-1

# How variations in Camber, Caster and Toe angle affect your vehicle performance and your pocket

### Camber

The Camber Angle is the angle formed between the wheel's vertical axis (**red**) and the vertical axis of the vehicle (**yellow**). In other words, it is the inward or outward tilt measured from the line orientated perpendicular to the surface.



Variations in camber beyond manufacturer's specification produce an uneven wear of tires. These variations can be produced by defective control arm bushings, defective ball joints, defective strut mounts, or any combination of the above.

**Variations are identified as:**

**Positive camber:** Top of the wheel is further out than the bottom (away from the axle).

**Negative camber:** The bottom of the wheel is further out than the top.

**Generally if the defective part is not replaced, the force distribution will be altered, applying extra load to a specific component, creating a domino effect that will eventually affect all suspension components.**

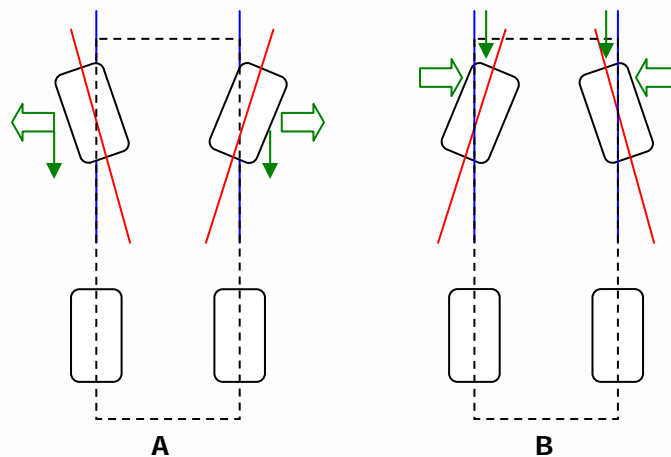




## How variations in Camber, Caster and Toe angle affect your vehicle performance and your pocket

### Toe angle

Toe angle is the angle formed by the wheel axis (**red line**) and the longitudinal axis of the vehicle (**blue line**).



A bent tie rod end or drag link is the common cause of variations in toe angle. Control arm bushings, radius arm bushings or strut bar bushings that wear out are also leading causes.

As indicated in the figure by the green arrows in **illustration "A"**, the positive toe angle is applying axial forces on the car structure; tires want to pull away from the frame pulling the suspension components out. At the same time the drive train is pushing the car forward, creating drag and pushing the suspension components to the rear. This increases the force applied to bushings, tie rod ends and ball joints, plus decreasing the life expectancy of your tires because the front tires are rubbing and the rear tires bear the extra load.

**Illustration "B"** shows the effect of a negative toe angle. In this case, the tires are pointing inward, applying the extra load in the direction of the green arrows and creating scrubbed tires.

**In both cases the steering capabilities are diminished and driving stability decreases considerably.**

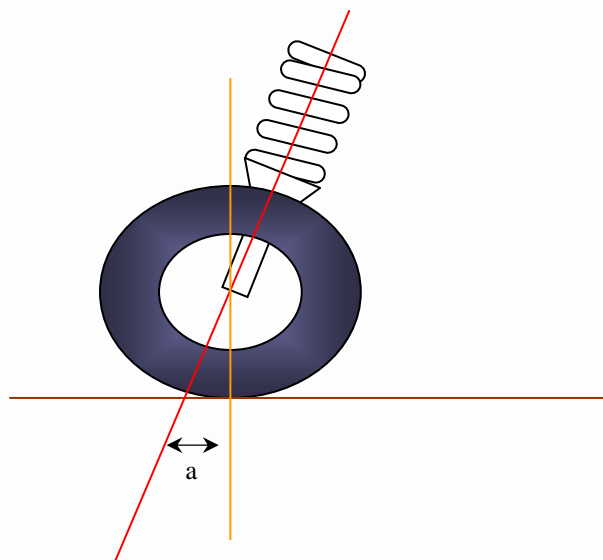




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### Caster

Caster is the angular displacement (a) from the vertical axis of the suspension, measured in the longitudinal direction. For cars equipped with upper and lower control arms, this is the angle between the line through the center of the upper ball joint to the center of the lower ball joint (**pivot line**) and the line perpendicular to the surface.



If caster is different on both sides of the vehicle, it will have a tendency to pull to the side. **Positive caster** will provide straight line stability and at the same time increase the steering effort; punishing steering components.

**Defective bushings in Strut bars, Radius arms and control arms will be a leading cause for this problem.**

Chassis



Strut Mounts



Control Arms



Hub Assemblies



U-Joints

