



ESCORT COSWORTH/MIKE RAINBIRD

# BRAKE EVEN



It's not all about big power when you are taking on the track, Mike explains just how important your brakes are for performance.

**ON** a track day car, the most important aspect to get right, which can make the biggest significant improvement in performance, is brakes.

Most people seem to be under the illusion that more power will make a car faster, this just means that a car can arrive at the corners carrying more speed than can comfortably be removed with an inadequate (standard) set-up, so you actually have to brake far earlier than you did with less power.

This means that a car equipped with better brakes, can run rings around a slightly higher powered car with poor brakes, as they can stay on the power for longer, and as you're only supposed to overtake at track days on the straights.

trap due to the brakes overheating and the pedal going to the floor.

There are several ways to improve performance, depending on your budget. The most crucial is the brake fluid, as the standard fluid is designed to stay in the car for years and is just not adequate for track use, due to brake fluid's natural hygroscopic nature.

Many tuners have their preferred choice of brake fluid, and mine is Castrol SRF. Put simply, it is the

**As with most things in life, this performance comes at a cost**

Standard brakes can also overheat within a few laps, so fitting bigger, better brakes will mean you can spend more time on track enjoying yourself and not run the risk of ending up in the gravel

absolute best brake fluid available — being used by most Formula 1 teams and in every form of motorsport. It has a dry boiling point of 310 degrees C (when it is first put in the car).

Discs are floating to help prevent pad knock-off





Rear runs four-pots and 315 mm discs

However, as brake fluid is hygroscopic, meaning it attracts and absorbs water from the atmosphere, most brake fluids deteriorate significantly with this absorption, with the boiling point dropping dramatically. Not Castrol SRF, which still has a wet boiling point of 270 degrees C, something that should be taken into account when considering other 'recommended fluids'. All you have to do is compare the technical data sheets and see that nothing comes close. Unfortunately as with most things in life, this performance comes at a cost and the RRP of this fluid is £47 per litre (see my website for a discount)!

The next thing that needs improving is the brake lines and all the rubber hoses should be replaced with Goodridge or similar braided hoses. The reason for this is that under pressure the rubber hoses balloon, which can give a spongy feel to the pedal and obviously split with age if the rubber is as old as the car (as most fast Fords are now in excess of 10 years old!).

Following that, the brake pads need changing for something

more suitable. The OE pads are designed to operate instantly from cold, which means that the material is totally unsuitable for track work, as they get up to temperature instantly and if operated continuously on a track environment, have even been known to catch fire due to the heat that this constant hard use generates! Again, most tuners have a favourite and mine is Ferodo pads.

You have the DS2500s designed for Fast Road/light track use and then the DS3000s, which are effectively a race pad. In my experience, if you are retaining the standard disc size, then these race pads are the way to go. Although aggressive on the discs, they will stop the car repeatedly.

That's the first level of upgrade, the next is the same as the above, retaining the OE callipers, but fitting bigger discs, either from a higher spec'd model

in the range (Cosworth discs onto an Escort RS Turbo is popular) or some aftermarket discs with alloy bells and brackets to relocate the existing calliper. This just improves the braking performance by providing greater leverage on the wheel due to the calliper being moved further out. Combined with Castrol SRF, braided hoses and DS3000 pads, it makes a very effective set-up.

Obviously the next level is budget constrained and this is to use a complete aftermarket brake conversion kit with a replacement calliper, larger disc and an alloy bell with full fitting hardware. I have a preferred set-up again,

stoppers. AP developed some water-cooled items for the WRC cars. The CP6235s (2.75 kg) is a radial-mounted calliper with a two-piece cast aluminium body, differential bores, alloy pistons (38.1 mm, 31.8 mm and 27 mm). In my application I use a 378 mmx32 mm disc (6.3kg).

The pad at 163 mm is 11 mm longer than the top-flight AP road-going six-pot, to take advantage of the greater clamping force generated by the larger pistons. Even though it utilises a larger disc than the 356 mmx32 mm size that is typically used with the road calliper, the smaller disc at 6.6


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and that is the AP brand, which is synonymous in the braking world for its motorsport pedigree.

The AP range of callipers was originally designed as racing callipers and was converted to road use, they use top quality materials which helps justify the price of them — a case of fit and forget.

For my own car I wanted something a bit different from the norm, and with the Escort Cosworth having been a Group A/WRC car in its build life, it was easy to obtain some serious

kg is actually heavier. Also, the road-going CP5555 six-pot at 3 kg is fractionally heavier than its motorsport cousin. Any reductions here help with the unsprung weight (the weight of the various parts that are not carried on the springs, such as wheels, axles and brakes), which benefits handling.

The 378 mmx32 mm (15 inch) discs I use also have to utilise a 'floating' arrangement as well. This is where the disc is mounted to the bell. Instead of it being rigidly bolted to it, 



378 mm front discs fill the insides of those Comp MO 18s





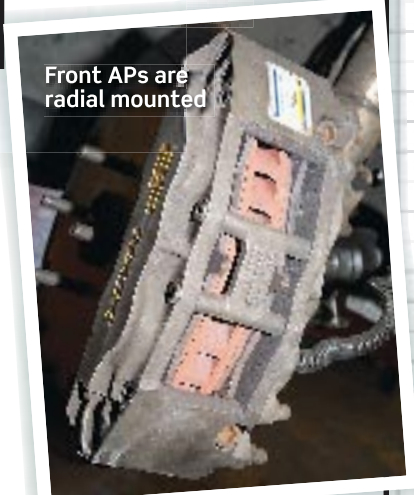
Discs are mounted on separate alloy bells to aid heat dispersal



Hydraulic handbrake needed for this set-up



Bobbins allow the floating discs to move a few mm



Front APs are radial mounted

▶ it has a 'bobbin' that is rigidly bolted to the bell. The disc has slots instead of mounting holes and these allow the disc to move about in all axis on the bobbin by a few mm.

This means that any flex of the wheel bearing in hard

of the discs, as they heat up they expand and the bobbins allow this expansion to take place without shearing the retaining bolts or warping the discs. There is a slight

onto AP 315 mmx28 mm (12.4 inch) discs.

With the amount of braking force available, it was essential to be able to adjust the bias front to rear, especially as the 4wd system links all four wheels, which allows more braking force to be applied to the rear than you can get away with in a 2wd car without causing the rear to lock up. An AP lever-type bias valve was installed and allows adjustment to suit a wet or dry track.

I have never had the need to connect up the water-cooling on the front brakes, as this was only required on the tarmac stages when left foot braking is utilised, and I'm not quite up to that level of skill/lunacy! Also the water cooling requires a stand alone cooling set-up consisting of a pump, radiator and reservoir, all of which would add extra weight as well as the packaging issues (I have no room for anything else!).

Practising what I preach, Castrol SRF is used along with Ferodo DS3000 pads, their effectiveness can be measured by the number of passengers that try and brake way earlier than I know is necessary (although that may be due to the fact that they know what happened to my Sapphire!). On track the three-point harnesses are essential, with the braking force being able to exceed the tyres' grip at almost any speed and lift you out of the seat. Fortunately the level of feel that this set-up provides, means that it

is easy to feel the limit of adhesion and maintain the required pedal pressure to prevent the tyres from locking up.

What this adds up to is a brake set-up that is unmatched by almost any other car on track (with a few exceptions from the Reyland camp), and despite the fact that my Escort has been under-powered by comparison to other Cossies for the last few years, it has always been able to hold its own (and that is using road tyres). This year with slicks and a little more power should see me mixing it with the big boys!

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cornering does not lean on the pads and push the pistons back into the calliper ('pad knock-off'), as it would if fixed rigidly. Instead the disc can 'float' and move off centre on the bobbins, preventing it from leaning on the pads. Also due to the size

trade off in that the discs make a rattling noise at slow speeds which can be disconcerting if you aren't sure they're supposed to so that!

The rear needed something similar to match, and to this end I raided the Group A parts bin and purchased some ex-works titanium pistoned CP3620 four-pots mounted

