



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.

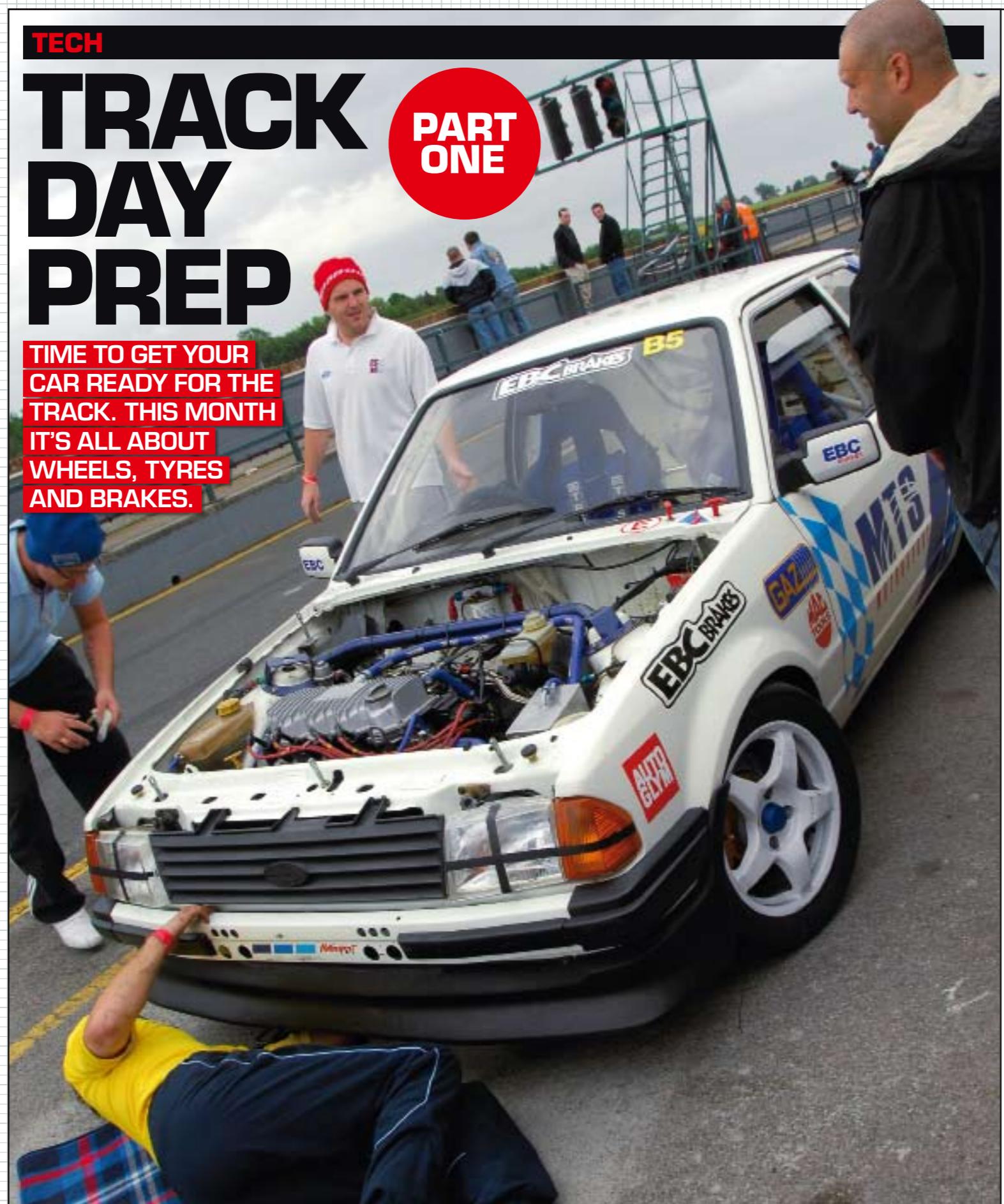
Stu's enviable knowledge of the workings of modern-day Ford performance engines means that every month he's just the man to explain how and why things work, and importantly how they can be improved.

TECH

TRACK DAY PREP

PART ONE

TIME TO GET YOUR CAR READY FOR THE TRACK. THIS MONTH IT'S ALL ABOUT WHEELS, TYRES AND BRAKES.



While watching Will, my workshop manager, working on his track car it occurred to me that more fast Ford owners are venturing on track days. Sadly, it's not uncommon to see ill prepared cars and drivers on track causing havoc. It's virtually always due to inexperienced owners that lack preparation and instruction, so let's look at how to prepare your car for track use, both occasional and regular, starting with wheels, tyres and brakes.

WHEELS

Wheels will need to be removed to allow access to the brakes, so while they are off take the opportunity to clean them. This isn't to make them look pretty, but to have a good look at what lies under all that brake dust and road grime. Hairline cracks, buckling, flat spots, kerb damage etc are all faults that should see the affected wheels relegated from track use.

The wheel and tyre package needs to be balanced to eliminate vibration. This vibration will take a lot of the 'feel' out of the drive and give very little feedback, as well as cause hugely accelerated wear to all suspension components. A 1g weight imbalance exerts similar forces as driving up the road with a brick strapped to your wheel!

The wheel is a major factor of the unsprung weight of the vehicle. Lighter wheels will allow sharper and more responsive turn-in to corners, better acceleration and better braking.

NOVICE/OCCASIONAL TRACK USER

Steel: Cheap, heavy and worst of all flexible. Not good qualities for Fast Road use, never mind track days!

Cast alloy: The most commonly found alloy wheels. Quality depends largely on the manufacturer and whether the wheels are cast simply by pouring molten material into a mould, or if the material is pressure cast. To ensure suitable strength in the wheel, a greater amount of material is used which tends to make the wheels heavy. An acceptable entry-level wheel for track use, but check for porosity and cracks before use.

EXPERIENCED/REGULAR TRACK USER

Forged alloy: The next step up from cast alloy wheels, these are the best all-rounder for track use. The forging process involves working the material at temps just below melting point with immense pressures. This has the benefit of eliminating porosity as well as voids that can lead to cracks. As the wheels have great inherent strength, less material is required compared to cast wheels meaning you can have lighter, stronger wheels. However, this is reflected in the price.

Magnesium: Competition wheel of years gone by, still good for track use due to its relatively lightweight properties. However, most competitors have now progressed to avoid the inherent fragility of magnesium wheels.

They are prone to cracking and porosity as well as being very easily damaged. Magnesium wheels are also flammable and have been banned in some forms of motorsport in the UK following fires that are very difficult to extinguish. Wheels have been known to catch fire in competition use after a punctured tyre has allowed prolonged scraping of the wheel on the road surface. Beware when using these wheels.

Split-rims: Great strength and easily repaired if damaged, however, all those bolts to assemble can add weight. They don't tend to be cheap either! They're perfectly acceptable for track use, but there are better ways to spend your money on track wheels.

Carbon-fibre: Amazingly lightweight, incredibly strong but with an equally incredible price tag! Some leading competitors in the Time Attack race series are running these with good results, however, in reality, unless you are chasing tenths of a second they are overkill for track days in relation to the expense.

WHEEL NUTS

Whichever wheel you choose, let's not forget what actually holds the wheel to the car. Wheel nuts will need to be torqued up before the car goes on the track and after each session/return to the pits. While there is a bit of extra weight in them, I personally prefer the use of steel wheel nuts on track cars, aluminium ones have a tendency to come loose quicker!



Carbon-fibre wheels are incredibly light and strong, but expensive

**BRAKES**

The most crucial area of any track day preparation – you are depending on your brakes to keep you and your car in one piece as you accelerate towards other cars, tyre walls and barriers! The reality is the use your brakes see on a day-to-day basis is minimal compared to on a racetrack.

Braking from 130mph to 30mph two or three times a minute over a 20-minute session is unlike anything you can achieve on the road no matter how fast a driver you consider yourself to be. All that heavy braking will take its toll

throughout a track day so it's well worth keeping a spare set of front and rear pads in your toolbox!

While we're talking about brakes and toolboxes, it's also worth keeping a few chocks of wood in there too. When you come in off the track, whatever you do, do NOT put the handbrake on when you park up, leave the handbrake off and put the wooden chocks in. The residual heat in your rear brakes could well see you with warped discs or sometimes left unable to release the handbrake!

NOVICE/OCCASIONAL TRACK USER

Budget discs, brake pads and fluid don't cut it on track. As a

minimum I'd expect to see an upgrade to a performance compound brake pad and a change to high quality fluid.

That's assuming the standard brake discs are in good condition, if not they will need replacing. If you wanted to go a bit further consider braking system upgrades from higher-powered vehicles from the same manufacturer. With a bit of work you can increase your braking capabilities on a budget quite easily using many parts from salvage yards!

Next, a set of braided lines to replace factory rubber ones can eliminate some of the vague pedal feel and give more feedback under braking as they almost eliminate the expansion that naturally occurs in the flexible rubber lines when braking hard.

Pad material should be chosen carefully. Standard road pads will likely overheat in just one or two laps of a race circuit as they are designed to work well from cold and the compromise here is they overheat easily. At the opposite end of the scale, a race-spec brake pad is designed to operate when it's extremely hot and the compromise with this material is it doesn't generate friction at all when it's cold so if you get a race-spec pad you will find it literally won't work on the road until the pedal has been pressed hard for a number of seconds.

This is not acceptable for obvious reasons so only buy a Fast Road pad guaranteed to work well from cold. Obvious choices tend to be materials like Ferodo DS2500 and EBC Green Stuff.

**TYRES**

These are the only things connecting your car to the track so it's imperative to make sure they're in good condition! At the very least look for signs of uneven wear, sidewall damage, perishing, low tread level, stones/sharp objects trapped in the tread etc.

There is sadly no tyre out there that gives the best of everything without compromise. The compromise will come

for a few thousand miles before taking them on track. Brand new tyres can easily overheat if tall tread blocks squirm around in the corners. This will affect grip levels and drastically reduce tyre life. This can be overcome by 'buffing' the tyres; shaving material off from the new tyre tread depth of around 7mm down to around 4mm.

Tyre pressure: The pressure will rise rapidly on track and requires monitoring throughout your track

"FOR INITIAL TRACK VISITS YOU CAN NORMALLY GET AWAY WITH A GOOD SET OF ROAD TYRES."

down to trading off grip for tyre life. There are a number of road legal semi-slick tyres in varying compounds, which while ideal for track days, are soon worn out. Performance road tyres will last considerably longer, but may not offer the same grip levels through the corners.

If you choose performance road tyres, I'd suggest 'scrubbing' them in on the road

day. As tyre pressures rise the contact patch will reduce and focus on a thin band in the centre of the tyre. The pressures need lowering at that point to return the contact area to the full width of the tyre, maximising the tyre life and grip. Just remember to put them back to road pressures once they've cooled down before you drive home otherwise you will be driving home on almost flat tyres!

■ In-car adjustment in the form of a dial, this allows for fine adjustment and easy changes.

■ Pedal box adjustment. If the vehicle is fitted with an aftermarket pedal box there will normally be two master cylinders. With correctly specified cylinder ratings and an adjustment bar, braking effort can be directed into the front and rear brakes proportionally.

EXPERIENCED/REGULAR TRACK USER

As you learn circuits and how late you can leave the braking you will need to consider upgrading. Big brake kits are exactly that, bigger. Moving to big brake kits normally gives you the following benefits:

- More clamping force in the form of multiple-piston calipers, four-pot, six-pot, eight-pot etc.

- Larger brake disc diameter which amplifies the torque retardation to the rotating wheel via the hub.

- Larger brake disc thickness to give more rigidity and better thermal stability.

- Two-part bell and rotor – the bell is the vehicle specifically machined carrier of the rotor. Using a two-part system offers the advantage of allowing the use of universal rotors. In addition you only



The first thing you should do is fit some decent pads and high quality fluid

have to renew the rotor when worn out making it cheaper in relation to one-piece discs.

Once the front brakes have been addressed it's time to move to the rears. If your vehicle runs drum brakes at the rear, look at fitting a disc and caliper set-up from another model/vehicle in the range.

If you are already running a rear disc and caliper-based system then normally a

performance disc and pad compound can offer a good starting point.

After that you are in to big rear brake kits, again offering multi-pot calipers and two-part discs. If the car is to remain road legal it is sometimes necessary to leave the original brake caliper in place to allow for mechanical handbrake operation.

If you have fitted big brake kit upgrades, either to the front or front and rear then you may find the car a little unsettled. If you have too much braking force at either end of the car you can cause that end to 'squat' and the other end to lift in relation.

Ideally, the car needs to remain level under braking and 'sit' squarely. This can sometimes be achieved by changing pad compounds to give less or more

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aggression at the relevant end. However, this will only help so far. After the pads have been changed to give more suitable characteristics then a brake bias valve can be fitted. This valve controls the percentage flow to the front and rear brakes, which after careful set-up, can allow fine-tuning to suit the car and driver.

The brake bias adjustment is available in a number of different ways, the two most popular are:

THANKS
Thanks to Will for his help with this article, his in-depth knowledge of building Time Attack cars has been a great help.

Next time we'll look at some of the other aspects of track day prep such as suspension components and geometry, engine reliability work, transmission, aerodynamics and cabin work to name but a few.



Decent tyres will transform your car when on track days

probably end up with a number of wheel and tyre combinations to accommodate track conditions in the form of wets, intermediates and slicks. Here's what you should be looking for in your selection.

WETS: Your wet tyres will have prominent patterned grooves/tread patterns. This allows the water between the ground and the rubber to be displaced. The combination of grooves and soft compound will also generate heat in the tyre when lateral forces are applied under cornering.

Some competition wet tyres are smaller and narrower than intermediate or slick tyres. This allows the tyre to spin faster and expel more water with a narrower footprint. Wet tyres will quickly overheat and disintegrate on a damp or dry track so at the first sign of drying up you need to pit and change to a more suitable compound.

INTERMEDIATE TYRES: In between wets and slicks. They are normally a slightly softer compound than slick tyres and are cut with shallow grooves. These grooves

prevent excessive heat build-up while still providing moisture dispersion where required. Most road legal 'semi slicks' fall into this category as they must be capable of water dispersion by law for road use. Intermediates generally offer good performance on dry tracks but tyre pressures must be carefully monitored to ensure they do not overheat.

Slick Tyres: The ultimate for dry track driving, however, they will require careful selection. Your optimum tyre is normally neither the softest, widest or the most expensive. It's the one that works with your set-up. For that tyre

NEXT MONTH
PART 2
SUSPENSION,
ENGINE WORK,
TRANSMISSION