



THE EXPERT STEWART SANDERSON

Having worked as a tuner for 17 years, Stewart 'Stu' Sanderson is one of the most-respected names in the business.

A Level 5-trained fuel-injection technician, Stu has worked for a Ford Rallye Sport dealer, a well-known fuel-injection specialist and various tuning companies.

Eight years ago he joined forces with Kenny Walker and opened up Motorsport Developments near Blackpool (01253 508400, www.remapping.co.uk), specialising in engine management live remapping, as well as developing a range of Evolution chips which are now sold all over the world.

He is the creator and administrator of www.passionford.com, which he started in 2003. It has grown rapidly from a few friends contributing, to one of the biggest Ford communities on the web.

Stu's enviable knowledge of the workings of modern-day Ford performance engines means that every month he's just the man to explain how and why things work, and importantly how they can be improved.

ANTI-ROLL BARS

**AS PART OF
OUR HANDLING
SPECIAL, STU
GIVES YOU ALL
THE INFO ON
ANTI-ROLL BARS.**

Anti-roll bars are fitted as one of the key components in a vehicle's suspension system. They can be fitted at the front and the rear of a vehicle and their purpose is, as the name suggests, to reduce body roll from the vehicle under cornering conditions.

You can probably all think of a time where either as a driver or

a passenger you have been in a car that has turned into a sharp corner at speed and ended up leaning out of your seat. Well, that is a fantastic point to start explaining how anti-roll bars work!

If you think back to 'that corner', you'll probably remember how your body was pulled to the outside of the turn. For a right-hand turn, you leaned to the left and vice versa for a left hand turn. The same thing is happening to the vehicle. When everything leans to the outside of the turn, it pushes down on that side of the vehicle. As this happens, there

**Words: Stewart Sanderson
and Will Pedley**



is less loading on the side of the vehicle on the inside of the turn and it lifts up slightly. When this scenario occurs it is referred to as body roll and is something we try to avoid!

Roll transfers the loading to the outside of the turn which means considerably harder work for your tyres, which will lead to excessive wear, a reduction in traction as the inside wheels will not have as much weight on them and will require the driver to work harder to adjust the steering wheel to compensate.

HOW ANTI-ROLL BARS WORK

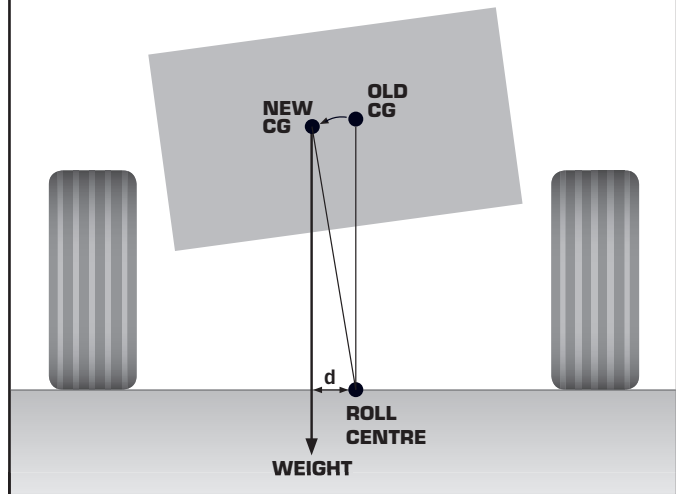
An anti-roll bar tries to reduce the body roll of the vehicle to keep the weight distribution more even across all four tyres through the corner. It does this

by transferring the forces generated through cornering from one side of the vehicle to the other. An anti-roll bar on the front of a car connects to the lower arms either side and is mounted with at least two bushes to the car.

By attaching to the lower arms, when the outside lower arm pivots up during cornering, the torsional force is transferred through the anti-roll bar to the inside lower arm and it is pivoted up too. This in turn helps the vehicle to remain 'flat' through the corner and prevent body roll. The reason for mounting the anti-roll bar inside the bushes is to allow for rotation. This is sometimes aided by greasing the inside of the bushes during installation.

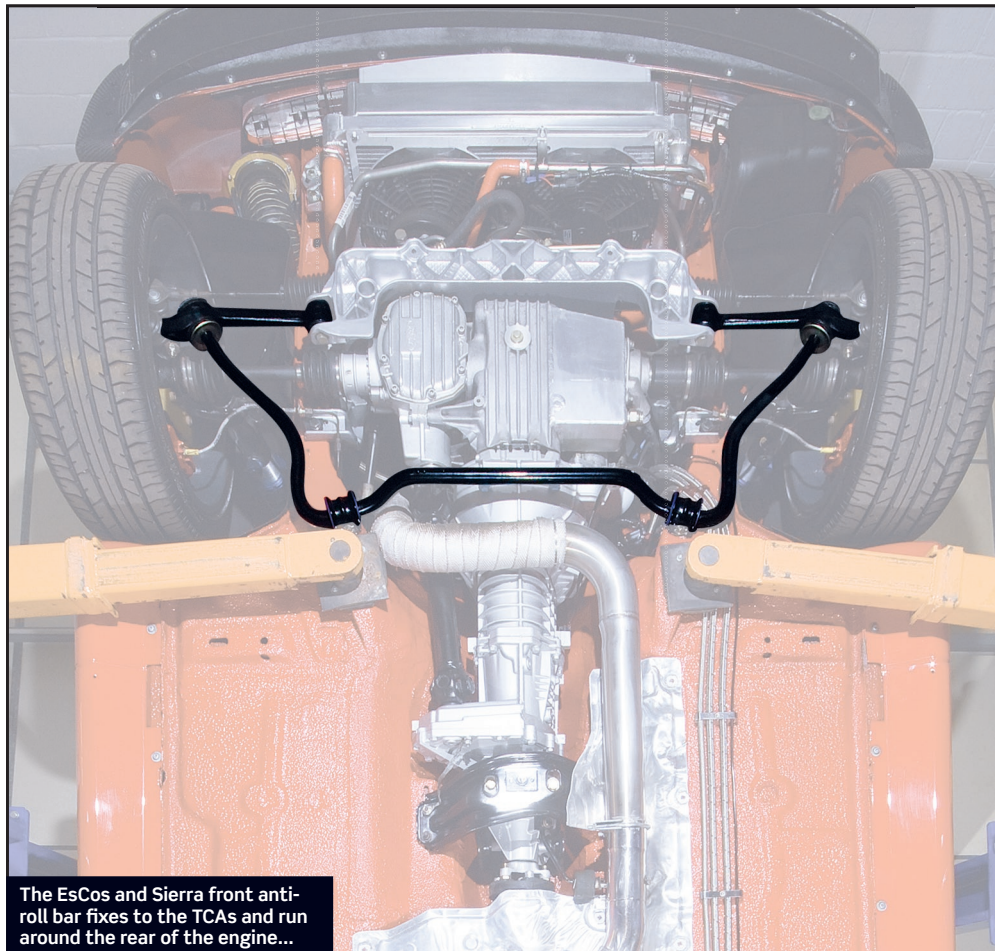
BODY ROLL

By reducing body roll you keep the centre of gravity as close to its original position as possible

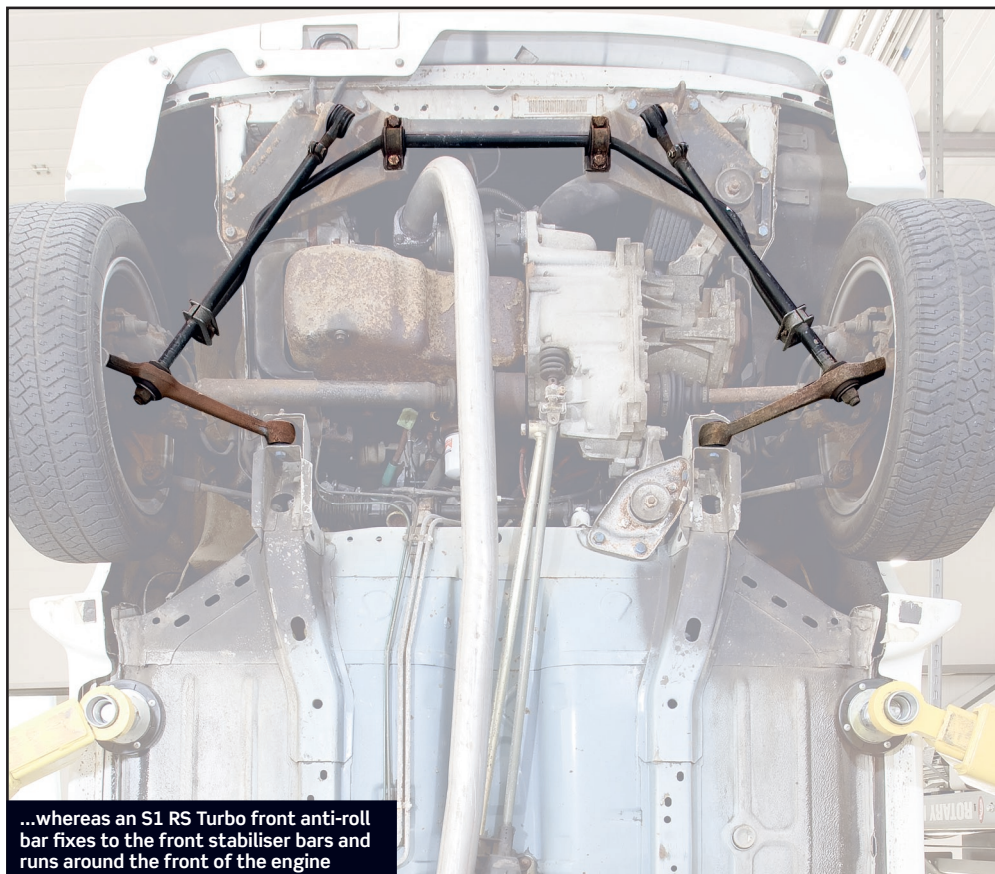


Anti-roll bar ties the two wheels together which helps the car remain flat through the corners





The EsCos and Sierra front anti-roll bar fixes to the TCAs and run around the rear of the engine...



...whereas an S1 RS Turbo front anti-roll bar fixes to the front stabiliser bars and runs around the front of the engine



Anti-roll bars are usually fixed directly to the chassis by at least two fixing points

> Virtually all cars have them. Although some high-end modern cars no longer have a physical anti-roll bar, they employ an "Active Anti Roll" system that uses gyroscopic sensors, pumps and electronic control units to drain and pump fluid between the suspension dampers to control the vehicle body roll electronically.

UPGRADES

Anti-roll bar upgrades are a very worthwhile upgrade if you feel your vehicle still suffers with body roll through corners. A common upgrade is from other vehicles from the same manufacturer, in particular upgrading a base model car by fitting the thicker anti-roll bar from a performance model. Thicker anti-roll bars as a rule are significantly stiffer and stiffer anti-roll bars allow for better weight transfer side to side.

An aftermarket performance anti-roll bar is another option and these have been specifically designed in most cases to not only improve the handling of the vehicle, but also the traction. Before deciding on an anti-roll bar upgrade you need to review the handling balance of the car because it is possible to reduce traction if you get it wrong!

As a rule, fwd cars have a stiff anti-roll bar at the front and a relatively soft bar at the rear. To improve the handling and traction therefore we would only need to replace the rear anti-roll bar to balance the handling. It would be a poor move to fit a performance anti-roll bar to the front and leave the original at the rear as this would further decrease the balance from front to rear and reduce traction.

If you decide to upgrade both front and rear anti-roll bars, it's

ADJUSTABLE ANTI-ROLL BARS

There are a couple of different types of aftermarket adjustable anti-roll bars available.

The main benefit to an adjustable anti-roll bar is that it allows a relatively simple form of adjustment at the side of a race track. If you have spent time and money having a car corner weighted, aligned and balanced the weight distribution with coilovers, if you encounter

understeer for example, anti-roll bar adjustments can be easily made while leaving everything else alone.

Some anti-roll bars have a number of different holes in to allow the drop links to the front lower arms to be mounted at different heights to vary how stiff or soft the bar behaves.

Alternatively, bladed anti-roll bars can be used. These are slightly different in appearance

as they have the bar that runs side to side on the vehicle, but have 'blades' between the bar and the pick-up.

The simplest way to explain how a bladed anti-roll bar works is to imagine the blade as a plastic ruler. We're sure that you have sat around and played with a plastic ruler at some point in your life! We know how easily it flexes into a C shape when we hold it across its width and bend it. Now, imagine turning it through 90 degrees and trying to bend it into a C shape through its thickness... It might only be a couple of millimetres thick but it is virtually impossible!

The same principle applies to bladed anti-roll bars! They allow for very, very fine adjustment anywhere between the widest part being horizontal, through 90degrees, to it being vertical. Horizontal is full soft and vertical is full hard and the adjustment can be set anywhere in between.

By moving the point at which the drop links fix to the roll bar you can effectively alter the strength of the roll bar



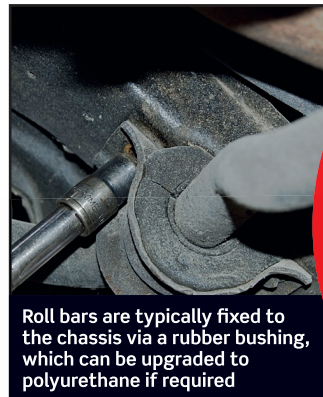
Bladed roll bars are infinitely adjustable between horizontal, the full soft setting, and 90deg vertical, the full hard setting

advisable to run the front on the softest available setting and the rear on the hardest, this tends to prevent understeer.

On the other hand, rwd cars can often be found set up the opposite to fwd cars in terms of anti-roll bars. They often tend to have stiff at the rear and soft at the front. Therefore a front anti-roll bar upgrade is beneficial. 4wd cars vary widely depending on manufacturer and are unfortunately too varied to apply any 'rules of thumb'.

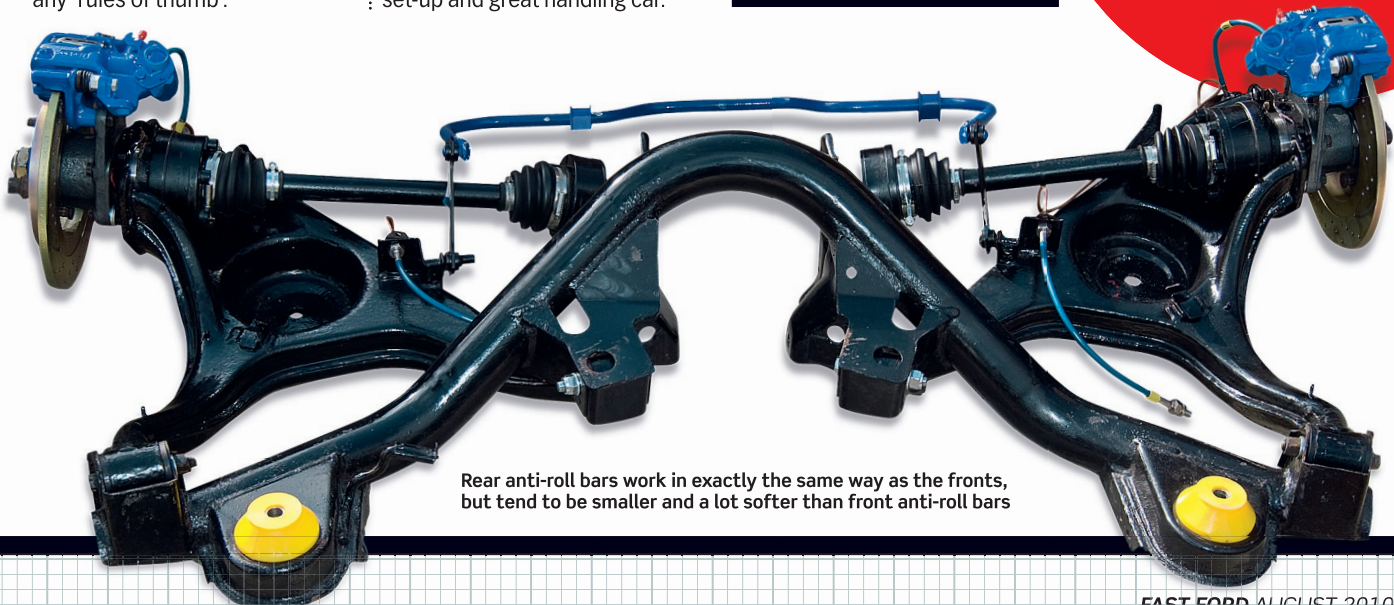
Obtaining the additional traction by upgrading the anti-roll bar doesn't solely come from balancing and optimising the tyre loads, excessive body roll tends to adversely affect caster and camber on MacPherson strut set-ups. So it is more beneficial to reduce the roll and retain the optimum geometry angles.

So, hopefully along with the rest of our 'handling special' features, you should now feel confident to get yourself one well set-up and great handling car.



Roll bars are typically fixed to the chassis via a rubber bushing, which can be upgraded to polyurethane if required

NEXT MONTH
AN IN-DEPTH
LOOK AT WATER
INJECTION



Rear anti-roll bars work in exactly the same way as the fronts, but tend to be smaller and a lot softer than front anti-roll bars