

WEIGHT DISTRIBUTION HITCHES & AIRBAGS



How a Weight Distribution Hitch works:

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, and some will be imposed on the front axle, try laying a pencil on two blobs of blue tack and you can "see" the loading.

Now, we move the load point behind the rear axle, and if slightly behind there will be a change in that the rear axle will have slightly more load, and importantly the front will have less load than it started with, so our pencil test results in the pencil tipping up, and it tips up easier the further "rearward" we press on the pencil. So, this is the situation with conventional caravans when they are coupled up.

What the WDH does is cause the rear end of the pencil to rotate, imagine a wheel on the end of the pencil turning, and the harder you turn this the more it will counteract the downward load. So, basically the WDH is a "rotation" device, it uses the bars to provide a rotational load at the rear of the vehicle, and the result is 3 fold.

- 1. The rear vehicle suspension will extend (load decreased)
- 2. The front vehicle suspension will compress (load increased)
- 3. The trailer suspension will compress (load increased)

The degree to which each of the above over depending on many factors, and due to this the observed change may not be obvious and lead one to misinterpret what is happening.









By comparison, how airbags work:

In the same conventional caravan 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.

1. The rear vehicle suspension will extend (load un-changed)

On some vehicles (e.g. with 2 live axles) there may be a small residual change at the front of the tow vehicle, however this is minimal.

So, the question over which device is required comes down to identifying the problem, issues, concerns being addressed. If we firstly look at the WDH, the primary effect is to put some load back on to the front wheels of the towing vehicle, the need to for this best established by measuring the front suspension/vehicle height with and without the trailer on the tow ball with a basic tow ball and no other adjustments.

If the front of the tow vehicle lifts more than about 15mm then a WDH may be required to push it back down again, and no other product can do this. If the front of the tow vehicle raises less than this, it is likely no WDH is required, unless it is a small or particularly sensitive vehicle.

In the event that a WDH is required, then it is likely that the rear of the vehicle will have dropped an obvious amount, and when the hitch is connected it will return some or most of this height, however this comes at the cost of decreased rear axle loading (may be desirable), and decreased rear spring stiffness (less desirable for stability).







This is where airbags come in as they are able to help correct the height at the rear, but more importantly they maintain or increase the stiffness of the rear springs so that the rear suspension of the tow vehicle retains or improves its stability, which is becoming an increasingly large issue with tow vehicles as they become tuned more toward un-laden ride comfort.

If you consider the common situation of a large SUV tow vehicle, with IFS front suspension and a live rear axle, loaded to 75+% of GVM and towing a caravan at 75+% of the allowable towing capacity, and stock suspension with no WDH, the rig will likely be rather un-pleasant to drive, have poor steering feel and will not deal well with added load.

If we then add a WDH and adjust it to level out the whole rig, it will visually look OK, have better steering feel but will not be very rigid at the connection between the vehicles, and have poor tracking of the tow vehicle – this is masked by the WDH friction & tension but is quite noticeable in some situations, e.g. mid corner bumps.

If we now add airbags to the rear suspension of the tow vehicle, we can often decrease the load on the WDH "drop a link", whilst maintaining the height of the rig, and introducing the desired stiffness back into the rear springs, as they are no longer being "tricked" into being un-laden. This combination is widely used to arrive at the best overall combination of comfort, stability and safety for the whole rig, and allows a good deal of tuning to get the best out of the rig.

The other reasons which 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, and some WDH's are fitted with sway reduction devices and/or separate sway reduction devices can be used, however addressing the cause of the sway is first thing that should be addressed, and further information can be provided on this topic.

Additionally, some rigs find that a WDH helps with "settling down" of a rig by reducing bounce at the back of the tow vehicle, 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.

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

Bag It With The Best





