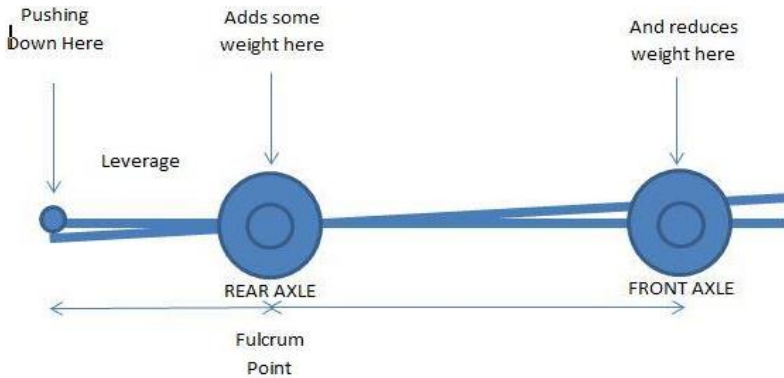


Towing Vehicles – Airbags or Hitches?

This simple diagram (as provided by Michael Carter from the [Australian Caravan & Towing](#) Facebook group) depicts how adding weight onto the vehicle tow ball changes the weight distribution across the axles of the vehicle. Therefore, the impact of BALL WEIGHT resulting from the trailer (caravan, boat or camper) and its contents can greatly affect the towing vehicle overall performance.



As the BALL WEIGHT increases - Vehicle ride may not be level, excessive weight (down-force) may appear on rear axle and reduced weight (up-force) on the front axle. This can result in un-stable vehicle handling, poor steering and braking, and potential physical damage to vehicle suspension. The blinding of the oncoming traffic with your headlights might also not be appreciated by everyone!

So what options do you have to correct this situation? Two popular approaches involve fitting additional equipment to your vehicle and/or coupling, each resulting in different solutions to this problem, with some "good" and "bad" consequences. Presented here is my logical and practical view (and, believe me, there are plenty out there regrading this topic), so you will need to do your own research before an ideal solution for you can be determined.



One approach is to fit a **Weight Distribution Hitch (WDH)** between your vehicle's towbar and the trailer. This picture shows a typical setup that involves using tension bars connected to the tow bar coupling to transfer weight (down-force) of the trailer as an up-force to the rear vehicle chassis resulting in a load transfer off the rear axle and onto the front axle. The resulting up-force will cause the

rear of the vehicle to rise (in relationship to the rear axle), allowing the towing vehicle to return to a level position.

The other approach is **Air Suspension Kits (ASK)** or **AirBags** that are fitted onto the rear axle to help stiffen the rear suspension to support this new down-force loading and to effectively push the body up (in relationship to the rear axle) so again resulting in the vehicle returning to a more level position. These airbags can be inflated/deflated to provide the required lifting support depending on the loads applied.



Whilst both approaches will return the vehicle to a level position, under the hood there are significant differences in the potential effect on your towing vehicle and its consequential handling when on the road. It may also result in physically damaging your vehicle and/or make your vehicle unstable or overloaded causing potential dangers to your vehicle and its contents, namely YOU!

Most of what I present in this article is the summary result of the findings presenting in the following video. **I HIGHLY RECOMMEND YOU WATCH IT FIRST**

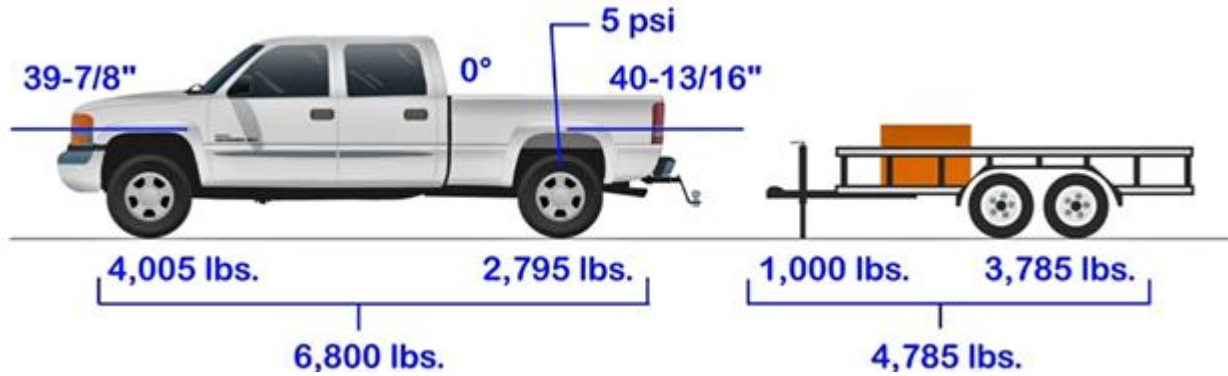
The Difference between using Weight Distribution and Air Bags to Level Your Ride

YOUTUBE VIDEO <https://www.youtube.com/watch?v=XBZu39pQ8Gg>



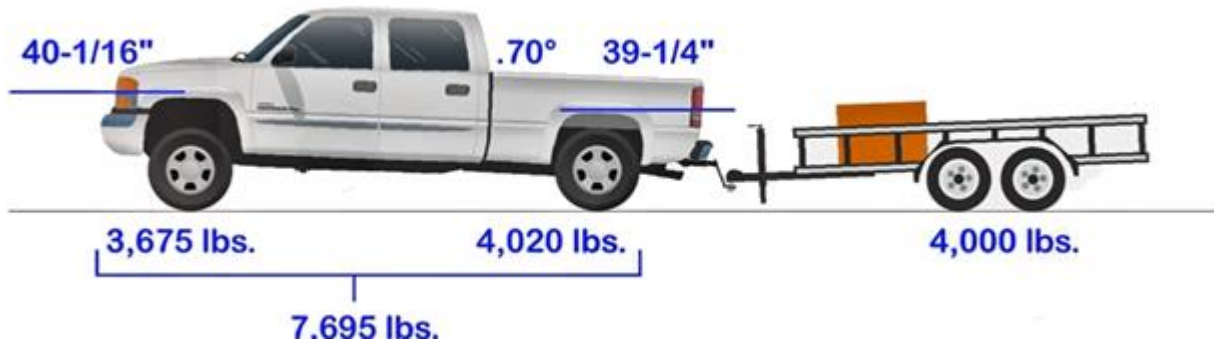
Towing Vehicles – Airbags or Hitches?

Unfortunately for us, as this video is produced in the USA (by Fastway Trailer Products) it uses inches and pounds but the results are indicative of the effects in using these two approaches. In the video, they take a towing vehicle and a heavily loaded trailer and measure the effect on the vehicle (levels and axle weight) as the loaded trailer is hitched on. They then measure what happens when AirBags are enabled or when a Weight Distribution Hitch is used.



BASELINE MEASUREMENTS

Shows the vehicle baseline measurements, height of the wheel arches and the axle weights. At this point the fitted AirBags are set to 5 psi (i.e. not effective) and the trailer has a 1000 lbs load added to it.



TRAILER LOAD ADDED

With the trailer now coupled to the vehicle without a WDH or the use of the AirBags we can see the impact of the added ball weight (from the trailer) and can observe the measured results on the vehicle axles and the resultant wheel arch heights.

How a Weight Distribution Hitch works: (as researched on the Internet!)

With a trailer load imposed on a tow vehicle, consider firstly a gooseneck style trailer (or 5th wheel) with the load being imposed in front of the rear axle, most of the weight will be imposed on the rear axle with some imposed on the front axle.

Now, if we move the load point just behind the rear axle, the rear axle load will be increased and the front axle will be decreased. This is the common situation with conventional trailers when they are coupled up to the tow vehicle.

Coupling in a WDH acts like a "rotation" device, using the tension bars to provide a rotational load at the rear of the vehicle, resulting in:

- The rear vehicle suspension will extend (load decreased)
- The front vehicle suspension will compress (load increased)
- The trailer suspension will compress (load increased)



Towing Vehicles – Airbags or Hitches?

The degree to which each of the above occurs depends on many factors and sometimes these are not obvious and may lead one to misinterpret what is really happening. In the video, the following was observed and measured:



WITH WEIGHT DISTRIBUTION HITCH ENGAGED

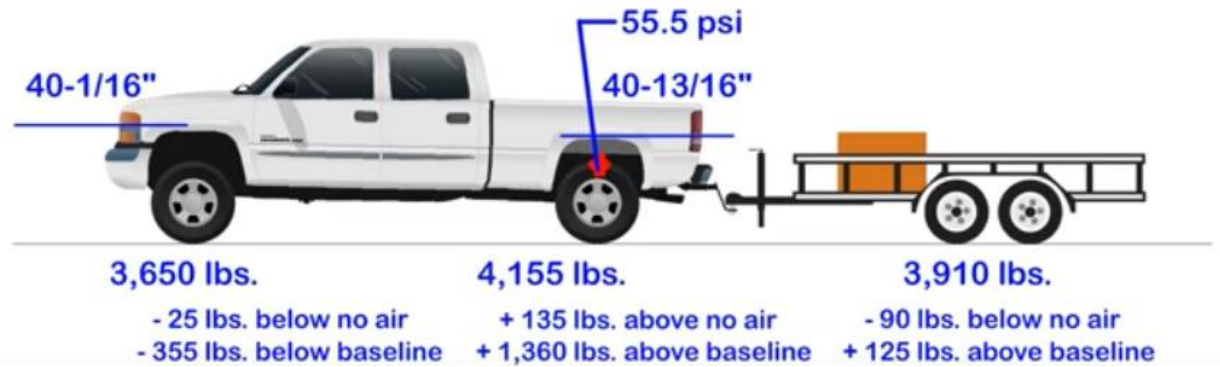
*Using a WDH does help level the vehicle but a **small 0.45-degree offset remains**. The rear axle loading is reduced by 375lbs, transferring some load back to the trailer (+150 lbs) and the some onto the front axle (+250 lbs).*

How an AirBag suspension works: (as researched on the Internet!)

Using the same conventional trailer loading, the AirBags do not change the load at the rear of the vehicle; they only raise the suspension height, so the effect is simple:

- **The rear vehicle suspension will extend (load unchanged)**

On some vehicles (e.g. with two live axles) there may be a small residual change at the front of the tow vehicle however this is minimal. In the video, the following was observed and measured:



WITH AIRBAGS INFLATED

*With the AirBags inflated to 55.5 psi, we see the vehicle return to a near level position. However, we have **increased the rear axle loadings** by 135lbs (from when the AirBags were deflated) and the front axle loads have **further decreased**.*

So which Device should you use?

Selecting the device to use comes down to identifying the problem, the issues and concerns wanting to be addressed within your specific rig configuration.

If you are concerned about rear axle loadings, a WDH will help. If you are concerned about in-balance on steering the vehicle, then WDH will provide the best solution. If you are concerned about removing any sag between vehicle and trailer, a combination of both may be required. If you are concerned about stabilisation, a specific combination might best resolve it. If you are just concerned about rear axle stability then maybe AirBags are good enough.



Towing Vehicles – Airbags or Hitches?

One reason people may fit a WDH is to reduce sway - this is a more complex issue and a WDH can provide some sway reduction through friction whilst other WDH's are fitted with specific sway reduction devices. However, addressing the cause of the sway should be considered first and that is the subject of yet another important topic (and not covered here!)

Some rigs find that a WDH helps with "settling down" of a rig by reducing bounce at the back of the tow vehicle, but this can also be addressed in a similar vein to sway and by fitting AirBags onto the tow vehicle or other suspension product as required.

If you need to add stiffness to the rear suspension, then it is likely that you are overloading it beyond the vehicle design limits! Some consider that if you are adding stiffness to the rear suspension without doing the same to the front suspension will change the handling geometry of the vehicle, sometimes with dangerous effects.

AirBags do help correct the height at the rear, but they also maintain or increase the stiffness of the rear springs hopefully to retain or improve vehicle stability but this may become a conflict issue as manufacturers of vehicles tune them more towards un-laden ride comfort. (SUV vs 4WD).

Why WDH?

- Generally where significant ball weights (> 160Kgs) then use of a WDH is recommended;

Why NOT WDH?

- Can be difficult and hard to fit every time you need to couple up the trailer;
- May require manual adjustments to the coupling whenever the trailer loads vary;
- Typically quite heavy and need to be included in any Gross Mass weight calculations;
- Can cause stiffening of the rear suspension that may lead to ride handling issues.

Why AirBags?

- Can be varied to suit various loads, typically from within the drivers reach;
- Provide rear support stiffness to help stabilise "soft" vehicle suspension;

Why NOT AirBags?

- Can burst, especially when under pressure, causing vehicle stability issues;
- Making suspension too "hard" may make the ride uncomfortable and difficult to manage especially over uneven surfaces;
- Un-balanced suspension geometry may cause un-expected and dangerous effects especially during heavy vehicle actions (swerving or braking hard);
- "overdo" using airbag to resolve poor loadings and excess mass loads (exceed vehicles capabilities);
- Can result in excessive loads being placed on the rear axle exceeding manufacturer ratings and work against vehicle manufactures wanting to tune for un-laden ride comfort.

Conclusion!

WDH's do a good job at what they are designed to do and are very often used in conjunction with rear AirBags to simply to get the best overall performance from your rig.

If you add AirBags to the rear suspension of a WDH tow vehicle, you can often decrease the load on the WDH ("drop-a-link") whilst maintaining the height of the rig and still introduce the desired stiffness back into the rear springs as they are no longer being "tricked" into being un-laden. This combination is widely used for enabling the best overall comfort, stability and safety for the whole rig and allows a flexible tuning option to handle different configurations in different environments.

My Mitsubishi Pajero has independent rear coil springs so having both a WDH and AirBags fitted is my best option providing I monitor their usage with any varying loads, road conditions and/or vehicle/rig stability and ride comfortability. 😊

[Chris Sieben]