All-wheel drive taken to new heights

19/02/2018 The Porsche 911 Turbo S was on its way to span the greatest changes in elevation possible by a vehicle in the UK.

All-wheel drive has been engineered into every generation of 911 over three decades, combining rewarding driving dynamics with reassurance and vital traction. First applied in experimental form on the ground-breaking 959 supercar, Porsche then applied the lessons learned to the 911 Carrera 4 (Type 964) in 1988, the first series production Porsche with all-wheel drive, and the drivetrain configuration has been fundamental to the company's success since.

All-wheel drive is naturally at the core of the Macan and Cayenne, where covering ground quickly, whatever the road surface is part of the core appeal of these sporting SUV models.

The Panamera Gran Turismo and Sport Turismo also offer the attraction of four-wheel traction, to further broaden their versatility and customer appeal. And the most innovative application of the technology was applied to the 918 Spyder plug-in hybrid super sportscar, the front and rear axles of which were driven.

An attempt to span the greatest changes in elevation

However, nowhere are the advantages of the latest Porsche Traction Management (PTM) system more apparent than in the latest – and ultimate – incarnation of the all-wheel drive 911 – the Turbo S. Its ability to cope with diverse climates and conditions makes it one of the most capable and exhilarating performance cars at any price – as was proved recently, when it embarked on a unique, challenging drive that best summed up these abilities; an attempt to span the greatest changes in elevation possible by a vehicle in the UK.

A 911 Turbo S started its journey at Holme in Lincolnshire, a place which, at 10 feet below sea level, has the distinction of being the lowest point in the UK. Ahead of it was the drive to Glenshee in the Scottish Highlands, taking in a mix of roads and weather conditions, culminating in sub-zero, snow-laden surfaces; and, of course, a dramatic change in elevation.

Over its 400 mile journey, the 911 Turbo S climbed over 2,000 feet above sea level, with the road conditions gradually becoming more and more treacherous as the weather deteriorated. But it would be the final few hundred yards that would provide the most formidable challenge.

For the final stretch of the route, the 911 Turbo S lined up at the base of a steep slope at Glenshee Ski Centre, in the Cairngorms National Park. Ordinarily, skiers would be travelling from the top of the run, down to where the Porsche lay. On this morning, the car would be retracing their steps, but instead drive up the slope.

Ahead was an intimidating stepped climb up the side of a mountain, with thick snow and ice under foot (and under wheel) as well as strong cross winds causing drifts to gather around the edges of the run. The only concession to these special conditions were specific, Porsche-approved winter tyres; otherwise, the 911 Turbo S was entirely standard.

After exploratory test runs up the ski slope, the green light was given for a full ascent. At the heart of the Porsche Traction Management (PTM) is an electromagnetic clutch, the friction plates of which are able to distribute a share of engine drive torque from the rear axle to the front within 100 milliseconds. As the 911 Turbo S made its way up the slope, the PTM fed the optimum share of engine power to the wheels under the toughest possible driving conditions. The all-wheel drive management system was able to 'look ahead' to maintain optimum dynamic behaviour. The dynamic and fully variable distribution of drive torque between the two axles delays the onset of wheel slip, and thereby intervention by the Porsche Stability Management (PSM), which reads accelerator pedal and steering wheel inputs.

After a thrilling run, the 911 Turbo S reached its goal, at 2,460 feet above sea level – and the same vital traction and driver reassurance robustly demonstrated on Glenshee, also means superior agility, outstanding grip, and faithful responses to driver inputs every day.

Just like the 911 since 1988, the concept of Porsche Traction Management (PTM) has similarly evolved

to keep up with the outright pace of the iconic coupe. For example, in the latest 911 Turbo S, the plates in the all-wheel drive clutch have a higher friction coefficient to transfer the enormous torque of the turbo engines to the front wheels. The system's robust design ensures that the distribution of forces between the front and rear axles remains fast and precise. This results in more agile handling as well as higher traction.

For over 40 years, the 911 Turbo has been renowned arguably more for its broad everyday usability as much as its outright power; and the supreme traction and effortless turbocharged thrust complement one another perfectly. Porsche typical 'intelligent performance' naturally also plays a big role. The 911 Turbo S sprints to 62 mph in 2.9 seconds, and the top speed is 205 mph (Fuel consumption combined 9.1 l/100 km; CO2 emissions 212 g/km). Nevertheless, it can still return over 30 mpg. The chassis rides on Porsche Active Suspension Management (PASM), with Porsche Dynamic Chassic Control (PDCC) and Porsche Ceramic Composite Brakes (PCCB), and offers an even greater spread between performance and comfort – come rain or shine, on road, track or, indeed, ski-slope.

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