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E30 Rear Semi-Trailing Arm Roll Center

What we will now concentrate on is how the static roll center moves as the geometry of the rear trailing arms is changed. If you have read the section on camber and toe change of a rear semi-trailing arm suspension then you know about the so called "sweep angle" of the trailing arms. During the BMW Motorsport days of racing E30 M3's in Gr A there were two different rear suspensions available, each with a different sweep angle (11° or 15°). The change in the sweep angle altered the camber and toe curves for the rear suspension. But it also changed the rear static roll center as shown in the following diagram:

Semi-trailing arm ROLL CENTER for reduced sweep angle.

The net effect of reducing the sweep angle of the rear semi-trailing arm suspension is to move the rear static roll center down. If the center of gravity at the rear end of the car remains unchanged then the net effect is that the rear roll couple is increased, and thus the rear of the car will want to "roll more" during cornering. This is not necessarily a bad thing, and depending on overall chassis setup it might actually be a desirable outcome. A roll center which is too high will introduce "jacking" forces such that the car is raised during lateral acceleration.

Another way that the rear semi-trailing arm geometry can be changed is by moving the trailing arm pivot points up or down. This configuration is sometimes seen in pictures of the last generation Gr A cars. The outer trailing arm pickup points can be adjusted for camber, as in earlier versions. But the camber adjustment does not move the pickup point (as it's on the trailing arm, not the chassis). However, there is a second adjustment which allows the outer trailing arm pickup point to be moved up and down. This type of adjustment mechanism is shown in **this photograph** of what is most likely a late model Gr A car.
The red arrow highlights the roll center adjustment while the purple arrow shows the camber adjustment. Adjusting the location of the outer trailing arm pickup point will obviously affect the camber and toe curves to some extent, but the main reason to make this adjustment was probably to effect a change in the location of the rear roll center (thanks to Paul Franz for pointing this out to me). How the roll center responds to a change in the vertical location of the outer trailing arm pickup point is shown in the next diagram:

Semi-trailing arm ROLL CENTER for raised outer pickup point.

The result of this change is that the static roll center moves downwards. Note that the same effect could be achieved by moving the inner trailing arm pickup points down (instead of moving the outer pickup points up). And conversely, moving the outer pickup points down (or the inner ones up) will *raise* the static roll center, instead of lowering it.

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not trivial information to obtain, therefore such an exersise is left for the reader 8^)
