Spa treatment

What happens when it's pouring with rain at a trackday? Don't worry, with a few adjustments to your car and driving style, it can be a lot of fun, as we found out at a very wet Spa, in Belgium

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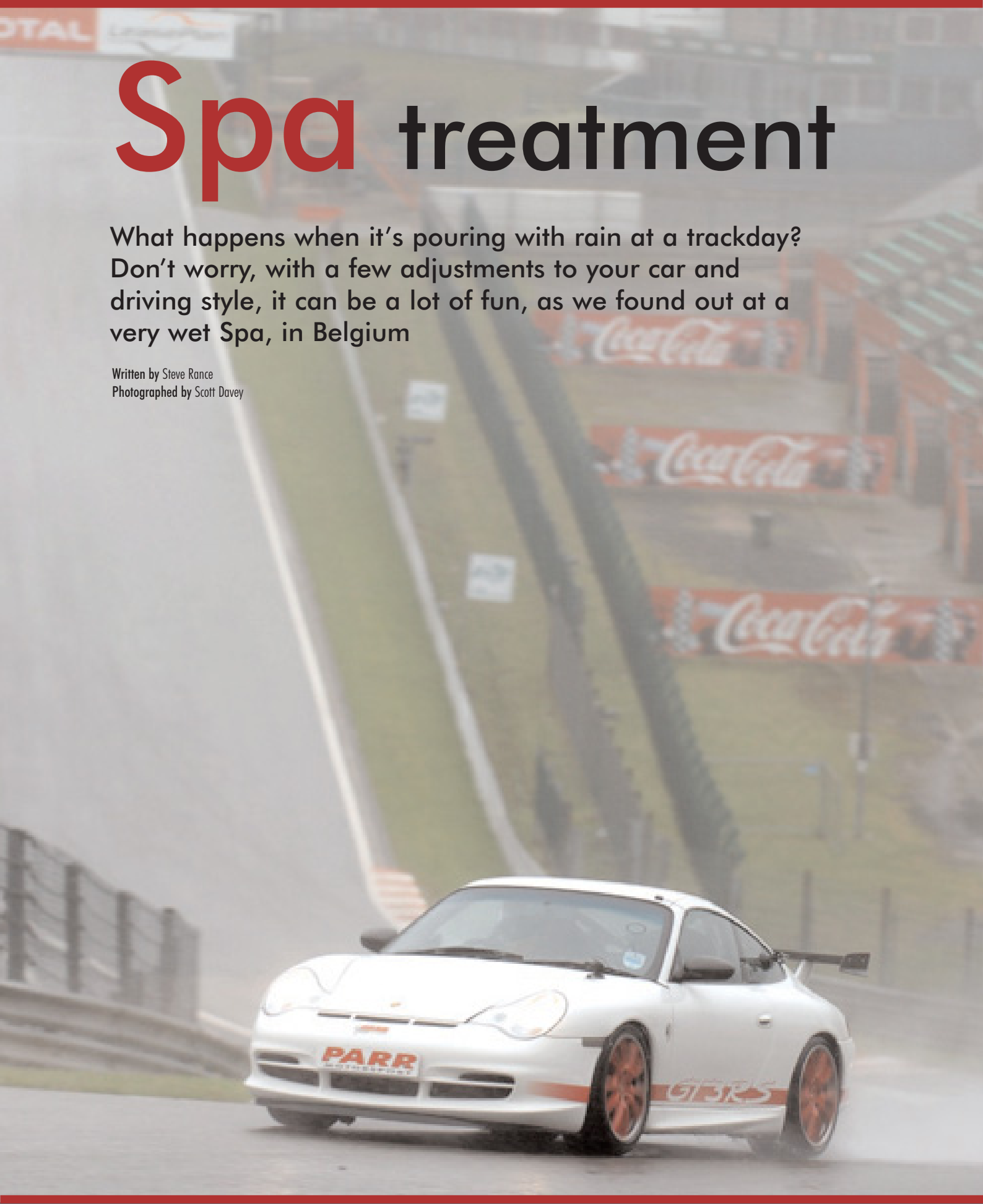

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Strange, the things that go through your mind when control is slipping away. I'm half way down the Kemel straight at Spa, travelling at nearly 150mph in the Parr Motorsport GT3 RS. The JRZ dampers are set to almost full stiffness and the suspension geometry has wild camber angles. Unfortunately, the Pirelli slicks that balance this beautiful equation are sitting in the pits in near sub-zero temperatures and, in their place, are road tyres that are still cold after five laps of hard driving. My braking point is just past the 200-metre board but I can't see it; just a ball of spray from a rooster thrown up from the GT3 somewhere in front of me.

On the previous lap, I'd had a clear run out of Eau Rouge and I remember the speedometer reading exactly 150mph at the start of the braking zone, before the complex at the end of the Kemel Straight. With no visual reference point, I decide to use my speedo and am effectively driving blind. I brake at 150mph, heel-toe down from fifth through to second and, for a millisecond, hold my breath as the rooster envelops me. It clears, and I see a GT3 just five metres ahead, turning into the complex. I return to the pits and tell the camera team that we'll have to stop filming the in-car footage until the standing water clears.

There is nothing that concentrates the mind of a racing driver quite like pouring rain and standing water. With heavy spray obscuring visual reference points, the possibility of aquaplaning at any moment, with upwards of 20 other vehicles just inches apart, even the most skilled drivers can become mere passengers of fate. Some good friends of mine, who race in the VLN, endured those conditions for hours a few weeks ago, before the race was finally stopped following a massive accident. It is a sobering reflection of the risks involved in involved in anyone who dons Nomex overalls – whatever the racing series.

"I decide to use my speedo and am effectively driving blind"

Many drivers believe that driving a 911 on a racetrack flat out in the wet is a black art best left to the professionals. Having driven thousands of laps testing GT3s and, speaking as an ex-racing driving instructor, I can tell you there is no black art to driving any 911. There is, however, a specific technique that needs to be mastered, but to do this a driver needs to understand fully the dynamics of the 911 at speed.

Set against the stunning backdrop of the Ardennes, Spa Francorchamps is the jewel in the crown of European grand prix circuits. Challenging high-speed corners, like the brutally fast Blanchimont 1 and 2, combine beautifully with slower, more technical sections to make it a driver's dream. But the essence of the circuit is in one sequence of corners – Eau Rouge.

Stunningly quick and extremely challenging, it is possibly the most daunting corner in grand prix racing today. It demands a precise line, supreme car control and confidence. Get it right and the rush is as good as it gets in motorsport. Get it wrong and you risk far more than your lap time.

In early summer each year, Autotrack organises a two-day track event at Spa. Specialising in overseas events, their professionalism and popularity is reflected in a large over-subscription many months beforehand and, for the past few years, we have used the Autotrack event to help develop the Parr Motorsport GT3 RS. Our aim is to optimise fully the development potential of the chassis, while leaving the engine and gearbox completely standard. The car had been developed to run on track-oriented Michelin Pilot Sport Cup tyres and had proved to be very quick at last year's GT battle,

finishing third overall in a damp final, comprising mainly of four-wheel-drive cars running almost twice the brake horsepower. This year, the aim was to take the quantum step forward from road legal tyres to full slicks. Our setup didn't require much adjustment to optimise the potential of slick tyres and, with the expectation of lap times in the low two-minute-forties, we set off for Spa.

Breakfast on the morning of the first day was a sombre occasion, as drivers peered through the hotel windows to see black storm clouds gathering. At the circuit, you could almost taste the disappointment of over 100 drivers as the pit lane opened to a soaking track surface and torrential rain. 911s are extremely sensitive to even very small chassis adjustments, and the difference between ideal setups for dry and wet is huge by motorsport standards.

All setups are a compromise. To optimise a dry setup is to compromise a wet setup and vice versa. Our suspension geometry, with its low ride height, extreme camber angles, stiff anti-roll bar and damper settings, was set to maximise the high grip levels that slick tyres would give us in dry conditions. High negative camber angles help create heat in the tyres and provide a flat footprint when the car is cornering at high speed, allowing it to work its tyres evenly and effectively. Wet conditions, though, don't allow the tyres to generate the grip levels needed to transfer load onto them for a flat footprint. Consequently, they would only use a small amount of their contact patch on the Tarmac and without a full footprint the car would have hardly any grip. Turn the wheel and the car would go straight on; get on the power early and the rear wheels would just break traction and spin.

So, what should you do when you find yourself and your pride-and-joy at a trackday in the pouring rain? This problem poses itself to all trackday drivers, especially those with track-oriented setups. Often I see drivers of 911s literally pack up and go home when bad weather sets in, but by making some adjustments to your car and your driving style, you can still have lots of fun in wet conditions. Wet weather accentuates the effects of the unique layout of the 911, and can provide a fantastic opportunity for a driver to practise the very particular driving style that a 911 requires.

"You can adjust your car to handle better in the wet"

Before venturing out onto the circuit, you can adjust your car to make it handle a little better in the wet conditions. If you have a 911 with adjustable anti-roll bars (like the GT3), soften them off. This allows more body roll at lower speeds and helps the car to load up the front and rear wheels during cornering, pushing them into the Tarmac to generate more low-speed grip. Always make sure that you take the correct tools – a ratchet, socket and combination spanner so that you can make the adjustment yourself – and there is someone in the pit lane who can help out with a trolley jack. The trick is to make exactly the same adjustments to the front and rear of the car, so as to keep the chassis balance unaltered. If conditions are very wet, soften the anti-roll bars as much as possible. If your dry settings are fully stiff up front and half stiff rear, adjust your bars to, say, half stiff front and full soft rear, so that the balance between front and rear is maintained. If the rain is light and there is no standing water, try softening the anti-roll bars by about half the available adjustment.

Those drivers who have cars with adjustable dampers can also soften the shock rate. Remember that, as you reduce shock rate, the suspension begins to absorb more of the shock load, as the damper transfers less of the load to the tyre. Ultimately, if the damper is fully released, the suspension will absorb almost all of the shock, and the tyres hardly any. This will make your suspension seem 'crashy' and the car will feel very

Generally speaking, the slower you are in the cockpit, the faster you are on the circuit. Do not over-correct the car. During the in-car footage we're filming (you can see this on the Downloads section of *Total 911's* website at www.total911.com), the GT3 is constantly moving around on the circuit. On occasions it is aquaplaning, yet there are relatively few corrections made to the car. Often, to over-correct a car is to further unsettle it and a spin can follow. You will be surprised how a 911 can cope with a slide on its own without any input other than a constant throttle.

Always be looking for grip and it's surprising where you find it in wet conditions. Often, the ideal dry line has the least amount of grip in the wet, especially on corners like hairpins, where rubber laid down on the circuit can become very slippery. Try taking a wide line around slow corners, as you may find more grip there and, if there is standing water on the circuit or running across it, always try to cross it with the car as straight as possible and on a constant throttle. That way, there is less chance of breaking traction and, if you aquaplane, the car has a better chance of exiting in a straight line. Taking kerbs on the apex and at the exit of corners in wet weather will probably unsettle the car, so keep away from them until the circuit dries out. Never place the loaded wheels on painted surfaces, such as chevrons, as these generally have much less grip than Tarmac. If a dry line develops, always keep the loaded wheels (ie the driver's side on left-hand corners) a foot or so inside the dry line. That way, if the car slides, it will be sliding on the dry surface. If it slides off onto the wet line, you will almost certainly go off.

After a few laps of a dry line developing, pit and

woolly. Be careful not to slacken the dampers off too much, though, or you may actually make things worse. Again, don't forget to take the correct tool with you to make the adjustment.

Tyre pressures are critical to performance in all conditions. In the wet, always start at your preferred dry operating pressure and bleed after three or four laps, if necessary. Do not leave the pits with your tyres under-inflated, as you would in the dry, because they may never come up to operating pressure. Quite often, in very bad weather, there is no need to bleed much air, as grip levels are so low that little or no heat is generated.

Driving a 911 is basically an exercise in weight transfer. With the engine sitting in the rear of the car, there is no weight pushing the front tyres onto the Tarmac; hence the rear-wheel-drive 911's natural tendency is to understeer. The dry weather driving technique requires high grip levels to load the nose of the car early in the braking zone, to give the grip required to turn the car into a corner. With the low grip levels experienced in wet weather, the technique has to be adapted slightly if the car is to turn.

Before I explain this technique in detail, there are some important general rules that apply to any track driver, no matter what the car. The golden rule of driving at speed in all conditions is to be smooth with all inputs; whether it be steering, braking, accelerating or correcting the car. Aggressive inputs may make you feel like a hero but they will make for slow lap times, lots of offs and bent cars. You must always ask as little of the car as possible.

check your tyre pressures. The increased grip will generate heat in your tyres and they will need to be bled off to prevent ballooning and overheating, causing oversteer. Never lift off the throttle in a 911 during a corner unless you are intentionally provoking the nose to drop. If you do experience oversteer, lifting will make it terminal. Finally, once a dry line has developed and there is no further likelihood of rain, restore your anti-roll bars and dampers to their dry settings.

So, the circuit is wet at Spa and there is heavy rain falling. I am strapped into a GT3 RS which is set up for dry weather, but the roll resistance has been softened and the tyres are set to optimal hot pressures.

How do I maximise the GT3's performance potential on the circuit?

The cornering process for slower corners can be broken down into four sections:

1. Braking

Generally, understeer is much more pronounced in corners that are tight with slow entry speeds, and it is these corners that require the most work from the 911 driver. Here, as the car approaches the corner, the aim is to keep the nose loaded until it is fully turned in, as this prevents the car's natural tendency to understeer.

Apply the brakes smoothly but very firmly at the beginning of the braking zone. If you are not firm on the brake pedal, the nose of the car will not load and the ABS will trigger – because there is not enough grip from the front tyres to prevent it – and this will lengthen the stop zone. Further unload the front of the car and you will understeer past your turn-in point.

Most drivers are too soft on the brake pedal. Pressure must be applied firmly but smoothly. Avoid stamping on the brake pedal, though, as this will unsettle the car, again triggering the ABS and, on bumpy surfaces, cause possible high-speed snap oversteer. Once the brakes are applied correctly, the attitude of the car will change, as the weight pitches itself forwards, compressing the front springs and unloading the rears. If the braking zone is at the end of a long straight (such as the Kemel at Spa), I slightly under-match the engine revs during heel-and-toe. This has a very slight engine-braking effect on the rear wheels, which does not unsettle the car and helps to further increase load on the front suspension. If you are not skilled in the art of heel-and-toe, though, don't try it. Keep the same pressure on the brake pedal all the way through the braking zone to maximise braking efficiency and ensure that front suspension remains fully loaded at all times. Keep the same pressure on the brakes when the turn-in point is reached – do not come off the brakes! If you release brake pressure at any time during turn-in, the weight will immediately begin to transfer rearwards and you will understeer.

2. Turn-in

Smoothly turn the steering wheel while maintaining the same braking pressure. You will feel the bite of the front tyres through your steering wheel, signalling grip that you have created by transferring the weight over the front wheels. Again, remember that it is essential that steering inputs are smooth. At this point, even though the steering wheel is turned, the car is still braking and the

weight has shifted to the front of the car. This makes the rear of the car correspondingly light and aggressive or jerky steering inputs will cause the rear of the car to break traction, leading to a spin.

3. Apex

Immediately after turn-in, bleed off the brakes but keep on a constant throttle until the car reaches the apex. This slightly releases load from the front springs and transfers the weight bias to the centre of the car. Effectively, the front tyres have now made their initial turn and do not need as much grip to maintain the turn to the apex. Keeping the car on a constant throttle holds it to the limit of adhesion, as the weight begins to shift rearwards ready for exit.

4. Exit

As the car reaches the apex, begin to apply power. Again, the application of throttle must be made gently and progressively. As a guide, apply power in direct proportion to the steering unwinding, so that full power is reached exactly the same time that the steering is completely unwound on the exit of the corner. The application of power compresses the rear springs and transfers weight to the rear where traction is now needed.

In essence, although the steering has made the turn through the corner, all of the work that has made the turn possible has come from weight transfer via the brakes and throttle. When driving a 911 – especially in the wet – most of the driver's work is done between the braking and apex points of the corner. The weight needs to be at the front of the car at the start of the corner, in the middle by the apex, and at the rear of the car immediately after the apex. If a corner is a slow downhill off-camber, stay on the brakes a little later after turn-in and be very patient before applying power on the exit.

So, in summary: brake, turn-in on the brakes, constant throttle to the apex, then gently apply power through to the exit.

In faster corners, understeer is less of an issue, so the attitude of the car does not need to be worked as hard before turn-in. It is really only the second half of the corner that requires attention. Braking should be done in a straight line. Again smoothness is key. Bleed off the brakes immediately before turn-in to ensure that weight has shifted rearwards early and settles the car as power is applied. Once the turn is made, maintain a constant throttle to the apex, then power progressively until the steering wheel is fully unwound at the exit as you would on a slower corner. This will maximise exit speed and provide traction over the rear wheels when needed.

"Most of the driver's work is done between the braking and the apex"

To build your speed, pick one corner and brake a little later each lap – maybe a metre at a time. Find a reference for each braking point. Maybe a break in the Tarmac, or a marker-board. If it is a slow corner, ultimately you will find a braking point where the car will understeer on turn-in. Once you've found this, go back to the previous braking marker – this will be your optimal braking point for the corner. Use that marker as your braking reference point from then on. Remember, though, as conditions change, so will your optimum braking point.

Be careful when finding the optimum braking point for a faster corner because your 911 will probably have a natural tendency to ultimately oversteer in faster corners, so care must be taken to prevent a fast spin on exit. Our two days at Spa were frustrating but, after a few minor adjustments, they were a lot of fun. In the end, the slick tyres were loaded onto the transporter untested, but I am looking forward to testing them somewhere soon in the UK.

So there it is. Enjoy your 911 in wet conditions and build up your speed slowly. Chip away at your braking points and then suddenly it will all make sense. There is no black art to driving a rear-wheel-drive 911 in the wet. All that's required is a modicum of driving skill and a full understanding of the particular dynamics of the car. Once a driver of a 911 masters weight transfer by using the brake and throttle, he holds the key to unlocking the performance of the most brilliant and rewarding sports car in the world. ***911***

See our unique in-car video footage of Steve Rance driving his GT3 at Spa in the rain at www.total911.com