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The Next Level

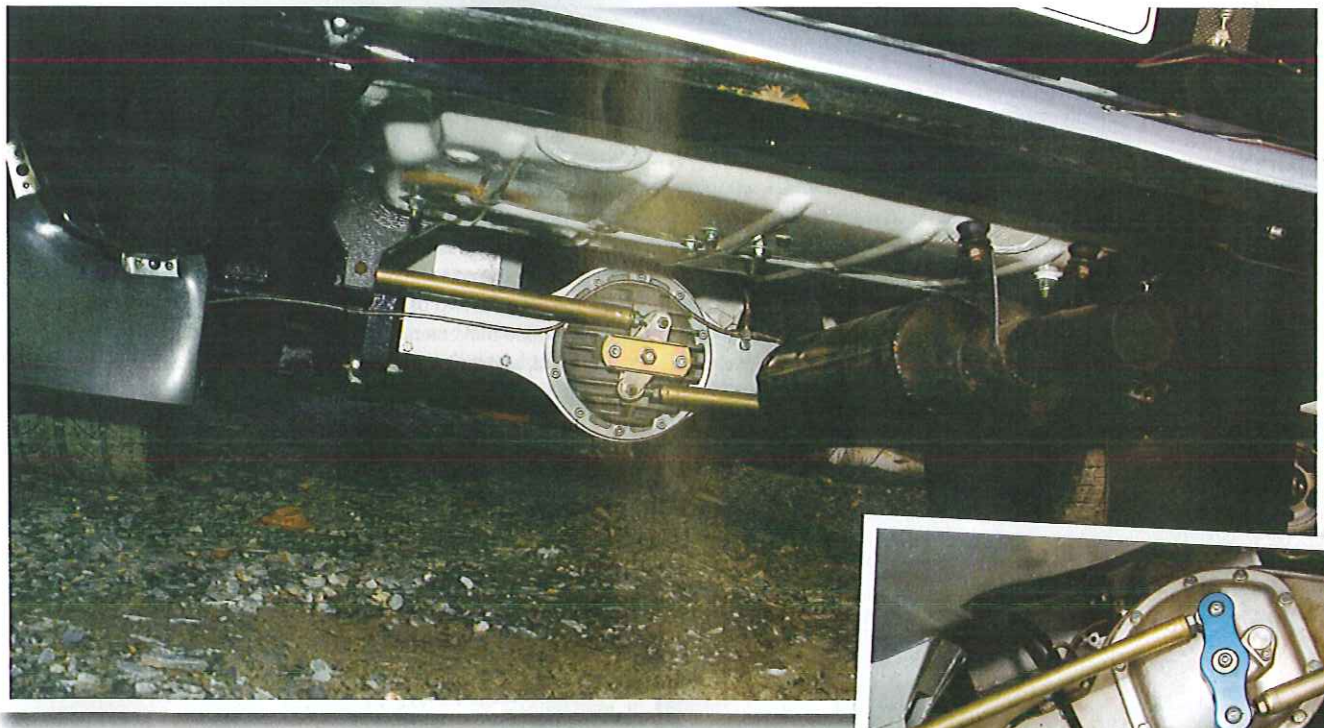
Last month, we showed you the basics of suspension modification. Now we look at some modifications that will take your setup to the next level.

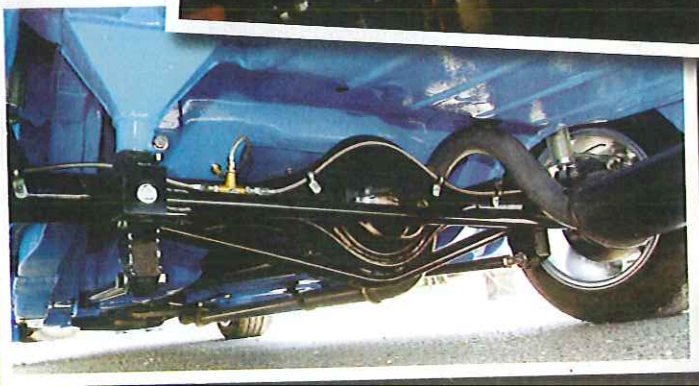
Words: Paul Miller Photos: Various

Last month we delved into the world of coil springs and dampers to give you an insight into making your suspension better. Ditching those tired old shocks for a set of shiny new coilovers will give you a considerable amount more speed through the bends, and that is one of the key things to getting a good lap time on the track. There's no point in having hundreds of horsepower at your disposal if you can't deploy it effectively, much in the same vein as not being able to reign them in at the end of the straight under braking, but we'll get on to brakes in a forthcoming issue.

Now then, back to the springs and shock absorbers. In the land of retro Fords, the vast majority are rear-wheel drive, with the rear axle held in place by just the leaf springs and the shock absorbers. Ultimately, when this is subjected to cornering forces when pounding the Tarmac in a circuit race, sliding through the gravel in forests or tearing up Tarmac in a drift car, the axle can move around all over the place. When you've gone to all the hard work of getting the up and down motions under control, leaving out the forward and back and side to side seems a little daft.

People talk about having a 'tight' suspension setup; what this means is that all forms of movement within the suspension system are kept to a minimum in order for the handling to be dialled in the most precise manner. So, in order to do this, we need to talk about linking.





What is linking?

Essentially, what linking refers to is connecting the rear axle to the body of the car in order to stop lateral movement. By cutting this movement out, the handling at the rear of the car will be far more predictable and, to coin the phrase used earlier, 'tight'. Not only this, but the setup of the rest of the system can be tuned more accurately and remain within the parameters originally set whilst under load. It can radically alter the overall feel of the car through corners, but can also have a positive influence over traction, too. So, here is the *Retro Ford* guide to linking systems and how them can benefit your car.

Before getting started

For a road car, the majority of the systems we talk about won't be entirely necessary, although there will be some that will be ideal for a fast road car, and others that wil be more suitable for more competitive use.

Basically, we would recommend that you pick the option that is best suited to your particular application; there's no real advantage to be gained by going over the top in this instance. That said, if your application warrants a trick setup, compromising could prove detrimental to your overall race pace. Before diving into linking your car, it's a good idea to have already completed the steps mentioned in last month's mag. Those ideas, coupled with a linking system, will tie together the whole system nicely and keep the rear of the car well and truly planted.

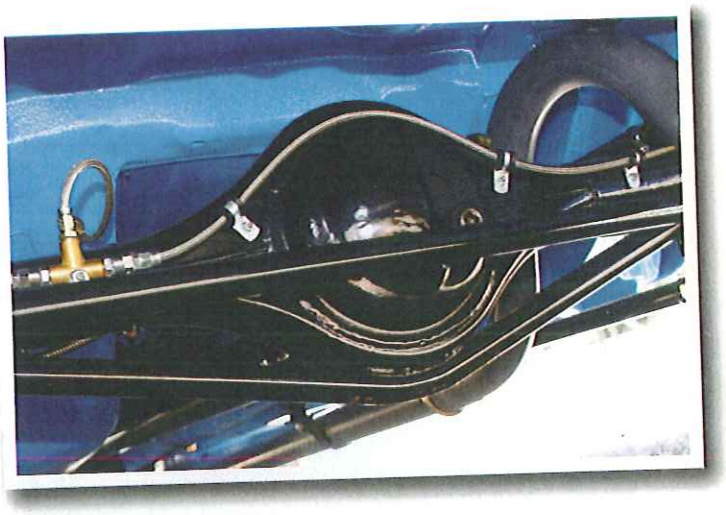
It should also be noted that in order to install any form of linking system, there will be some form of fabrication involved, so unless you're competent with a welder, leave it to the professionals. Your suspension is not an area in which workmanship can be compromised. Now, lets take a look and see what's what...

Different systems

Panhard rod

As far as linking goes, this should be considered as a stepping stone towards the other systems, as they all utilise a panhard rod (or a variant, as will be explained in due course) base line.

A panhard rod consists of a link on the axle and a link onto the chassis of the car, connected via a linking bar. Typically, the mounting on the axle is fixed, whilst the mounting to the body is adjustable, allowing for fine tuning depending on ride height, conditions under which the car is used etc. The 'rod' itself can also be tweaked via an adjustor in the centre of the bar. It's also worth noting that the front-wheel drive Mk1 Fiestas, although fitted with a panhard, benefit from an uprated and adjustable panhard rod, especially on lowered cars, in order to re-centre the axle.

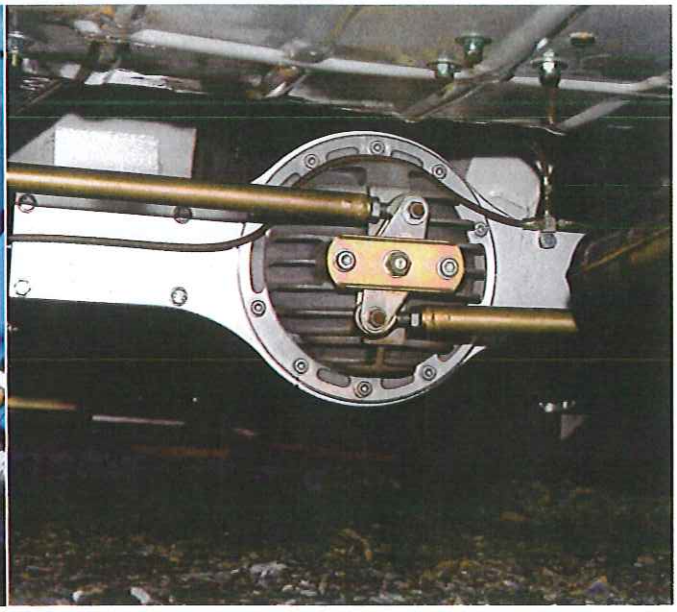


5-link

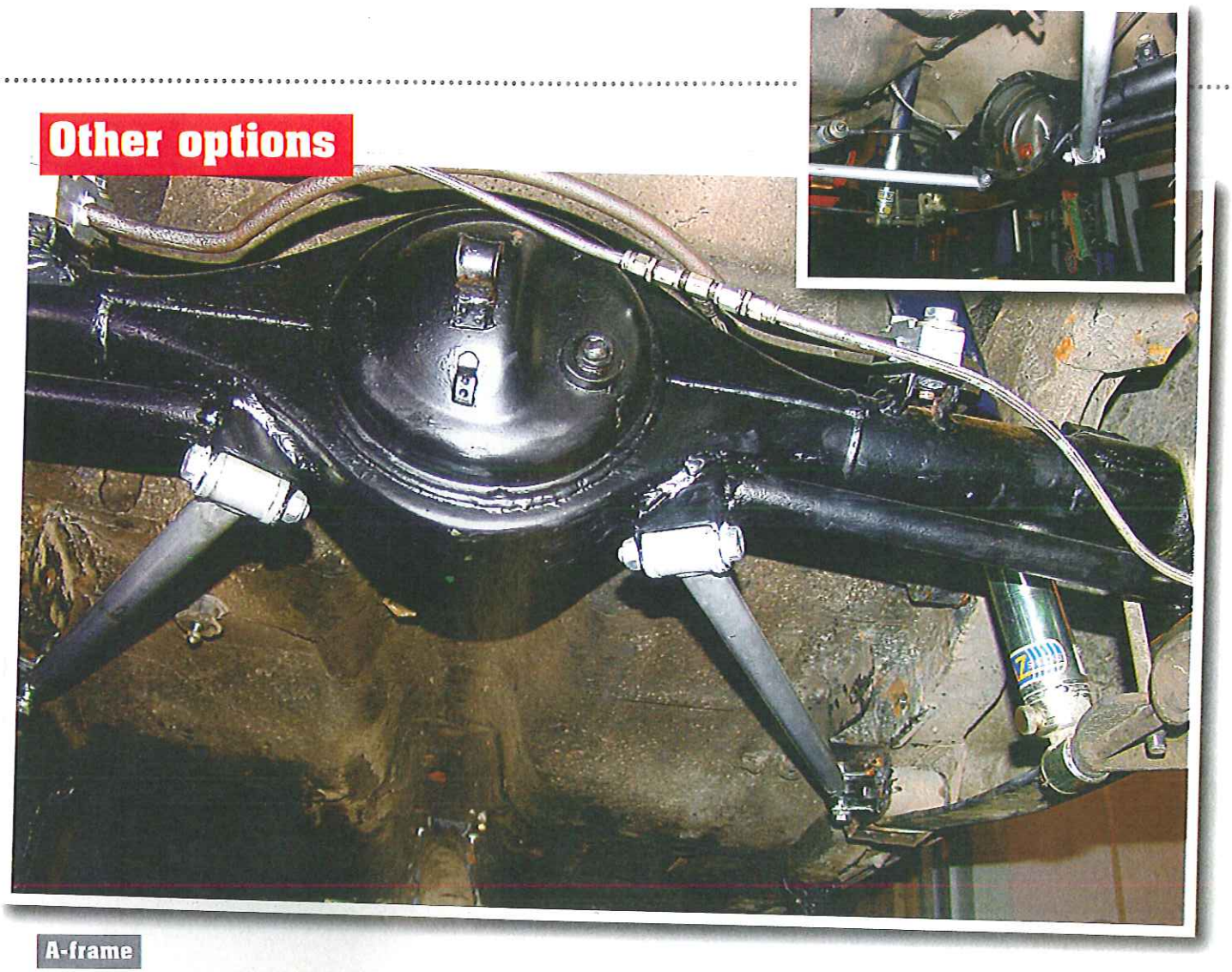
This is the next step where a set of forward links is added to the existing side-to-side link formed by the panhard rod. Further links are added above and below the axle on either side, then tied into the body of the car. These regulate front to back movement, but can also be used to alter the position of the axle within the wheel arch, as well as the angle of the differential in order to improve traction under load. It's a pretty comprehensive setup that will take everything you can throw at it, but you can go one step further for the ultimate in axle location...

6-link

Now, with this system, the front and rear link bars are maintained, but the panhard rod is dropped in favour of a Watt's linkage. This is a mounting placed onto the rear of the diff, with a special alloy rear cover, from which two bars connect laterally to the body of the car. It eliminates axle movement when one side of the suspension is compressed, and quite simply, this is the ultimate setup that finds its way under the wings of many a dedicated track car. In terms of location, this is as good as it gets, and is the limit without looking into a custom independant suspension setup.



Other options



A-frame

This is somewhat of a favourite here at *Retro Ford*, the setup finding its way under the back of both Goldmember and Project Skidmark. Essentially, it is somewhere between a panhard rod and a 5-link system, utilising two forward bars, angled from the bottom of the diff, outwards towards the chassis rails.

It is used to eliminate sideways movement, as well as front to rear movement and does so with great effectiveness. It does lack an element of adjustability, however, although this could be overcome with the use of adjustable bars. It could be argued that a 5-link system offers more precise axle location, but using A-frame axle location is a more than worthy substitute.

The guys at Milton recommend running an anti-roll bar alongside an A-frame set up to further tie in the rear end, as an A-frame changes the roll centre of the car. This basically means that the car is encouraged to roll more in the corners, and so the anti-roll bar is employed to reduce this.

What system is best for you?

Fast road car

A panhard rod would be the perfect solution for a fast road car, and if you went for a polybushed item, rather than a rose jointed item, it should make no difference to the quality of the ride.

A rose jointed one would have no give and could be a little more crashy and noisy. Panhard rods are standard fitment on a Mk1 Fiesta, but an adjustable one is necessary on a lowered car to realign the rear axle.

Circuit racer

Again, either go for the 5- or 6-linked rear end, either of which will offer a more than adequate level of location. With fewer undulations on a circuit, the 6-link system is less of a requirement, but there's no reason why not to have it. Go all out! If it is vital seconds you're after, and the budget allows then go for the 6-link, no compromise, option.

Track day car

If you're aiming on keeping the car road-legal, and therefore wishing to maintain some sort of degree of comfort without compromising too much on the handling side of things, then we'd opt for the 3-link system. For a dedicated track car, go for the 5-link system, fully adjustable with rose jointed ends. This will not only provide a huge level of adjustability, it will also keep the axle firmly where it should be.

Rally car

If you're going to pound the forest stages, go for the 6-link system. As previously stated, it offers a huge amount of adjustability, as well allowing adjustment of the diff angle for better traction. Junking the fixed panhard rod for the Watt's linkage also means that the axle is going nowhere, even when one wheel is under full compression.

What about the other end?

If you want to go further with your front suspension, there are a few different options:

Compression struts

Two bars are located from the chassis, forward to adjustable track control arms, giving adjustable castor. Compression struts are used in place of an anti-roll bar in order for the front wheels to be able to travel independently of each other, with no link between the two. For this reason, it makes it a preferred setup for loose surface rally cars, as both tyres will maintain a maximum ground contact time, even over the roughest of terrain at high speed.

However, while this option is great on a hard charging stage fighter, on the track it's a different story. With no anti-roll bar, body roll is massively accentuated and thus much stiffer springs are required, which really compromises ride quality on smooth surfaces. To overcome this on Tarmac, you can use an anti-roll bar in conjunction with the struts, but it could be argued that adjustable track control arms, and an uprated anti-roll bar and anti-dive kit would be just as good a setup.

Realistically, for the road, compression struts wouldn't be necessary as the compromise in ride quality would not make up for the difference in handling

Tension struts

These work in the opposite way to a compression strut, in that the struts mount from the front of the chassis back to the TCAs. There's not an awful lot of difference over using compression struts, although some say that dive under braking is reduced with tension struts. The angle at which the struts are mounted is also key, so follow the age old adage of measure twice cut (or weld) once!

Both of the above setups offer adjustability of castor and, coupled with adjustable track control arms, camber. By adjusting both, you will be able to dial in the front to perfection. However, it should be stressed that an anti-roll bar setup will be better for a road-going car. Tension and compression struts utilise rose joints, in which there is no give in the suspension at all, which results in a jarring ride and a lot of road noise being transferred through the car. For a road car, go for adjustable track control arms, an uprated anti-roll bar, an anti-dive kit and a quick ratio steering rack. This will be a huge improvement over the original Ford gear, especially when combined with the first bunch of mods we mentioned last month. You'll be carving corners like a pro in no time!

Final remarks

Suspension components are one of the most important bits on your car, so don't mess with them unless you know what you're doing, because if any components fail, the likelihood of you crashing is very high. Leave it to the professionals and get it setup while they're at it to really get the most out of what you have done. A corner weight and alignment session will transform a suspension setup in any state of tune and, as value for money goes, we'd recommend this whole heartedly.

At the end of the day, anyone can go fast in a straight line, but if you're quick through the corners, you'll be far faster in the long run.

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