The 4x4 Works Guide to Choosing the Right Suspension

Introduction

Your vehicle's suspension is a vital component and makes a big difference to every mile you drive, both on and off the road. Let's keep things simple and cover the basics so that we can select the best setup for your needs. If you have any questions after reading this article or need help, our staff are here to help, so don't hesitate to ask.

Buying a complete suspension kit is a major purchase, particularly for older vehicles. However, it is often a necessary upgrade, and a good quality kit can really enhance the ride and handling characteristics.

A properly functioning suspension system is vital for both safety and ride comfort; coil and leaf springs can sag over time, and shock absorbers can fail and start to leak. This leads to serious safety issues, compromised ride height and reduced ride quality. Of course, using the vehicle off-road will only make the situation worse.

If you are serious about maintaining your vehicle, you should be wary of the low-cost, low quality kits which have flooded the market in recent years. Some of these kits will not have undergone proper safety testing and could be prone to sudden failure, sometimes within weeks of fitting to your vehicle! Good quality suspension is expensive, but it is also costly to develop and test.

Generally speaking, it is not a great idea to 'mix and match' – pairing old or original factory components with new, upgraded parts. A set of new shock absorbers cannot compensate for a

sagged set of springs, nor can a set of uprated coil leaf springs make up for the effect of a degraded or leaking pair of shock absorbers or dampers.

Brands such as Old Man Emu and Terrain Tamer have large suspension ranges for 4WD models. Due to being large companies with significant research and development budgets, they are able to develop and test 'fully integrated' suspension systems. This term is often misunderstood, but it simply means that every component is tested and developed to work alongside every other component for your vehicle model. Some customers might choose to buy shock absorbers from one brand and coil springs from a different company, but without careful technical research this could lead to a poor outcome or unexpected ride or handling issues.

Buying the best suspension system for your vehicle is a simple process if you follow a few basic rules, but if you ignore the basics and 'mix and match', the results can be poor.

Should I upgrade my suspension?

There are several common reasons to upgrade your suspension:

- To lift your vehicle. This can be done for looks, off-road performance, or both.
- To replace broken or worn suspension.
- To improve load carrying ability or capacity, for carrying or towing.
- To improve suspension durability or reliability, for example if preparing for an overland trip.
- To improve ride and handling.

How much can I lift my vehicle? Will this affect the handling?

This is a complex question and the answer will vary from one vehicle model to another. However, some general rules do apply.

For every 25mm or 1 inch you lift your vehicle, the positive caster angle is reduced by 1 degree. Many vehicles have around 2 degrees of caster adjustment available, so in these cases it is possible to lift your vehicle by up to 2 inches and have the wheel alignment checked and adjusted by your local garage. However, once you reach or exceed 50mm or 2 inches, sufficient adjustment is not possible and other steps are needed such as the fitment of caster correction bushes.

With larger amounts of lift, it is not just the caster angle which needs correcting. Other components such as brake lines, track bars, control arms and trailing arms become more likely to need attention or modification.

For this reason, most high quality suspension lift kits are limited to 50mm or 2" lift heights. Indeed, some vehicles will not be able to achieve anything like this amount of lift without introducing problems. If you take a look across the suspension range of a brand such as Old Man Emu or Terrain

Tamer, you will notice that the lift amount varies from one model to another; this is because each kit has been developed for trouble-free installation without other modifications being needed.

In any case, even if you could achieve a larger than 50mm lift height, do you really need to? Big lifts will make steering and handling feel vague and the vehicle will have a higher centre of gravity. This might be fine for an off-road buggy, but not acceptable on the school run or your morning drive to work. 25mm to 50mm lift height is a 'sweet spot' for most vehicles and will give pleasing results if done correctly.

As all seasoned off-road drivers know, proper technique is far more important than lift height alone.

Which type of kit do I need?

Most 4x4 vehicles built in the last 60 years will have a fundamentally similar suspension principle. As much as the basic design has been revised and improved over the years with live axles giving way to IFS and air-assisted systems, we can simplify it down to the following components:

- Leaf Springs
- Coil Springs
- Torsion Bars
- Air Suspension
- Shock absorbers and struts
- Ancillary components (u-bolts, spring bushes, fitting kits, etc)

By selecting the correct suspension kit for your vehicle model and year, you will have a choice of the relevant components for your 4x4. These are bolt-on components which, in most cases, can be fitted by any competent mechanic without modifications being required.

Which spring rates should I choose?

It is very important to choose the correct spring rates and to not confuse term like ***'firm rate'*** with 'heavy duty'. Put simply, a stock factory vehicle with no extra permanent weight should almost always be fitted with medium-rate shocks and springs.

Contrary to popular belief, the ***'firm rate'*** springs which are available for your 4x4 are not necessarily taller than the ***'medium rate'*** equivalent – they may even be shorter. Therefore, fitting the wrong springs in a deliberate attempt to add extra lift is a bad idea and might just give you an uncomfortable ride for no good reason.

What is 'constant weight'?

Manufacturers refer to ***'constant weight'*** or ***'constant load'*** a lot when describing suspension setups. Both terms have a similar meaning, but there is a difference. In a front-engined 4x4, the only option we normally have for carrying extra load is in the front seats. As this load changes day-to-day, we do not need to consider it as this a ***'variable load'*** rather than a ***'constant weight'***.

When talking about front suspension weight ratings, we are most interested in permanently fitted upgrades, such as steel bumpers and bull bars, winches, engine swaps and other significant changes. After all, if you hang a 100kg bumper from the front of your car, it is obviously going to both affect the handling characteristics and cause the front end or ***'nose'*** to sit lower. Clearly, a 100kg adult in the driver's seat would not have the same affect.

Not all 'bars' are built the same. A polished stainless steel 'A' bar might only weigh 12kg, whereas an ARB Deluxe Bull Bar for a full-size 4x4 can weight 70kg or more – excluding perhaps 40kg of additional weight courtesy of your winch. Usually, Australian and American suspension brands will be thinking of 70kg to 90kg when they refer to your 'bar'.

'Constant load' tends to refer to the rear of the vehicle. If your 4x4 has any load carrying area at all, the manufacturer will have considered the fact that you will use the vehicle to carry goods or luggage. For this reason, the rear suspension is more capable of handling a variable amount of load and suspension choices might become a little less critical. Still, the principle is the same for the rear as for the front: your choice of setup must reflect your intended usage.

Overland vehicles are often heavily equipped with constant rear loads of 400kg or more; this loading does not significantly change from day to day. Here, a constant 400kg rear leaf or coil spring setup would be a great choice. However, if you overland for 2 weeks per year and drive to work for the remaining 50 weeks with all your overland gear safely stashed away at home, you may regret fitting those **'firm rate'**, **'constant load'** springs. In this case, finding the best compromise is vital.

How about towing?

Some users will tow on a daily basis, but more often when we talk about towing we are referring to an occasional usage only. Therefore, two important considerations would be:

- How is your existing suspension coping?
- What are your priorities in terms of outcome?

Frequently, poor towing characteristics being displayed by an older vehicle are due to worn rear suspension components. This can be improved by fitting a high quality replacement suspension system and may not necessitate firmer rear springs.

A somewhat less common option for occasional towing is to install an air-bag kit. This will allow you to raise the rear of your vehicle to your desired ride height by adding compressed air from an on-board compressor or even a foot pump. Whilst this can be a good solution for those who infrequently tow or carry very heavy loads, some systems can be prone to air leaks or failures and most will specify a minimum pressure level below which the system can become damaged by spring travel. This may adversely affect your unladen ride quality.

Ideally, having a dedicated vehicle for towing will be the ultimate solution. However, with so many different loading and towing scenarios being possible, we always recommend seeking proper advice if you are at all unsure.

Final thoughts

Your suspension system is there to support you and your vehicle safely and comfortably. Appropriate suspension selection will enhance your driving experience and allow you to remain comfortable on varying types of terrain; from smooth, straight roads to country lanes to farm tracks, deserts, jungles, forests and wherever your next adventure takes you.

The aim of your suspension is to maintain good ground contact without skipping or wallowing over bumps and rough terrain so you can achieve consistent grip and proper control.