

Boundary layer

You might have expected the very last in a long line of air-cooled Porsches to be something pretty special, and the 993-model 911 Turbo didn't disappoint. Even today, almost a decade since its demise, it's as highly prized as ever

Text by Chris Horton; photography by Antony Fraser

Rarely in nature do you encounter a definable point at which one substance merges into another. Whether it's the sea rolling up a beach, the juxtaposition of primeval geological strata, or the gradual transition from the earth's life-giving atmosphere to the unforgiving vacuum of inner space, there is almost always some kind of boundary layer; an area in which both elements co-exist and at the same time somehow blend almost imperceptibly with each other.

So might you categorise the 993-model Porsche 911 Turbo. Introduced in the spring of 1995 for the 1996 model year (and thus ending a roughly 12-month interregnum without any form of turbocharged model in the company's production-car line-up; the 964 Turbo had been discontinued in early 1994), it survived not only the autumn 1996 launch of the water-cooled Boxster but also

the arrival, in September 1997, of the water-cooled 996-model 911 Carrera. Indeed, production of the classic air-cooled 993 Turbo (and also, to be strictly accurate, of the Turbo-bodied but naturally aspirated Carrera 4S and Carrera 'S') continued until as recently as the end of the 1998 model year, in July 1998. That was over 12 months into the Blair government's tenure, four months after the death in late March of Ferry Porsche himself, and around the same time that *911 & Porsche World* was first published monthly. It seems like only yesterday.

But the 993 Turbo was no anachronism; no creature – like the coelacanth, a fish believed to have been extinct for millions of years, but then discovered alive and well in the depths of the Atlantic Ocean – out of its time. With 408bhp from its 3.6-litre, twin-turbo engine (which still had just a single overhead camshaft per cylinder bank), and what amounted to a brand-new, ultra-light four-wheel-drive transmission system, it hurled itself from standstill to 62mph in just 4.5 seconds, and then on to a maximum of 180mph. The 996 Turbo could in standard form muster only an additional 12bhp over and above the 993, and (no doubt thanks to better aerodynamics) only another 10mph in terms of top speed. And despite its extra power even



the latest 480bhp 997-model Turbo isn't *that* much quicker than the 993 (or the 996...), with a 0-62mph time of 3.9 seconds and a maximum (assuming you can find somewhere to prove it) of around 192mph. The 993 Turbo was, in short – and will remain – a fitting monument to over a third of a century of air-cooled 911 production.

Unlike most monuments, however, the 993 Turbo is no mere decoration, no essentially purposeless memorial. To drive one, even briefly and at normal road speeds, is immediately to discover that for oneself – and never to forget it. The naturally aspirated Carrera upon which the Turbo was so closely based had itself opened up a whole new market for Porsche – helping to save the company from oblivion in the process – and overnight made every previous 911, up to and including the outgoing 964, seem positively antediluvian. (Which, of course, they were.) Much of the credit for that must go to the 993's bold and dramatic new styling – largely the work of British designer Tony Hatter, and surprisingly contemporary even now, nearly 15 years later – but there were many no less significant unseen improvements, all of which make any 993, whether naturally aspirated or turbocharged, a thoroughly usable, practicable and highly desirable modern classic. This is a car that truly does everything it says on the tin – and more.

Chief among those unseen upgrades was the abandoning of every previous 911's familiar semi-trailing-arm rear suspension. In its place came what Porsche termed its LSA (for Light, Stable, Agile) rear axle. Based on the so-called Weissach set-up first seen in the 928 back in the mid-1970s, and not dissimilar to what you'll find even today under the blunt end of a 996 or a 997, this (in conjunction with the coil springs

first seen in the 964 models) not only drastically reduced the 911's previous and much-discussed tendency towards power-off oversteer, but also (and rather more usefully out there in the real world) dramatically improved the car's overall ride quality and refinement.

And that was a theme that continued throughout the 993. It was as if the Porsche management had assembled a group of 911 die-hards, gritted its teeth and asked them to name their collective top ten complaints about it, and had then – crucially, without losing the minutest part of the model's appeal – doggedly engineered their way around every single one. There was, for instance, a brand-new six-speed manual gearbox (known as the type G64/51), which although based on the five-speed G50 from the 964 finally had both a shift quality smooth and precise enough to rival anything from the likes of BMW and a clutch action light and progressive enough to have come from a Ford. And from 1995 the optional Tiptronic automatic transmission (although never fitted to the Turbo) was itself available with shift buttons on the steering wheel. Today we take such niceties for granted; back then it was all still new and uncharted territory for Porsche.

The engine, too, came in for a great deal of detail updating and improvement; once again the sort of features that we now take for granted, but which then (and particularly in a Porsche 911) seemed almost unbelievably avant-garde. Lighter pistons and connecting-rods and a stronger crankshaft than the 964's may between them have squeezed out both a little more power and a modest improvement in throttle response, but the use of lightweight magnesium alloy for the cooling fan and both

THE 993 & TURBO TIMELINE

December 1993 (1994 model year)

The 964-model 911 Carrera range is almost entirely replaced by the claimed 80 per cent new 993 version, with 272bhp from its naturally aspirated 3.6-litre engine, and Porsche's LSA (Light, Stable, Agile) multi-link rear suspension. At this point the new model is available only as a coupé, with rear-wheel drive and a new 964-derived six-speed manual gearbox. The 964 continues to be available for a short period in both rear-drive Cabriolet and Speedster guise

Spring 1994 (1994 model year)

The 993-model 911 Carrera Cabriolet is introduced, replacing the earlier 964 version

August 1994 (1995 model year)

The 993 range expands up to include the new all-wheel-drive 911 Carrera 4, with a transmission system said to be around 50 per cent lighter than the equivalent 964's. Tiptronic 'S' automatic transmission (with new steering-wheel shift buttons) becomes available as an extra-cost option, but only in the rear-drive cars

February 1995 (1995/1996 model years)

The manual-gearbox, rear-drive, 3.8-litre and 300bhp Carrera RS (and RS Club Sport) is launched, together with the 408bhp 993-model 911 Turbo (the latter as a 1996 model, although there may have been up to around 100 1995-model cars). The Turbo has a new version of the standard 993 body, with wider rear wheelarches and a fixed rear wing, and comes only with both a six-speed manual gearbox and an updated version of the C4's four-wheel drive system

August 1995 (1995 model year)

The glass-roofed (but standard-width) 911 Carrera Targa is announced, together with the Turbo-bodied but naturally aspirated 911 Carrera 4S, and also the limited-edition 911 GT2 with a turbocharged engine and 430bhp (and the GT2, note, with manual transmission and rear-wheel drive only). All naturally aspirated 993s benefit from Porsche's new Varioram induction system (previously seen only in the RS model), pushing peak power up to a claimed 285bhp

August 1996 (1997 model year)

The essentially Turbo-bodied (but rear-drive-only) 911 Carrera 'S' is introduced (together, of course, with the 2.5-litre, water-cooled Boxster). *911 & Porsche World*, previously a bimonthly, is now published nine times a year

May 1997

Tony Blair takes the Labour Party to a landslide victory in the UK's general election, ending 18 years of Tory government

August/September 1997 (1998 season)

Diana, Princess of Wales, is killed in Paris. The rear-wheel-drive 993 coupé, Cabriolet and Targa are replaced by the all-new water-cooled 996-model 911 Carrera, initially as a coupé only

March 1998

Ferry Porsche dies at the age of 88

July 1998

The very end of Porsche's 1998 model year finally brings with it the cessation of all 993 Turbo and Turbo-bodied Carrera 4S and Carrera 'S' production. *911 & Porsche World* makes the change to monthly publication

August 1999 (2000 model year)

The new 996-model 911 Turbo is announced



There's no mistaking a 993 Turbo from the rear (see next spread), but the front end is no less unique, with its new three-part air intake set into a rather more aggressive-looking apron than the standard 911 Carrera's. Litronic headlights are a valuable extra, if you can find them. Standard wheels - as here - are 18-inch Technologie rims with hollow spokes. This car, believed to be the only RHD 993 Turbo in this stunning Riviera Blue, belongs to Paul Jennings, to whom our sincere thanks for his help in preparing this buyers' guide



BEST BUYS – AND HOW MUCH TO PAY

There are good 993 Turbos and there are cheap (well, cheapish, anyway) 993 Turbos. But unless you are remarkably lucky there is almost certainly no such thing as a good, cheap 993 Turbo. Such is the reputation of the entire 993 range – last of the air-cooled classics and so on; last of the *real* Porsches, say some – that today we're in the rather odd situation where you can quite easily pay more for one than for the equivalent 996. Go figure, as the Americans might say.

What it means is that an average-to-mediocre right-hand-drive Turbo will cost you at least £35,000, a reasonable specimen requiring only minor attention around £45,000, and a good one – which, as we've suggested elsewhere, simply has to be the best buy – for £50,000 to £55,000. A low-mileage and perhaps one-owner car could even fetch £60k. It might be tempting to save a bit of cash by going for a higher-mileage car in need of new brakes, suspension and perhaps a couple of either new or rebuilt turbos – and maybe even with left-hand drive – but that could well prove to be a false economy in the longer term.

the oil-pump and timing-chain housings, together with still lighter modern plastics for the inlet manifold, the cooling ducting and even the valve covers, was a remarkably bold step, indeed.

Even more impressive was the use for the first time in any 911 engine of hydraulic valve lifters, reducing servicing time and helping to keep overall running costs in check. And two smaller turbos (rather than the single larger one fitted to all previous blown 911s) finally nailed the age-old problem of the off-boost throttle lag for which all of those earlier cars had become so infamous. In truth, and despite its sophisticated engine management system, even the 993 Turbo doesn't have quite the same monumental low-speed punch as the 996 version, and certainly not the 997 – at least, not until those tiny turbines have started to do some useful work – but it's far, far better in that respect than even the 964. (And without, of course, even the slightest reduction in that utterly addictive shove in the back once things *do* start to happen.)

It was much the same story in the cabin. At last here was a 911 with a heating and ventilation system that worked just about as well as that in any of its water-cooled contemporaries. It even had dust and pollen filters. Driver and passenger airbags were – quite rightly – standard in all markets. The headlights – high-tech poly-ellipsoid items with variable-focus high beams – offered night-time visibility more or less on a par with the car's massive performance. (And the optional Litronic system was even better.) New, larger and still more powerful brakes, together with the latest ABS from Bosch, made the car even more surefooted, as did the Automatic Brake Differential, or ABD, that was also optionally available for all manual-transmission Carreras. And in deference to the environment – even then becoming a big issue – there was a switch to mostly water-based paints, even for the metallics.

It was a formula that set Zuffenhausen's cash registers ringing loudly from the start, and must have gladdened the heart of many a Porsche shareholder, who for the previous five years had had to weather one financial crisis after another. In the four-and-a-half years

from December 1993 to July 1998 Porsche built around 72,500 993s of all types, of which very nearly 6000 (5939, to be precise) were the even more lucrative Turbo models. (There were also around 200 homologation-special GT2s; see opposite.) The profit thus generated, thanks in part to the more efficient Japanese-inspired production methods introduced by CEO Dr Wendelin Wiedeking, enabled the company to push ahead with both the Boxster and the 996-model Carrera (which would inevitably be the main beneficiaries of those modernised assembly techniques), and by implication even the Cayenne, the 997 and most recently the Cayman.

It also makes the 993 Turbo the unsung supercar hero of the last 20 years. We hesitate to use the phrase supercar bargain, because at £45,000–£50,000 a 993 Turbo that is today worth owning – and that's the only kind you should even be thinking of buying – will be neither cheap to buy nor cheap to run. Reckon on about double the maintenance costs of a naturally aspirated car, suggest the experts. But it's well worth going the extra mile, argue enthusiastic owners such as Paul Jennings, whose stunning Riviera Blue 1995 car is shown here. 'I get a real sense of occasion whenever I drive it,' he says.

'Far more than I did in the naturally aspirated 993 Carrera I had before it, far more than I would from a 996 – and it's practical, too. It's quiet enough to do long distances when I need to, I feel it's as safe and as reliable as my year-old 3-series BMW estate, and it's always a huge amount of fun whenever you do get the chance to open it up



VARIATIONS ON A THEME

There were, depending upon how you look at it, either two or three 993-model 911 Turbo derivatives – and arguably just one. They are, in more or less chronological order, the GT2, the Carrera 4S, and the Carrera 'S' (sometimes, and perhaps understandably, but none the less incorrectly, referred to as the Carrera 2S).

The GT2 was built primarily for the GT2 category of endurance racing (hence its name), but around 50 out of a total of around 200 are believed to have been registered for road use. All featured the six-speed manual gearbox from the standard Turbo, but perhaps not surprisingly came with rear-wheel drive only. Peak power, thanks to both a rechip and maximum boost pressure raised from 0.8 to 0.9 bar, was nominally 430bhp – maximum torque remained the same, at around 535–540Nm – but the racing version offered up to 480bhp.

Externally the GT2 is most easily recognised by virtue of its screwed-on (and thus easily replaceable) wheelarch flares over 9.0J x 18-inch and 11.0J x 18-inch split-rim wheels at front and rear, respectively, together with 235/40ZR18 and 285/35/ZR18 tyres. It also

had an even more aggressive-looking front airdam/splitter than the 993 RS (itself no shrinking violet), with dramatically upturned outer edges, and a massive biplane rear wing with a roughly triangular air intake in each of the two vertical elements. The fully adjustable suspension was fitted with solid bushes, and even in the road cars the interior was just about as minimalist as it could possibly be. Racing versions were said to be around 200kg lighter than a standard 993 Turbo.

For 1998 an Evolution model developed the theme still further, with detail engine improvements, improved aerodynamics – including a new front splitter and an even more outrageous rear wing – and still further reductions in overall weight.

The Carrera 4S, meanwhile, offered what amounted to the naturally aspirated engine and four-wheel-drive transmission from the Carrera 4 (including that car's manual-only gearbox), but in the wide-wheelarch body of the Turbo. It also had the Turbo's cross-drilled and ventilated brake discs with four-piston red-enamelled calipers, and not least its hollow-spoke wheels – 8.0J and 10.0J x 18

inches at front and rear, respectively, with 225/40 and 285/30 rear tyres. But there was obviously no need to accommodate the Turbo's intercooler, and so the 4S also had the self-raising (and thus rather less ostentatious) rear wing from the mainstream 993 range. The suspension was lowered by about 15mm compared to the standard Carrera. Inside, the 4S had a high level of equipment, including full leather trim, air-conditioning, electrically adjustable seats, and a high-end sound system.

Launched in autumn 1996 for the 1997 model year, the Carrera 'S' was, as you've probably guessed, similar in concept to the 4S, but by virtue of its simpler rear-drive transmission became the first Turbo-style 993 to be available with a Tiptronic 'S' automatic gearbox as an alternative to the standard six-speed manual. Other identifying features included a new two-section intake grille for the self-raising rear wing, and either 17-inch Targa wheels or, as an extra-cost option, the Turbo's 18-inch hollow-spoke Technologie rims. Inside the cabin there was a ball-shaped gear knob, a trim panel round the handbrake lever, and a 'Carrera S' legend on the tachometer dial.

a bit. 'I still can't quite believe how staggeringly quick it is to 100mph!' Peter Tognola, one of the UK's foremost authorities on the 993 in all its many forms, agrees. 'I reckon they're fantastic GT cars. The previous 911 Turbos had been something of a

compromise, I think, essentially a clever adaptation of the naturally aspirated model. But the 993 as a whole is so competent that the Turbo version feels as if it was engineered to be what it is right from the very beginning. They're not particularly good track cars, of course – you need a 996 GT3 for that, or better still a 993 RS – but if you're looking for a virtually depreciation-proof supercar that you can actually use, and an undisputed modern classic, then it's a great place to put your money for a while – or even for a very long time.' And we're not going to argue with that. Neither, we suspect, will you once you've tried one. Just make it soon; it can't remain a secret for too much longer.



CHECKPOINTS

Body structure

The 993 in general might look not unlike a 964 Carrera that has undergone a simple makeover (or, to less forgiving eyes, one that has begun to soften and melt in the sun), but in truth the new car's body shell was almost entirely different to its predecessor's. Indeed, only the roof panel was carried over from the 964 without any major changes. And the 993 Turbo – available only in coupé form – was significantly different again.

Like every 911 Turbo both before and since it had rear wheelarches still wider (in this instance by about 2.5 inches) than the standard car's (which were themselves far more pronounced than the standard 964's). And their extra bulk was cleverly accentuated by new sill pressings, which instead of turning under the doors kicked outward to give a flared lower edge that flowed into the lower front part of the rear wheelarch. Each sill also had a black-plastic cover beneath it to mask the transition to the underbody area.

There were plenty of further clues to the Turbo's identity – albeit shared with the naturally aspirated but wide-bodied Carrera 'S' and 4S. Viewed from the side both front and rear aprons were now squarer to the ground, giving the former in particular a more pugnacious appearance. And what had been a single air intake in the nose was now divided into three, with a smaller duct either side of the main intake below the registration plate. The lower outer corners of the front apron also featured longitudinal slats to smooth the flow of air round the lower part of the fat front tyres.

At the rear the wrap-around apron was widened to blend with the new wheelarches, but the most obvious change (apart from the lower-case 'turbo' script) was to the aerodynamic wing, which instead of rising automatically was now a fixed, whaletail-style device with downturned side 'fences' (and which really did look like they'd melted in the sun; Salvador Dali would have loved them). There was also a body-coloured GRP moulding across the top edge of the rear window. This provided a high-level mounting for the third brake light that by this time was mandatory in some markets, and offered

as an extra-cost option in others. All UK-market 993 Turbos came with that third brake light as standard, by the way, and also with a sunroof.

Body problems, as such – and barring the usual horrors of badly repaired accident damage – are rare. So good had become Porsche's corrosion protection by this stage that rust (unless as a result of inexpert body repairs) is very rare. Even so, it will pay to look at the car's extremities for evidence of impact damage (and to the low-slung underbody area for signs of grounding, or a poorly positioned lifting jack). The inside of the luggage compartment is the logical place to start – pull out the carpet for access to the inside of the nose section – and you should then check the two rear corners of the car from within the engine compartment. As ever, though, problems of this nature can be difficult to spot, so a professional inspection is always a good idea, either for a second opinion, or else as a judgement in its own right.

But there are a number of what might be termed lesser issues that affect the 993, whether naturally aspirated or turbocharged. Probably the best-known of these is the now infamous creaking-windscreen syndrome. Thanks to its slimmer pillars the 993 has both a windscreen and a backlight slightly larger than any previous 911's, and although they appear to be secured with old-fashioned rubber mouldings they are, in fact, bonded in place, with a press-in trim to finish the job off. What happens is that the inevitable slight twist in the body shell as the car negotiates bumps – possibly worse in the Turbo because of its stiffer suspension, and bigger wheels with lower-profile tyres – causes the windscreen aperture in particular to flex, and the covering trim to fret against the body. It's this rubbing that generates the creak.

The solution is either to learn to live with it, or else to have the trim(s) removed and a strip of a special tape applied beneath it/them in order to minimise the friction, and thus the resulting noise. Accepted wisdom (and particularly in the US) suggested at the time that windscreens could crack, delaminate or even pop out of their apertures as a result of this torsional twisting – it was a major talking point in

several *Running Reports* we published back in the late 1990s – but we would suggest that this is highly unlikely, if not physically impossible, unless a replacement has been (very badly) fitted and/or the car has a number of other very serious structural issues.

Bear in mind, though, that correctly fitted windscreens are crucial to the shell's overall strength and rigidity, and that some less than diligent fitters routinely make a complete and utter mess of the job, scraping the protective paint off the aperture when they remove the old adhesive, and so providing the ideal conditions for future corrosion. Again, seek advice if in any doubt about this aspect of the car.

Other bodywork issues include the four bracing stays for the rear apron, and fading of the rear-light lenses. Oddly – but not atypically – Porsche used ordinary mild steel for these stays (although the main bumper mounts are plated steel), and not surprisingly one or more can eventually rust through, allowing the panel to vibrate. It's not a major problem, however, involving about an hour's work to remove and refit the moulding, and around £120 for the parts needed. Replacing the lamps will cost rather more – budget for a total of around £500 for the two indicator units and the centre reflector – but unless they have discoloured enough to fail an MoT test this could be left until you can live with the shame no longer.

Likewise you'll sometimes see the black powder-coating on the door-window frames peeling – it's caused by damp getting through it and attacking the aluminium-based alloy beneath – but again this is usually more a cosmetic problem than a structural one, and while eradicating it will mean stripping and subsequently rebuilding the doors – and certainly won't be cheap – it can't spread to the rest of the shell.



Engine and transmission

The 993 Turbo's type M64/60 engine was based closely on the M64/05 unit of the contemporary naturally aspirated Carrera, but with a number of internal differences – and some no less significant external changes, too.

Chief among the former were reinforced connecting-rods, new Grafal-coated forged pistons to reduce noise from thrust loads (piston slap, basically), and ceramic-coated exhaust ports in the cylinder heads. Both the inlet and outlet ports in the heads were larger than the Carrera's, too. The former grew from 38mm to 43mm, the latter from 32mm to 38mm. And in order to reduce the additional load on the cylinder-head seals (the engine was not only turbocharged, but also had a compression ratio up from 7.5:1 in the previous 964/965 version to here 8.0:1) each piston now extended 5mm into a recess machined in the head. The cylinder barrels also underwent a redesign to incorporate mountings for the knock sensors that would play such a crucial role in the engine management system (and also allow it to run on unleaded fuel with a rating as low 95 RON).

Cylinder-head cooling was further improved by redesigning the fins to make them as large but at the same time as thin as possible, and the overall strength of the engine was raised by redesigning both the cylinder-head securing nuts and their seats in the head castings – giving them a larger surface area. Interestingly, the cylinder heads were also redesigned to incorporate just one spark plug apiece instead of the naturally aspirated car's two, and this means the Turbo has just one

distributor rather than both the 964 and 993 Carrera's linked pair. In truth this previously sometimes troublesome twin-distributor set-up was by this time entirely reliable, but for a would-be buyer it's one less thing to worry about. The heads also retained the new hydraulic (in other words, fully automatic) valve lifters from the other 993s, a system that would slash several hours from the service schedule.

There were no less substantial changes to the combined fuel and ignition system. The previous 911 Turbo's single KKK K27

you're likely to encounter are oil leaks from the moulded-plastic camshaft covers, and occasionally the large-diameter rubber pipes between each half of the intercooler and the twin turbos either working loose or else falling off completely. The former is caused by the thick rubber gasket beneath each cam cover hardening with heat and age (simply remove the covers and fit new seals), the latter by the fact that the intercooler – and thus the pipes – has to be removed each and every time you need access to the top of the engine, with an obvious

“ The Turbo is no mere decoration, no purposeless memorial. To drive one is immediately to discover that for oneself – and never to forget it ”

turbocharger was replaced with a pair of the same company's smaller K16 blowers for quicker throttle response, and there was a new version of Bosch's Motronic management system, with four oxygen sensors, hot-film mass-airflow sensing, electronic boost control, separate fuel-mixture monitoring for each cylinder bank, and not least the OBDII (On-Board Diagnosis II) secondary management system which by the 1996 model year was mandatory for all new vehicles in the US (but fitted to the 993 Turbo for all markets), and which, 10 years on, is now making a major contribution to the cars' overall reliability and driveability (and desirability).

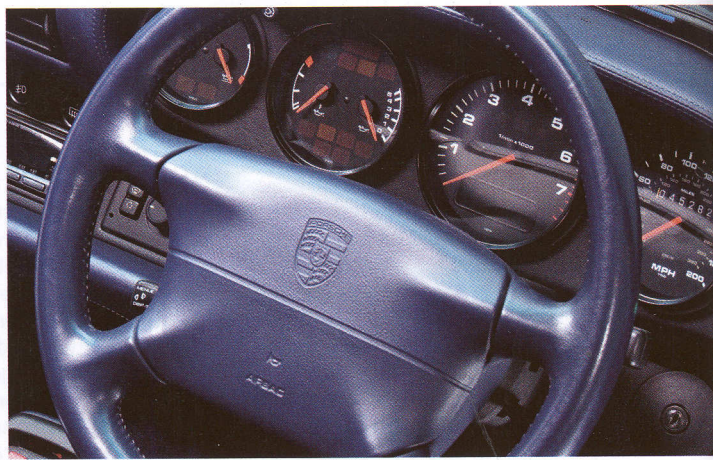
The result was to make the 993 Turbo engine just about unburstable in normal use and, despite the additional loads placed upon it by turbocharging, arguably one of the best air-cooled engines Porsche has ever built – if not the very best.

The only real issues

effect on the shape and strength of the rubber. The pipes can usually be persuaded to stay on again for a while, but the best long-term solution is simply to buy some new ones. They're neither expensive to buy nor difficult to fit.

You might find that the engine tends to consume more oil than the litre per 1500km suggested as normal by the factory, the situation often manifested as a trace of smoke in the exhaust. Provided it *is* just a trace you can possibly learn to live with it, says Peter Tognola, although in such cases he also suggests trying a change from the standard Mobil 1 recommended by Porsche to the same company's slightly thicker motorsport-grade oil. Don't, though, be tempted to run any non-synthetic oil. The heat generated in the turbos will simply fry both it and ultimately the blowers themselves. Speaking of which, these tiny, high-revving units are generally very reliable (provided you take the precaution of letting the engine idle for a minute or two after a long, fast run), and although new from Porsche they cost a small fortune, they can usually be overhauled for around £500 each.





Flagship Turbo's cabin might seem austere by today's standards, but still provides most essential comforts – airbags, too. Engine compartment is dominated by the huge intercooler, and whose presence also dictates that the no less substantial rear wing (far right) is fixed rather than self-raising

Rough running and possibly exhaust-emissions problems, meanwhile, may suggest a problem with the two catalytic converters in the exhaust system (one per cylinder bank), but equally possibly an oxygen-sensor fault. The 993 Turbo has no fewer than four such sensors, and they rarely last for much more than about 50,000 miles. They're not in themselves difficult or too expensive to replace, but can sometimes corrode into the exhaust pipework.

The six-speed G64/51 manual gearbox and four-wheel-drive transmission system are, apart from a few minor differences, the same as in the naturally aspirated 993-model Carrera 4 – and, despite both their inherent complexity and the huge torque (up to 540Nm) routinely passing through them, generally no less reliable. Even the dual-mass flywheel that caused so much trouble in early 964s had by this time been rendered bulletproof, and even today, with the youngest cars approaching their 10th birthdays, failures are rare. A loud clonking noise with the engine idling in neutral and a looseness in the drivetrain are the usual signs of problems, though, in which case you'll be looking at a total of around £1750 including the new clutch that it would be sensible to install at the same time.

Such, however, were the clamping forces required of the clutch pressure plate that in order to maintain within sustainable limits the effort required at the pedal the 993 Turbo has what amounts to a power-assisted clutch-release mechanism. In simple terms it uses the same engine-driven radial-piston pump that operates the power-assisted steering to charge a high-pressure spherical accumulator to around 70 bar. A system of valves, pistons and pipes then applies that fluid pressure, when instigated by the pressure generated within the clutch master cylinder (and crucially with a small reserve of 'power' even when the engine is switched off), to the slave cylinder, reducing clutch-release travel by a claimed 15 per cent, and pedal force by as much as a quarter.

So far so good – and so reliable, too. But the accumulator can eventually lose its ability to store pressure, primarily as a result of the deterioration of its internal membrane, and then no matter how hard the pump works you not only have to push the pedal 15 per cent further in order to disengage the clutch sufficiently for a clean gear change, but 25 per cent harder, too.

The good news is that the screw-on sphere – mounted on the left-hand side of the car just

forward of the transverse LSA 'frame' – is both straightforward and cheap enough to change (about £150 all in); and that even in the event of a total failure of this part of the system the car can still be driven, albeit with a higher pedal effort. The bad news is that the entire system – which has a fluid storage tank in the left-hand rear corner of the front luggage compartment – must be filled only with a special mineral oil (Pentosin CHF 11S), and never with the automatic transmission fluid that is required even by some other Porsche power-steering systems. Get that wrong and you could be looking at replacing not just the clutch hydraulics but also the steering rack, too.

The clutch friction plate itself should last for at least 40,000–50,000 miles unless consistently abused, but since it's an engine-out job that will cost at least £1000 to fit a new one, it's well worth making sure there are no signs of slipping, juddering or grabbing. Another good reason to enlist the help of an acknowledged expert.

Suspension, steering and brakes

Despite the complexity of its full-time four-wheel-drive transmission system, the 993 Turbo's suspension (which, apart from the stronger ball-joints between the front-suspension lower arms and the axle uprights required to sustain the increased loads from the 18-inch wheels, is much the same as the naturally aspirated Carrera 4's) holds few surprises, and beyond regular alignment checks requires little in the way of routine maintenance.

Even so, it will pay to have a good look at the dampers for signs of leaks (they're reckoned to last for about 60,000 miles before losing their sporting edge), the drive-shaft joints (all eight of them...) for torn gaiters, and the various ball-joints and mounting bushes for signs of split covers and other obvious damage. Don't forget the anti-roll-bar mounts or their connecting links: both can be the source of clonking noises. The various bushes in the LSA rear axle seem remarkably long-lived, though – which given their inaccessibility is a welcome relief.

Known specific trouble spots include the rubber bushes by which the front-suspension lower arms are secured to the underbody (they last for only around 50,000 miles, suggests Peter Tognola), and occasionally leaking steering racks. Check the bushes by undoing a couple of screws per side and pulling down the adjacent plastic undertray; you're looking for evidence of the rubber either cracking or else being squeezed out, rather like toothpaste from a tube. It's not a major problem, though. It takes an expert only about an hour per side to remove the arms and fit new ones, and even for genuine Porsche arms you'll be looking at a total cost of

only about £180 per side, plus whatever that hourly rate equates to – and then the all-important suspension realignment, of course.

The most obvious source of steering-rack leaks are, as ever, the concertina-style rubber cover at each end from which emerges the tie rod (and bearing in mind that the system may well have been filled with the wrong fluid at some time during its life; see above), although it's worth having a look at the connecting pipework, too. In the event that you do need a new rack (and it does happen), reckon on a bill of about £1100 plus fitting by a specialist, and then once again a full suspension realignment.

Suspension alignment, as we've twice suggested above, is important for both optimum handling and optimum tyre life. The latter, given the car's substantial mass and huge power, isn't fantastically long under the best of conditions. Certainly, paying an extra £150–£200 each time you have any suspension work carried out (and at least once a year in any case) might not sound like a brilliant investment, but then a set of decent tyres costs around £1000 a go, and so wide are they that it won't take long for even the slightest misalignment to wreak havoc on their treads. And a well set-up 993 Turbo is such a joy to drive that you owe it to both the car and to yourself to get that right. The problem, if you can call it that, is compounded by the number of adjustment points – six at the front alone; it's definitely a job for a trained and competent specialist – and the relative ease with which you can disturb the original settings while driving. Even a big pot-hole is enough, never mind a kerb.

The 993 Turbo's brakes are in principle similar to the standard Carrera's, but with bigger (322mm diameter) discs both front and rear, all of them both cross-drilled and inner-vented. The four-piston light-alloy calipers – the famous Big Reds, as they're known – are much as you'll find in the 993 RS. Once again problems are neither commonplace nor insurmountable, although a car with this level of performance will get through friction pads – and discs, as well – at a fairly steady rate, particularly if you use them as hard as the acceleration will encourage you to. Reckon on about £300 for a set of front pads, fitted, £275 for the rears, and about £400 per axle for a new set of discs, again fitted by a specialist – but obviously quite a bit less than that if you're prepared to do the work yourself.

As usual with these light-alloy Porsche calipers, though, cars that are used relatively infrequently can suffer from sticking pads. It's caused by corrosion of the alloy caliper body in the areas under the stainless-steel plates that are used to spread the load of the pads' metal backing plates. The resulting expansion squeezes the pads top and bottom, and



prevents them sliding freely within the caliper body – and it also makes them very difficult to remove and refit. The usual signs of problems are a reduction in brake efficiency, perhaps in conjunction with uneven braking, and quite possibly a build-up of rust on the face of an affected disc, where it's no longer in effective contact with the adjacent pad. Not surprisingly, this tends to be more of an issue on the usually unseen inner faces of the four discs.

The cure is to remove and dismantle the affected caliper. It's not a particularly difficult job – a specialist will do it for around an hour's labour per corner – but you'll need at least new stainless-plate securing screws (two per caliper) and quite possibly the plates themselves, too. You'll also have to – carefully – heat the old screws in order to soften the locking compound with which they should have been fitted, so all in all it's arguably best left to a specialist. Budget for around £20 per caliper for a repair kit of the necessary plates and screws, or a total of around £130 per caliper if you farm the job out.

Wheels and tyres

All 993 Turbos would have been supplied new with Porsche's hollow-spoke Technologie wheels (8.0J x 18 at the front, 10.0J x 18 at the rear), and either Bridgestone S-02 or Pirelli P Zero Asimmetrico tyres: 225/40 and 285/30 at front and rear, respectively, and both N1 rated.

Crucially the wheels were made by an ingenious process during which two pre-formed aluminium-alloy castings were friction-welded together, and leaving not just hollow spokes but also an additional hollow section round the outermost part of each rim. This gives the wheels both exceptional strength and a remarkably low mass – the latter typically 30 per cent less than a comparable solid wheel, and offering a major reduction in unsprung weight.

Problems, as you might expect, are usually corrosion and kerb damage, but because of the hollow spokes and rim all but the tiniest of marks are impossible to machine out with complete safety (but which doesn't mean that someone may not have tried). And at around £1000 a corner they're not exactly cheap to buy new, so beware, too, that your intended purchase hasn't been fitted with a set of much cheaper solid-spoke lookalikes. Even similar rims from Porsche itself have solid spokes.

The easy way to tell the wheat from the chaff, as it were, is to run your hand over the inside face of one of the five spokes (and don't check just one wheel at random; try them all). If the surface is smooth and flat it's a hollow-spoke; if it's concave then it's a cast wheel, and while these may be both perfectly safe and serviceable you could justifiably negotiate the

car's asking price downward by the £4000 or so it will cost to buy four of the genuine articles.

Tyres, as we've suggested, cost around £1000 for a set of four, so you need to see both a reasonable amount of tread on them, and no evidence of the uneven wear that might suggest alignment problems. They need to be a good, reputable brand – although such is the huge choice of high-performance rubber these days that can include a lot more than either those original-equipment Bridgestones or Pirellis – and ideally the same make (and type) both front and rear. Beware an obvious mix of tyres, though, and (even if they're nearly new and also a reasonable make) particularly across the car. The vendor may be struggling to keep up with the demands of a machine of this nature, and could well have skimmed on other areas, too.

Interior and trim

If the 993 Turbo had the best chassis and engine of any air-cooled 911, so its interior was pretty special, too. Air-conditioning and full leather were naturally standard, as was a trip computer (this last in order to provide a digital turbo-boost gauge), and in all cars, whether left- or right-hand drive, a contrasting 'turbo' script was embroidered into the rear face of the left-hand rear backrest. Front seats will most likely be either fully electrically adjustable jobs, or else manually operated Sport items, the latter a no-cost option when the car was new.

Checking this area of your would-be purchase is largely a matter of common sense – it doesn't take a Porsche-trained specialist to spot damp or dirty carpets and seat-belts, a nicotine-stained headlining, and worn or simply undernourished leather – but it will none the less pay you to take the time to check that all of the various equipment and systems work as they should: electric windows, mirrors, sunroof, central-locking, heating and air-conditioning – and bearing in mind, too, that while this was, and is, a sports car *par excellence* it might also be described as a gentleman's (or lady's) express. You shouldn't, in short – and especially at this still rarefied level in the marketplace – be expected to make do with even minor faults.

So check that the airbag warning light goes out (make sure it comes on in the first place; someone may have disabled the system rather than fix any fault), and take the air-con through its full range of settings. Even a 993 will never provide what you could call freezing-cold air, but it should still be way ahead of even the best 964 system. Have the owner demonstrate the alarm system, the stereo, the toolkit, jack and space-saver spare wheel – and maybe even that the lights really are both the expensive optional-extra Litronics that they're claimed to be and work as they're meant to. At around £250 a side for a special gas-discharge bulb that's not a bill you want to be landed with after shelling out £50K for the car – however good it may be. **12**

FURTHER INFORMATION? STICK WITH THE EXPERTS

As ever, *911 & Porsche World* itself has to be the best place to start, in this case in the shape of the naturally aspirated 993 Carrera buyers' guide in the November 2006 issue (pages 78–85). After that we'd recommend Paul Davies's 964 engine analysis in the April 2006 issue, and then the same author's examination of the 930 power unit in the June 2006 edition. Neither of these motors is identical to the 993 Turbo's, of course, but they're all similar enough that the two stories will give you some very useful background. All three magazines are available, for just £4.95 per copy including UK postage, at www.chpltd.com/shop, or else by calling 020 8655 6400.

Good books specific to the 993 Turbo are thin on the ground. Peter Morgan's *Original 911* is a useful primer (£24.99 plus postage from the CHP shop), and so too is the 993 guide from the same author's own *Ultimate Buyers' Guide* series. That'll cost you £9.95 plus postage direct from us at the web address above. We'd also recommend getting your hands on the official drivers' handbook for the 993 Turbo, either by borrowing one from an existing owner or, better still, by buying one from your nearest Porsche Centre. It's packed with invaluable technical information on just about every aspect of this extraordinary machine, and at £26.19 it's not expensive.

Specialists? Try Autofarm in Oxfordshire (01865 331234; www.autofarm.co.uk) and Russell Lewis at RSR Engineering in Grayshott, Surrey. He's on 01428 602911. Both offer independent pre-purchase inspections (depending on location), and this service is also available from Peter Morgan. Call him on 01672 514038, or go to www.petermorgan.org.uk. Other highly reputable independents include JZ Machtech in Kings Langley, Hertfordshire (01923 269788; www.jzmachtech.com), and, for most spare parts, Porscheshop in Halesowen, West Midlands (0121-585 6088; www.porscheshop.co.uk). Finally, our sincere thanks to Peter Tognola and Greg Cranmer at Tognola Engineering in Datchet near Slough (01753 545053) for their enthusiastic and hugely knowledgeable help in compiling this guide. We can think of few better in the region to look after your 993 Turbo once you've bought it, and they also offer pre-purchase inspections.