

REAR SUSPENSION AIDS

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October 2009

1. Caravans

Adding the noseweight of a hitched trailer caravan to the rear of a car can cause problems with the car's rear suspension. This is because the car designer may have allowed for 4 or 5 occupants and their luggage, but given little thought to the effect of an additional 50 kg plus of trailer noseweight. Some cars offer self-levelling suspension to cope with this, but those without may suffer problems of reduced ground clearance, headlights tilted up too high, and impaired handling. This is particularly the case with front wheel drive cars because, as the front of the vehicle is lifted up, so traction as well as steering and tyre grip may be affected.

To reduce the noseweight of the caravan is no answer to the problem, because trailer stability is reduced as the weight on the towball is reduced. It is indeed important to keep the trailer's noseweight as heavy as possible (within the car and caravan manufacturer's limits) to achieve stable towing, ideally around 7% of the caravan's actual laden weight. This means that extra load is placed on the car's rear suspension which must be able to cope without a significant effect on the car's handling.

Before deciding to buy extra aids, check first that the car's normal suspension and shock absorbers are working at near 100% efficiency, and that the rear tyres are inflated to the car's recommended pressure for laden use. Sometimes replacement of the car's springs and/or shock absorbers may be required, either by standard or heavy duty versions, but many caravanners would be surprised at the difference they would notice if the tyres were set at the car manufacturers' recommended pressures for towing.

Some years ago, it was quite common for towcars to benefit from suspension aids, and some models really required them to tow properly. As designs have improved, suspension modifications have become far less commonly necessary, and it is likely that suspension problems while towing today are much more likely to be due to an inappropriate outfit match, or worn suspension components. In either of these cases, rear suspension aids are unlikely to be the best solution.

2. Motor Caravans

Most motor caravans are based on commercial chassis, which tend not to have the refinements and comfort levels of a passenger car. For leisure use improvements are often possible however, usually through the use of air-suspension components. This may involve adding air-suspension to the existing leaf or coil springs, or may involve the replacement of the existing suspension with air-sprung alternatives. The latter is more effective but more costly. As for a trailer caravan, check for worn components before considering fitting any additional aids.

3. How to test your suspension/shock absorbers

Unless it is broken, to the untutored eye a worn coil spring looks very much like a new one, apart from the usual dirt and rust. If the car is not obviously sagging, the way to check the health of the springs is to measure the distance from the ground to the top of the wheel arch at each wheel with the car laden. Compare these measurements with those in the workshop manual or, failing that, another version of the same car with a healthy suspension system. A drop of about an inch is acceptable, but much more indicates the suspension is tired, and new springs could be the answer.

If the suspension looks good then check the action of the shock absorbers (dampers). They are likely to be at fault if you notice a fair degree of pitching with or without the caravan on the back, but remember a load equalising stabiliser (eg Scott) may mask these symptoms.

Damper inspection is best left to the professionals, though motorists can make their own simple checks. Oil leaks are the commonest cause of damper failure, with fluid being visible on the outer casing of the damper cylinder. Flat spots on the tyre tread are a sure sign of badly worn dampers - for safety's sake, dampers and affected tyres should be replaced. Deterioration in ride and handling: the car wallows in corners, bounces off line over bumps (even on straight roads) and squats and dives under acceleration and braking. Finally, the bounce test, push down hard on each corner of the car and release quickly. Good dampers should allow no more than one and a half oscillations (ie the car body will rebound once, then settle).

If the car at full load is still tail down when hitched up to its caravan, some form of rear suspension aid is obviously essential. Such aids vary from the inexpensive which assist when towing but may generally make the ride rather firmer when driving solo, to the sophisticated which effectively uprates the rear suspension to make it self levelling, but these are obviously more costly. In many cases the choice is limited by the type of suspension fitted to the car.

4. Types of suspension aid

There are two categories of suspension aids: first those which are replacement shock absorbers (dampers) with additional features and/or load bearing capacity (suitable obviously only for cars fitted with telescopic 'dampers'), and second, various devices which affect the car's suspension in some way. These are listed in the table overleaf.

4.1 Replacement Shock Absorbers

These either have a progressive rate coil spring fitted around a hydraulic 'damper', an additional spring at one end, sometimes in the form of a resilient moulding made of an engineering plastic, or instead compressed air is fed into them via flexible tubing. The latter can either be pumped by a garage air line, or, at extra expense, by a fitted on-board compressor operated by a control on the dashboard. As the rear of the car sinks under load, so normal ride height can be regained by pumping air into the system. This

compressor can also be used, with adaptors, to pump up tyres, air mattresses, footballs, igloo tents, etc. It can also be transferred from car to car when a vehicle is sold which helps to justify its extra cost. However, a cheaper compressor from Halfords works just as well!

The progressive rate coil spring versions only deflect the lightweight portion of the spring under normal conditions, but when laden the heavier part flexes to take the additional load without allowing the rear of the car to sag much more than normal. Of this type only one is adjustable - the Koni Load-a-Juster which can be adjusted if removed from the car, to allow for wear after considerable use (about three years).

4.2 Devices affecting the car's suspension

These are of four main types:

- 4.2.1 Those for use only with elliptic springs are a form of additional spring which clamps to the rear of the car's normal leaf springs between the axle mounting and the spring shackle. They can be adjusted for tension by turning the sleeve nuts, and then require no further attention.
- 4.2.2 For use only with coil spring, the Do'nut is a very simple and inexpensive circular wedge inserted between the coils. Being of plastic, it can be sliced to fit narrow gaps. Two per spring are recommended for use when towing a trailer, one fitted at the top and one at the bottom. (Do'nuts can also be fitted in front coil springs where MacPherson struts are used.)
- 4.2.3 For both elliptic and coil springs the Auto Ball-ans is an air filled plastic sphere. It is fitted inside those coil springs which do not have a damper inside the coil, or, for elliptic springs, clamped between the rear of the springs and the car sub-frame above them. In the case of coil springs, two Auto Ball-ans may be fitted interconnected. As with the air-filled shock absorber types, air is pumped into the spheres. A dashboard control box to do this is available as an extra. As the rear of the car sinks so the spheres compress, and their walls expand.
- 4.2.4 For cars fitted with Hydragas (or for the earlier Hydrolastic) interconnected suspension, the only aids possible are those which replace the standard fitted bump stops. These are also available for use on cars with other forms of suspension, and kits are available for most car models. An Aeon Car Helper Spring Kit comprises a simple, strong, hollow rubber cone.

The alternative to spring inserts is a separate heavy duty 'helper' spring that sits alongside or inside the existing spring arrangement.

NOTES

Car engineers spend a considerable amount of time and expense developing the suspension/shock absorber system, and as the car leaves the factory all such components should complement each other and be suitable for the original purpose for which the car is designed, ie generally providing a comfortable and safe ride for people. If one of these components is altered in some way, eg the spring (by inserts or replacing with a heavy duty version), the original shock absorber may not be able to provide effective damping.

Therefore attention should be paid to both springs **and** shock absorbers when uprating the rear suspension.

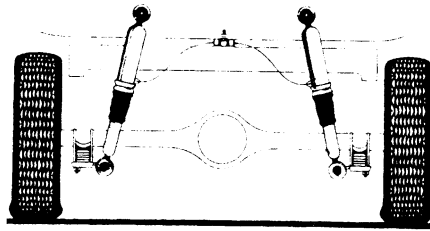
It should also be noted that the car's solo handling performance and/or comfort of ride could be adversely affected by any alterations to the suspension system.

Cars with factory fitted self levelling suspension (eg Citroen) cannot be fitted with any other device. If this suspension sinks too low when towing then the suspension may need adjustment or repair. Some motorcaravans can be ordered with air suspension which both improves ride and springing characteristics. This system cannot be modified with extra suspension aids. Be particularly cautious if modifying the suspension of vehicles fitted with an Electronic Stability Control System. Check with the equipment supplier for vehicle compatibility before purchasing.

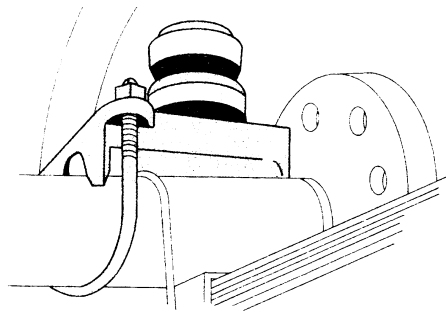
Suspension Aids

SUSPENSION AIDS	PRICE GUIDE (USUALLY PER PAIR)
Fitted as replacement shock absorbers	NB price will vary according to car model
<ul style="list-style-type: none"> • Koni Load-a-Juster (remove to adjust) • Monroe Level Light 	<p>£190 upwards £120 pair upwards</p>
<p>Compressed Air, variable:</p> <ul style="list-style-type: none"> • Monroe Ride Leveller (compressor and dashboard control extra) 	£199 Pair
Fitted to car suspension	
<p>Only for cars with elliptic springs:</p> <ul style="list-style-type: none"> • Grayston Universal Leaf Spring Assister (Standard or heavy duty) 	£64
<p>Only for cars with coil springs:</p> <ul style="list-style-type: none"> • Grayston 	£19 - £35
<p>For elliptic, coil, hydragas or air springing:</p> <ul style="list-style-type: none"> • Aeon Helper Springs • Grayston Heavy Duty Auxiliary Spring Assisters 	<p>£45 + £65 +</p>

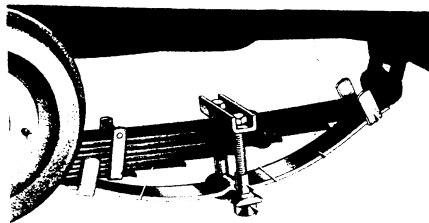
Examples of these main types of suspension aids are shown on page 6



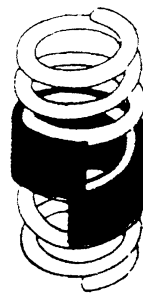
RIDE LEVELLER



AEON HELPER SPRING



GRAYSTON



GRAYSTON

USEFUL NAMES AND ADDRESSES	REAR SUSPENSION AIDS
CDI Polytek Ltd Oldfield Road Hampton Middx, TW12 2HT Tel: 0208 481 8300 www.hallite.com	Aeon coil lift and helper springs (for 4 x 4s and commercials only)
ZF Trading UK Ltd Eldon Way Crick Industrial Estate, Crick Northants, NN6 7SL Tel: 01788 822353 Sales: 01788 822855 www.zf-trading.co.uk	Nivomat (limited models) Pro-Gas (limited models) Turbo gas Automatic/GS Standard
Peter Bowman Towbar Centre 1-37 Mason Street Bury Lancs, BL9 0RH Tel: 0161 797 3000 www.towing.co.uk	MAD, Grayston, Monroe,
Camberley Auto Factors Ltd Unit 2, Hawley Trading Estate Hawley Lane Farnborough, GU14 6ES Tel: 01252 517272 www.camberleyautofactors.com	Koni, Monroe
Demon Tweeks 75 Ash Road South, Wrexham Industrial Estate Wrexham, LL13 9UG Tel: 01978 664466 www.demon-tweeks.co.uk	Monroe, Koni, Spax, Grayston,
Grayston Engineering Ltd 115 Roebuck Road, Chessington Surrey, KT9 1JZ Tel: 0208 974 1122 www.grayston.biz	Grayston
Tenneco Automotive Wharfdale Road, Birmingham, B11 2DF Tel: 0121 609 3140 www.monroe-eu.com	Ride Leveller, Level-Light
A J H Leisure Ltd Saville House Stephenson Avenue Spalding Lincolnshire, PE11 3SW Tel: 01775 766455 Fax: 01775 710292	Monroe, Koni, Bilstein, MAD
V-B Airsuspension UK Ltd Unit 13 Elder Court Lions Drive Blackburn Lancashire BB1 2EQ Tel: 01254 848010 Tel: 0773 8562832 www.vbairsuspension.nl	Motorcaravan suspension

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