

3.0 Suspension Overview

3.1. GENERAL

We are now, perhaps, coming to the single most important point in the preparation of a car for rallying. To get the best out of a car, whatever its power, it is essential that it handles properly. Few people can afford to build the optimum Gp 4 car straight off, so here's an approximate list of priorities for those of you who aren't quite so well off.

1. Matched springs and gas damper combination.
2. High ratio steering rack.
3. Balance bar pedal box.
4. 5 link rear suspension.

But before getting into the technicalities of all the different systems, it's a good idea to explain some of the terms used.

Camber is the angle the front wheels point in or out from the vertical, viewed from the front. It is another compromise setting to maximise tyre contact under all conditions.

Castor is a product of the inclination of the front struts fore and aft, and directly affects the self-centring and consequently the feel of the road through the steering.

Toe In /Out is the angle that the front tyres point in or out when viewed from the top and is evolved from practice rather than theory. It ensures wheel stability under all conditions, braking, cornering, etc.

Bump Steer is found at extremes of suspension movement. The toe in/out set static can vary at those positions and affect handling. This is not important for forest rally conditions, but can be significant on tarmac cars with slick tyres.

Zero Steer is a term applied to the four link trailing arm set-ups, and is rarely strictly true. Consider a normally sprung car - if one rear wheel is deflected upwards, the car would tend to turn into a curve. 4 link arrangements minimise this effect, but cannot completely cure it.

Roll Centre is the instantaneous point about which a car moves. Dramatic changes in a car's optimum cornering potential can be affected by moving suspension pick-up points. However, this is not a subject to be undertaken lightly - get everything else 100% first!

3. 2. GAS FILLED DAMPERS

If a car is to be used for high performance work, the usual procedure adopted for dampers is to 'uprate' them. That is the valving is adjusted so making the damper stiffer.

This works well, but over a period of time the oil becomes aerated and thus causes it to fade. The only way to offset this problem is to make the initial setting harder, so allowing for fade. Unfortunately, this means that the initial setting is too hard for optimum handling and comfort, and it is not until the damper has begun to fade that the car really begins to handle. This also means that all the mounting points, and the damper itself, are subject to strain until fade occurs.

So, the gas filled (Bilstein) damper was evolved which completely fulfilled all the requirements. The reason for the gas in a gas filled damper is that it keeps the oil pressurised at all times so it is impossible for any oil to become aerated; a secondary advantage is that due to the oil being pressurised, it can operate extremely efficiently with a very short suspension travel.

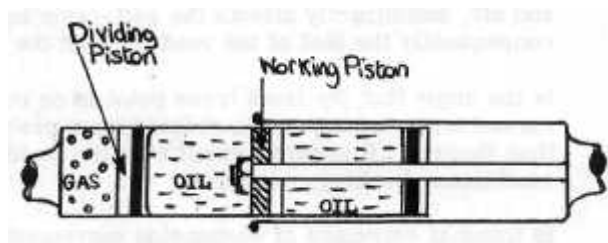


Diagram showing working principles of a gas filled damper

Please be aware that these articles were written in the 70s and some of the regulations may have changed. Please consult the MSA Blue Book before preparing your car