



# TOE THE LINE

Continuing our series promoting advanced motoring techniques, Porsche Driving Consultant, Neil Furber, explains electronic rev-matching versus classic heel-and-toe

**A**s we head frighteningly fast into a world of 'automated this' and 'automated that', our cars can still provide welcome analogue tranquility. For many GT Porsche readers, manual transmission is an absolute must, and yet Tiptronic and the very latest Porsche Doppelkupplungsgetriebe (PDK) gearboxes are also very good when controlled correctly.

Rather than debate which transmission type is best, we're going to focus our attention on electronic rev-matching and an introduction to heel-and-toe. It seems the majority of owners thoroughly enjoy a

particular feature of their PDK-equipped 911, Boxster or Cayman PDK: the 'blip' on down-change. Whether in auto mode or using the paddles, buttons or lever, there's a little something about that extra excitement as the engine growls quickly to match the revs for the next gear (especially with a Sports exhaust fitted), but the effect isn't just for grins and giggles. The blip allows a faster down-change and makes sure the move is silky and smooth.

More importantly, this smoothness is a result of removing clutch-based engine braking and maintains chassis stability as you prepare to enter a bend. But wait!

There's good news for owners of recent manual Porsches: these cars have the feature built into the optional Sport Chrono package. As with PDK, the computer-controlled electronics open the throttle just the right amount to raise engine revs to the required speed during a down-change. When you move the lever to select the lower gear whilst in Sports Plus (and Sport for the later cars) mode, the engine reacts immediately, with the revs raising just the right amount. You can then release the clutch quickly with no jerk. If you've got a less than sympathetic left foot, the difference is chalk and cheese!

## ANALOGUE vs DIGITAL

Since much of Porsche ownership is heavily linked to emotion, all this electronic engine-based stuff is a lovely enhancement, but for a truly immersive experience, and as someone who sees driving as an art rather than a skill, I'll always prefer manual rev-matching and heel-and-toe. On the other hand, you may delight in the development, performance and electronic wizardry behind PDK. After all, to be able to make a perfect, near instant down-change at the touch of a button is quite some feat.

Predictably, the analogue process is far more involved. So, how is it done and why rev-match with a manual gearbox? Firstly, you'll need to depress the clutch. Then, during or immediately after you've selected gear, 'blip' and release the throttle pedal with just the right strength and duration.

Before the revs can drop again, immediately bring the clutch back to the biting point for a quick, yet smooth release. If you wish to do this by double-clutching, there's even more to it. You'll need to release and depress the clutch a second time within the process. Quite the pedal dance! Perhaps you can see why so many drivers love the digital nature of PDK – one simple click is very appealing!

Then again, if your car makes use of a manual gearbox and you're willing to spend time learning the technique, it can pay dividends; rev-matching can eliminate clutch wear during the down-change due to the clutch having no work to do. If you add the double de-clutch, your 'blip' can also spin the gearbox layout shaft to the right speed in order to engage internals without wear. Ideal if you're in possession of a car with an older gearbox and worn synchros.



## ALL THREE PEDALS

Rev-match down-changing is fine for overtaking or when the road rises, but most down-changes are in preparation for a corner. Much of the time, you'll be braking. There are differences in opinion regarding a 'good' technique when talking about when to change gear relative to braking. Advanced driving groups don't always see eye-to-eye with more performance-oriented or circuit drivers. Perhaps unsurprisingly, overlapping shifting and braking can be of real benefit, but can cause problems if performed incorrectly.

To overlap (or 'blend') brakes and gears without waiting a long time for the clutch (and



to avoid causing dynamic issues), you'll need all three pedals. This technique is known as heel-and-toe. It's essentially the same as the rev-match down-change mentioned earlier in this article, except for the fact your right foot will be on the brake pedal throughout. Your right foot must pivot or roll in order to blip the throttle with the heel or side of the foot. Assuming you've already developing the timing and intensity, the tricky bit is maintaining brake pressure! If you double de-clutch, there are at least seven foot movements, and that's on top of moving the gear lever. That flick of a PDK paddle seems wonderfully simple now, doesn't it?!

## DYNAMIC EFFECTS

During braking, the car's nose is heavier and the tail is lighter due to dynamic weight transfer. The rear tyres have less grip than usual as they've lost some of the vertical load pressing tread into the road. Clutch-induced engine braking could overload the rear tyres just as you wish to enter the bend. It's akin to pulling on the handbrake as you start to turn. In extreme cases, the tail can lurch sideways, or you could spin! Learning heel-and-toe can avoid this. With no unnecessary braking torque at the driven wheels, you can maintain better cornering control. For rear-wheel drive, this can make a huge difference.



## BEST OF BOTH WORLDS

The latest manual Porsches equipped with the desirable Sport Chrono option provide a fantastic transmission solution, insofar as they retain all the involvement of a manual gearbox, with the added pleasure and security of electronic throttle-blipping perfection at the touch of a button. Not only can you choose to learn these techniques, they'll even show you how it's done! Try a few with electronic rev-matching, then disable the function and have a go yourself. Unless you're a die-hard PDK fan, perhaps this is the best of both worlds?!



## HEEL-AND-TOE

- 1 Start braking and hold a smooth brake pedal pressure
- 2 Depress the clutch
- 3 During or immediately after you select the lower gear, ensure you blip the throttle



- 4 Immediately bring the clutch to bite
- 5 Release the clutch smoothly to take up any minor speed mismatch if you didn't execute the previous steps perfectly
- 6 Release the brake pedal



## NEXT MONTH

An introduction to cornering dynamics



## DOUBLE DE-CLUTCH HEEL-AND-TOE

- 1 Start your braking and hold a smooth brake pedal pressure
- 2 Depress the clutch
- 3 Move the gear lever to neutral
- 4 Release the clutch
- 5 Blip the throttle
- 6 Depress the clutch and select the lower gear\*
- 7 Immediately bring the clutch to bite
- 8 Release the clutch smoothly to take up any minor speed mismatch if you didn't execute the previous steps perfectly
- 9 Release the brake pedal smoothly

*\*depending on the time taken, you may wish to re-blip the throttle if revs have dropped too far, else you'll save the gearbox internals, but will wear the clutch*

## DRIVING FORCE



Neil Furber is GT Porsche's resident driving expert. With a technical background as a mechanical engineer in the Formula One industry, Neil brings a unique technical insight to driver coaching. Splitting his time between the French Alps and the UK, he coaches drivers through his brand, Drive 7Tenths ([drive7tenths.com](http://drive7tenths.com)), and as a Porsche Driving Consultant at Porsche Experience Centre Silverstone.