

INVESTOR DOSSIER & TECHNICAL COMPENDIUM

Porsche 911 (997.1) Carrera, S, 4 and 4S · Coupé, Cabriolet and Targa

Reading sample: technology, buying advice and investor dossier

Original pages from the full edition

911finder.de | As of: September 2026

Scope: Sample from 5 parts, 26 chapters, 8 charts



About this sample

The pages that follow are taken unchanged from the Investor Dossier & Technical Compendium on the Porsche 911 of the 997.1 generation. Tables, info boxes and chapter numbers appear exactly as they do in the book. Where the text refers to a chapter that is not included here, it means the full edition.

We picked passages where the book goes further than an ordinary buyer's guide. The first pages belong to the engine, because on a 997.1 that is where most of the money is at stake. They show how the scoring on the bores of cylinder bank 2 comes about, the physics of piston tilt, and the driver profile 911FINDER keeps finding behind affected cars. Three measures against the heat load follow, with part numbers and prices. From the Targa chapter comes the interlock between glass roof and rear window, which tends to send fault-finding down the wrong path. From the buying process: how to order an engine inspection so that the result can carry a purchase decision.

The second block comes from the investor dossier, and it does the arithmetic. Manual or Tiptronic S is the most expensive single decision on a 997.1. No database records the leather interior as a feature, so we read it from the description texts of the listings and measured its effect on price. An adjusted calculation separates the value drivers from one another. Three scenarios lead into a five-year return calculation. The basis is 2,612 listings from 911FINDER Market Monitoring and Analytics (MarqueScope).

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1.1.4	Piston tilting: the physics behind the damage
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The complete book

The full edition runs to close to 400 pages: five parts, 26 chapters and 253 sections, eight charts, seven of them based on our own market data, plus a glossary and an appendix. It covers all ten variants of the 997.1, that is Carrera, Carrera S, Carrera 4 and Carrera 4S, each as Coupé and Cabriolet, plus Targa 4 and Targa 4S. The technology is in chapters 1.1 to 1.15, the buying process in 2.1 to 2.7. Chapters 3.1 and 3.2 read the factory brochure and the price list, 4.1 takes the market price apart, and 5.1 is the investor dossier.

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PART 1

Technical Deep Dive

Systems, weak points, measurements and inspection points

Technical Deep Dive Model: Porsche 911 (997.1) Carrera, S, 4 and 4S · Coupé, Cabriolet and Targa

Chapter 1.1 - The M96.05 and M97.01 engines: a forensic analysis of the 3.6 and 3.8 litre units

From chapter 1.1 (13 sections): introduction, 1.1.3 to 1.1.6.

The engine decides the value

On hardly any other 911 does the price hang so directly on a single assembly as on the 997.1. The body, chassis and interior of this generation are durable and easy to assess. The engine is a different matter. A 3.8 litre with clean bores and a 3.8 litre with the beginnings of a piston seizure look identical from the outside, sound almost identical at cold idle and appear in listings at the same price. The difference between them lies in a rebuild invoice. According to 911FINDER Market Monitoring and Analytics (MarqueScope), the median of the last asking prices of sold 997.1s stands at €57,900. An engine rebuild costing between €10,000 and €35,000 is equivalent to roughly 17 to 60 per cent of that.

This chapter takes the two engines of the 997.1 apart far enough for purchase decisions to rest on it: the 3.6 litre M96.05 in the Carrera, Carrera 4 and Targa 4, and the 3.8 litre M97.01 in the Carrera S, Carrera 4S and Targa 4S. It explains why the damage almost always occurs on the same three cylinders, why the way a car is driven has more to do with it than the mileage, and which three measures noticeably reduce the thermal load. Where the evidence is thin, the text says so.

1.1.3 The damage pattern: piston seizure on cylinder bank 2

The typical engine problem of the 997.1 goes by many names among enthusiasts: bore scoring, bore damage, piston seizure, piston slap. They all mean the same thing. Score marks form on the cylinder bore, the piston rings no longer seal properly, oil consumption rises, and at some point the engine knocks audibly. The seizure is always the consequence, never the cause. The cause lies in pressure, temperature and lubrication at one particular spot in the cylinder.

The damage occurs overwhelmingly on cylinders 4, 5 and 6, that is on cylinder bank 2. Cylinder 6 is affected most often. The scoring lies in the upper half of the bore, in the area between ten and two o'clock when looking into the cylinder. Seizures on the lower bore at six

o'clock are extremely rare. This distribution is stable across many rebuilds and matches what specialist workshops in Britain and the USA report independently. All three cylinders of a bank are rarely affected at the same time; the damage tends to move from one to the next.

The 3.8 litre is affected considerably more often than the 3.6 litre, and the 381 PS X51 engines more often still. There are no reliable rates. A British dealer estimate puts the figure at around five per cent of all engines in this family; there is no comparable figure from German sources. In rebuild practice, however, many 3.8 litres with bore damage turn up at around 70,000 kilometres, and individual X51 engines at under 40,000 kilometres. These are workshop observations, not statistics, but they show the direction.

A look at the whole engine family helps to put this in context. The small Boxster engines from 2.5 to 3.2 litres are regarded as largely trouble-free, apart from minor leaks. Piston seizures only accumulate with the larger-displacement versions. More power, more torque, more friction and higher temperatures met a basic design laid out for smaller displacements. With the 3.8 litre in the 997, the load limit was exceeded at certain points. The engines are therefore not fundamentally bad. Across all variants, piston seizures are rare, but on the 3.8 litre and the X51 they are not.

Important for buyers: bore damage rarely announces itself with a bang. After the first seizure the condition often deteriorates only slowly, because blow-by lowers cylinder pressure and with it the load on the damaged spot. Such an engine can run for many thousands of kilometres more, with rising oil consumption, black oil and declining power. Up to a millimetre of material can be lost from the piston skirt in the process. Anyone who only asks whether the engine runs will therefore get a worthless answer.

Why bank 2 in particular: five causes that add up

There is no single cause. Bore damage arises when several weaknesses, each small in itself, coincide at the same spot. On the 997.1 there are five.

First, the wall. The cylinder wall is sized tightly for the combustion pressure of an engine with more than 90 PS per litre, and most tightly on the 3.8 litre. Under the alternating load of every power stroke the material no longer springs back fully. It creeps. Over tens of thousands of kilometres the round bore becomes slightly oval. The material is displaced in the process, not worn away. Measurements on 3.8 litre cylinders with 80,000 to 100,000 kilometres show ovality in the range of several hundredths of a millimetre, in individual cases up to 0.2 millimetres. The installation clearance between piston and cylinder is about 0.04 millimetres when new and grows to as much as 0.12 millimetres by 100,000 kilometres.

Second, the material. The silicon particles in Lokasil are hard but brittle. Under high load individual grains break out, some of them during honing. The rings drag them across the bore like abrasive grit. Lokasil expands less than the surrounding aluminium, and stresses build up at the interface. In sectioned engines, fine cracks show up as dark grey lines in the bore, even in cylinders that have not yet seized. Even in production, the brittle preforms could not always be held exactly in position during casting. After final machining, the Lokasil layer is therefore not equally thick everywhere. Markings on the preforms show that they were inspected before insertion and oriented so that the thickest point faced the thrust side. Lokasil also conducts heat less well than an aluminium bore with a Nikasil coating.

Third, lubrication. The oil jets sit in the same position on both banks. On bank 2 the connecting rods mask the spray jet during parts of each revolution, creating a spray shadow. Gravity adds to this. The oil mist is drawn downwards. If the thrust side of the piston is at the top, as it is on bank 2 after top dead centre, the most heavily loaded surface of all receives the least oil. On bank 1 the thrust side is at the bottom, and there the oil drips from above onto the loaded surface. On the longer-stroke engines, wider crank webs and a modified crankcase bedplate further reduce the oil supply to the walls. A trial from rebuild practice confirms the oil starvation: with one additional oil jet on each cylinder of bank 2, the oil temperature fell and the oil pressure rose slightly instead of falling. Less friction between piston and cylinder means cooler, more viscous oil. Because of the high machining effort, the measure has so far rarely been implemented in rebuilds. Although the bore grew step by step from the 2.5 to the 3.8 litre, Porsche never adapted the position or design of the oil jets.

Fourth, the coolant. Each cylinder receives its coolant separately from below, in the six o'clock area, close to the exhaust manifolds. It rises and warms up as it does so. The top of the cylinder therefore sits in coolant that is already warm. On bank 2 this is exactly the thrust side. There are no cylinder fins in the water jacket. From the 3.6 litre engines on, Porsche fits a symmetrical one-size head gasket with equally sized coolant passages on both sides. According to measurements from rebuild practice, this gives cylinder 4 considerably more and cylinder 6 considerably less coolant than before, and the coolant flow through the block is greatly reduced compared with the head. Anyone wondering why cylinder 6 seizes most often will find part of the answer here. The coolant space around the cylinders has shrunk with every larger bore. A 3.8 litre has less coolant around its cylinders than a 2.5 litre Boxster, and the small transfer slots from block to head were made smaller again on later engines.

Fifth, the piston. The six pistons are identical, forged, weight-reduced and given an iron-based friction coating on the skirt around five hundredths of a millimetre thick. On the 3.8 litre this coating comes away in places at high cylinder temperatures. The gudgeon pin is offset by about 0.9 millimetres towards the thrust side to damp the piston's change of contact face. If a piston is fitted rotated by 180 degrees, the engine sounds as if it is damaged even though it is not. A detail for buyers of an engine that has already been rebuilt.

Cause	Mechanism	Why bank 2 is affected more
Cylinder wall	thin Lokasil wall in the open deck creeps, bore becomes oval	thinnest on the 3.8 litre, affects both banks, consequences hit bank 2 harder
Material	silicon grains break out, microcracks at the interface	broken-out grains act where the oil film is thinnest
Lubrication	bore supplied almost only by jet oil, hardly any splash oil	connecting rods mask the spray jet, thrust side is at the top, oil mist drawn downwards
Coolant	coolant enters at the bottom and warms up on the way up	thrust side of bank 2 lies in the hottest area, cylinder 6 receives the least
Piston	skirt coating comes away at high temperature	temperature is highest at the top of bank 2

Fact check: IMS and bores

The IMS bearing and bore damage are often confused in listings and forums. They are two separate damage patterns with separate causes. A retrofitted or replaced IMS bearing says nothing about the condition of the cylinders. On the 997.1, bore damage is the more frequent and more expensive risk.

Conversely, an engine with clean bores can still develop a bearing problem, although rarely. Both points are checked separately and documented separately.

1.1.4 Piston tilting: the physics behind the damage

Anyone who wants to understand why driving style matters so much on the 997.1 has to look at the forces the piston passes on to the cylinder wall. This is textbook mechanics, and it explains the workshop observations better than any anecdote.

Gas force, inertia force and side force

Two large forces act on the piston. The gas force comes from the combustion pressure on the piston crown and pushes downwards on the power stroke. The inertia force arises because the piston, gudgeon pin, rings and part of the connecting rod are constantly accelerated and decelerated. It grows with the square of engine speed. Near top dead centre it acts against the gas force: the piston is being braked and wants to keep moving upwards, which relieves the force that has to be supported through the connecting rod.

Because the connecting rod is at an angle during the power stroke, the piston force splits into two components. One runs along the connecting rod to the crankshaft and produces torque. The other presses the piston sideways against the cylinder wall, on what is called the thrust side. This side force is the resultant piston force multiplied by the tangent of the connecting rod angle. With a stroke of 82.8 millimetres, the rod angle reaches around 17 degrees, depending on the length of the connecting rod.

One often reads that centrifugal forces are missing at low engine speed. The meaning is right, but the term is not. Centrifugal forces arise on rotating parts, at the crankpin and the big end of the connecting rod, and they load the bearings. What acts on the piston are oscillating inertia forces, that is, inertial forces from the up-and-down movement. It is these that partly cancel the gas force at high engine speed and are missing at low engine speed.

A worked example with the 3.8 litre figures

Bore and stroke are documented: a 99 millimetre bore gives a piston area of 7,698 square millimetres, or around 770 newtons per bar of cylinder pressure. The crank radius is 41.4 millimetres. The oscillating mass and the connecting rod length are not publicly documented. For the calculation, an oscillating mass of 0.75 kilograms and a connecting rod length of 141.5 millimetres are therefore assumed, together with typical full-load cylinder

pressures of a naturally aspirated engine, set equal for both engine speeds. The trend of the results does not depend on these assumptions; the exact values do.

Quantity	2,000 rpm	6,000 rpm	Context
Oscillating inertia force at top dead centre	around 1,760 N	around 15,850 N	three times the engine speed, nine times the force
Mean piston speed	5.5 m/s	16.6 m/s	stroke and engine speed only, connecting rod plays no part
Time for one crankshaft revolution	30 ms	10 ms	three times as long exposure to heat per stroke
Side force 15 degrees after TDC (80 bar, assumed)	around 4,550 N	around 3,540 N	plus 29% at 2,000 rpm
Side force 30 degrees after TDC (55 bar, assumed)	around 6,060 N	around 4,430 N	plus 37% at 2,000 rpm
Side force 45 degrees after TDC (35 bar, assumed)	around 5,490 N	around 3,860 N	plus 42% at 2,000 rpm

At the same cylinder pressure, then, the piston presses against the wall 30 to 40 per cent harder at 2,000 rpm than at 6,000. The maximum side force comes slightly later than peak pressure, at around 30 degrees of crank angle, because the connecting rod angle grows with crank angle while the pressure falls.

Why the oil film carries less at low engine speed

A hydrodynamic oil film carries the load between piston skirt and bore. Its thickness increases with viscosity and sliding speed and decreases with load. At 2,000 rpm the piston slides at a third of the speed, yet the load is a third higher. Both push the operating point on the Stribeck curve towards mixed friction. There the asperities of the surfaces touch, and with Lokasil those asperities are the silicon grains. Heat comes on top: each power stroke lasts three times as long, piston and wall absorb more heat per stroke, and the oil and coolant pumps, whose delivery depends on engine speed, supply less. The oil on the skirt becomes hotter and thinner.

Tilting at top and bottom dead centre

At the dead centres the piston changes its contact side and tilts about the gudgeon pin in doing so. With new clearance this tilt angle is very small; simulations put it in the range of 0.1 to 0.2 degrees. It increases as clearance grows and the bore becomes oval, and the piston strikes harder. At warm idle this can be heard as a dull, rhythmic knock. At bottom dead centre the pistons of the 3.6 and 3.8 litre engines protrude a few millimetres beyond the lower edge of the cylinder. If the piston tilts there, the skirt touches the edge. The detached skirt coatings found on these engines a few millimetres above the lower edge of the skirt match exactly this contact.

The flat-six adds a peculiarity of its own. The dead weight of a piston of around half a kilogram is irrelevant compared with side forces of several thousand newtons. Gravity does, however, act on the oil. In a horizontal cylinder it collects at the bottom. Where the thrust side is at the top, it is missing. When the engine is stationary the pistons rest at the bottom, and with increased clearance oil seeps past them into the combustion chamber, which explains the brief puff of smoke after a cold start.

Insider knowledge

The physics confirms the workshop rule: labouring at low revs under full load is the least favourable way to operate these engines. High engine speed at full load puts more stress on bearings, valve train and chain, but less on the cylinder wall. Revving it out does not harm a healthy 997.1 engine. Constantly lugging it in a high gear does.

The connecting rod ratio is often overrated in this context. A slightly shorter connecting rod on the 3.6 and 3.8 litre changes the side force for the same piston force by only a few per cent. Engine speed changes it by 30 to 40 per cent.

1.1.5 The driver profile: observations by 911FINDER

For years, 911FINDER has asked how the car had been used every time an engine failure of this kind came to light. The picture that emerges is remarkably consistent, and it contradicts the widespread assumption that it is mainly hard-driven cars that are affected.

Most of the piston slap cases we were able to trace had led a quiet life. Weekend car, a few hours at a time, leisurely country roads. Driven in the lower rev range, almost never beyond 5,000 rpm. And the same pattern again and again: accelerating gently in third or fourth gear at far too low an engine speed instead of changing down a gear. As the previous section shows, it is precisely this mode of operation that produces the greatest tilting moment on the piston and the highest side force on the wall. Wear rises relatively quickly as a result.

This is an observation, not a statistic with a control group. It does, however, agree with the physics and with what engine rebuilders describe from their own practice: accelerating from low engine speed in a high gear without changing down puts the greatest load on the cylinder wall. In rebuild practice, cars with Tiptronic S are regarded as more heavily stressed. No statistic putting a figure on this exists.

Cold load, short trips and warm-up

The second unfavourable mode of operation is load before operating temperature. Full load with cold oil and cold coolant can damage the bore within a few seconds, which corresponds to a few hundred piston strokes. Usually many small scuffing events add up. A long warm-up while stationary does not help. During the warm-up phase the secondary air is blowing, the mixture is rich, and fuel washes the oil film off the wall and dilutes the oil. Better: start, let it run for ten to fifteen seconds, drive off promptly with little load, never press the throttle when starting, and release engine speed and load only once the oil is warm.

Short trips make the problem worse. If the oil does not reach around 90 degrees for at least a quarter of an hour, the fuel and condensation that have entered it do not evaporate. Two to four per cent of foreign matter in the oil is then possible, which lowers viscosity noticeably, by roughly one SAE grade. On a car that is only used occasionally for short distances, this state can be reached after a few thousand kilometres.

Seasonal use and standing time

Two damage patterns are directly linked to long periods of standing. If an injector drips, fuel runs into the cylinder, washes off the oil film and dilutes the oil. Usually a single injector is affected, and the first start after the break is then rough. The second pattern is rarer but catastrophic: over the winter, coolant gets into a combustion chamber through a leaking cylinder head gasket. On the first start in spring the engine fires briefly and stops dead, because the piston meets the incompressible liquid. The cylinder wall can break in the process.

Prevention costs nothing: before the winter break, mark the coolant level on the expansion tank with the engine cold and check it in spring before the first start. If coolant is missing without any visible external leak, the engine stays off until it has been checked. Anyone parking a car on a steep slope should park it nose down so that the oil can drain from the camshaft housings.

Mode of operation	Load on the cylinder wall	Recommendation
Accelerating in 3rd or 4th gear below 2,500 rpm	very high: maximum side force, thinnest oil film	change down, apply load only from medium engine speed
Full load with cold oil	very high: no load-bearing film, uneven expansion	release load only once oil is at operating temperature
Long warm-up while stationary	high: rich mixture washes film off, oil dilution	10 to 15 seconds, then drive with little load
Short trips under 15 minutes	medium to high: fuel and water in the oil	shorten oil change interval, regular long drives
Brisk driving when warm, high engine speed	low for the wall, higher for bearings and valve train	not critical with a healthy engine and fresh oil
Circuit use on semi-slicks	oil supply critical under long lateral acceleration	agree use with the engine builder, oil level exactly per on-board computer
Long standing time, seasonal use	risk of dripping injectors and hydraulic lock	mark coolant level, maintain battery, careful first start

1.1.6 Taking the edge off the temperature side: three measures

If pressure and lubrication at the wall are one side of the damage, temperature is the other. Here a lot can be achieved for little money. Three measures have proved themselves in practice. One of them costs nothing at all.

The 71 degree thermostat

The standard thermostat is rated at 83 degrees. Measurements from rebuild practice put the start of opening closer to 86 degrees and full opening only just below 100 degrees. More important than the value is where it is fitted. By design, the thermostat sits in the return line after the radiator, at the entry to the engine. It therefore measures water that has already cooled and reacts too late to a load peak in the engine. By the time it opens, the heat has long since arrived at bank 2.

The temperature gauge in the instrument cluster should not be relied on here. According to measurements from rebuild practice, it shows a lower temperature than the coolant in the engine actually has on average, because it registers a mixed temperature. The driver is therefore more likely to underestimate the situation. Chapter 1.8 explains the gauge in detail.

A thermostat with an opening temperature of 71 degrees takes out part of this inertia. It is not a tuning part but is catalogued as standard in the independent parts trade, for example Metzger 4006157 with seal, suitable for the 986, 987, 996 and 997. On 23 September 2026 it was listed by several dealers at around €40, against a recommended retail price of €49.90. Some suppliers charge many times that for a thermostat with the same opening temperature. A British specialist workshop measured the effect: engine temperature around 84 to 85 degrees instead of around 95 degrees, oil about ten degrees cooler, and the temperature difference between the banks fell from about five to 1.6 degrees. That is a workshop measurement, not a factory figure. Porsche itself never lowered the opening temperature on the M96 and M97, though it did on later Turbo and GT3 engines.

The third radiator in the nose

As standard, the 997.1 is cooled by two radiators ahead of the front wheels. Cars with Tiptronic S have a third, central radiator in the front bumper from the factory. According to dealer and workshop information, it is there in connection with the temperature control of the transmission fluid. For the X51 power kit, the price list includes an additional radiator, but only for the manual gearbox, because Tiptronic cars already have one. The Turbo, GT2 and GT3 of the series have their own cooling systems. A Carrera, Carrera S or Carrera 4S with manual gearbox and without X51, on the other hand, runs with two radiators.

It can be retrofitted. In the aftermarket the radiator is available, for example, as MAHLE CR 778 000S for around €96 (as of 23 September 2026; the original part 997.106.037.02 cost around €120 on the same day). Anyone planning this should allow for pipework, brackets and air ducting on top. The radiator alone is not enough. The Porsche retrofit kit comprises the radiator, brackets, front and rear air ducting and two hoses, and four pre-marked openings are cut out of the front bumper panel. According to workshop information, the labour time is around four hours.

Keeping the radiators clear: the cheapest life insurance

And the point that costs nothing: the two existing radiators sit behind the air-conditioning condensers and clog up there with leaves and dirt. This is what produces the classic rotted-out radiators and an engine that gets less air in heat and traffic jams. The damp leaves hold water and salt against the fins, the aluminium cores corrode from the outside, and condenser

and radiator start to leak. Clearing them once a year and a fine mesh grille in the nose are the cheapest life insurance there is for this engine.

To clean them you have to get at the cores, depending on the extent through the wheel arch liners or with the front bumper panel removed. Condenser and radiator can then be flushed from both sides with compressed air and low-pressure water. While you are there, you can see whether the fins are still intact. The layout of the cooling system, the water pump and the coolant lines are covered in chapter 1.8.

Measure	Parts (as of 23.09.2026)	Effort	Effect
71 degree thermostat	Metzger 4006157 with seal, around €40	low, drain and bleed coolant	earlier opening, lower and more even temperature
Third radiator (manual without X51)	MAHLE CR 778 000S around €96, plus brackets, air ducting, hoses	around four hours, front bumper panel is cut	more cooling surface in heat, traffic jams and under load
Clean radiators and condensers	none	once a year, remove nose or wheel arch liners	full cooling capacity, less corrosion
Fine mesh protective grille in the nose	grille of your choice	low	prevents renewed clogging

The preventive package for a healthy engine

In rebuild practice, a bundle of small measures has become established for engines without previous damage. None of them turns a 3.8 litre into a different engine. Together they lower temperature and wear and improve early detection.

Measure	Purpose	Note
71 degree thermostat	earlier opening, lower coolant temperature	see above
Fine mesh grilles in the air intakes	no leaves in front of condenser and radiator	clean once a year regardless
Third radiator (manual without X51)	more cooling surface	retrofit kit with air ducting
Modified radiator fan control	fans cut in earlier	to be carried out by a specialist, no factory approval exists
Fresh coolant, carefully bled	corrosion protection, no air pockets at hot spots	in practice changed every 50,000 km, vacuum filling
Magnetic oil drain plug	makes swarf visible	check at every oil change
Short oil change interval	lubrication, less dilution	see section 1.1.10
IMS bearing	replace small 6204 on early MY2005 with reinforced bearing, remove outer seal on the 6305	see section 1.1.7
Replace water pump as a precaution	maintain delivery rate	interval and design in chapter 1.8

For engines with high mileage, the recommendation from rebuild practice goes further. On an X51 with more than 100,000 kilometres on its first engine, this experience suggests damage should be expected soon; on a 355 PS 3.8 litre, a preventive rebuild is recommended from around 150,000 kilometres, before damage occurs. These are empirical values, not a forecast for the individual car. A clean borescope finding shifts the assessment but does not replace it.

Fact check: Thermostat and radiators

There is no Porsche factory approval for the 71 degree thermostat. It is a measure from specialist practice. The temperature reduction figures come from one workshop measurement, not from a test series on several cars.

Coolant must be bled carefully after every intervention. The highest point of the system is difficult to bleed, and air pockets at the hottest points of the engine create exactly the local overheating one wants to avoid. Specialist workshops therefore use vacuum filling.

Chapter 1.15 - The Targa: glass roof, rear window, mechanism and drains

From chapter 1.15 (10 sections): 1.15.3.

1.15.3 The opening rear window and the interlock logic

The rear window of the 997 Targa is made of toughened safety glass and opens as a hatch. It is released by a switch in the cockpit or via the remote key, and is then lifted by hand using an integrated handle. When closing, an electric soft-close pulls the glass the last part of the way into the lock. The hatch gives access to the luggage space behind the rear seats.

Roof and rear window are interlocked. According to the factory, the roof must be closed before the rear window can be opened, and the rear window must be closed before the roof can be operated. The reason lies in the geometry: the glass roof slides under the rear window. If the hatch were open, the roof would slide into empty space or collide with it.

This logic has a practical consequence for fault-finding. If a sensor tells the control unit that the roof is not fully closed, the rear window will not open, even though nothing on it is faulty. An owner of a 996 Targa describes exactly this case: the hatch did not respond because the glass roof was no longer running properly into its end position. Other owners name microswitches in the central lock, which report the open or closed state, as possible causes. The same principle of mutual interlock applies to the 997. Anyone faced with a rear window that will not open should therefore check the roof first.

Practical tip for investors

During the viewing, open the rear window once with the key and once with the switch, and let the soft-close shut it. It must pull in fully without being pressed. Then operate the roof. Also try once to operate the roof with the hatch open: it must not move.

A hatch that closes only with hand pressure points to a problem with the lock or soft-close. A hatch that will not open at all often points to the roof. Both should be resolved before purchase.

PART 2

The Buying Process

From the pre-purchase inspection to the first 3,000 kilometres

The Buying Process Model: Porsche 911 (997.1) Carrera, S, 4 and 4S · Coupé, Cabriolet and Targa

Chapter 2.1 - Pre-purchase inspection: the 997.1 test protocol

From chapter 2.1 (11 sections): 2.1.6.

2.1.6 Commissioning the engine finding correctly

The interpretation of the engine checks is set out in full in chapter 1.1.9. For the purchase, what counts is that they are ordered and documented correctly. "Endoscopy done, all fine" is not a finding. A usable report states the condition of the honing pattern for each of the six cylinders, identifies every mark by its position on the clock face, on bank 2 above all between ten and two o'clock, shows the piston crown and contains images or a video in which the cylinder number is recognisable. Tell the inspector in advance that this is exactly what you expect.

Endoscopy via the spark plug hole is the mandatory stage. It has a known limit: scoring that begins in the lower area of the bore is hard to see from above. The view from below onto cylinders 4 to 6, with the piston at top dead centre and the sump cover removed, closes this gap but takes considerably more time. Whether to commission it depends on the result of the first stage. Heavy carbon deposits on a piston crown, a single oily plug on bank 2, a darker left tailpipe or an abnormal oil finding are reasons to go further even without visible scoring from above. On a 3.8-litre or an X51 with high mileage and no documented engine work, the view from below is worth the investment even if everything looks clean from above.

Stage	Content	When
1 Mandatory	Spark plug pattern, endoscopy via plug hole, oil sample, overrev, camshaft deviation	On every 997.1
2 Suspicion	Endoscopy from below cylinders 4 to 6, leak-down per cylinder	Abnormality in stage 1, 3.8-litre or X51 with high mileage
3 Second opinion	Finding images to an engine rebuilder for M96 and M97	Unclear marks, high purchase price, conditional purchase

The leak-down test supplements endoscopy; it does not replace it. It pressurises each cylinder at top dead centre with compressed air via the plug hole and measures how much escapes. In workshop practice around 10 to 15 per cent is considered good, and up to about 20 per cent on older engines with high mileage. More telling than the absolute value is the comparison of the six cylinders and the place where the air escapes: if you hear it at the crankcase ventilation, the loss is at the rings and bore; in the intake or exhaust, at the valves; in the cooling system, at the head gasket or cylinder.

Fact check: Overrev count

The overrev memory counts ignitions per engine speed range and stores the operating hour of the last event (chapter 1.1.9). How exactly the count on the 997.1 converts into a duration is not documented in any Porsche document available to us. Conversions found in forums are therefore approximations.

For the valuation the operating hour is sufficient. When reading out the memory, note the control unit's current operating hour. If an entry in range 5 or 6 lies only a few hours back, it is fresh, and the engine has had no time to show consequential damage.

PART 4

The Anatomy of Value

What actually determines the price of this model

The Anatomy of Value Model: Porsche 911 (997.1) Carrera, S, 4 and 4S · Coupé, Cabriolet and Targa

Chapter 4.1 - Which equipment dictates the price

From chapter 4.1 (11 sections): introduction, 4.1.3 and 4.1.6.

The price has an anatomy

Two black 2006 Carrera S Coupés, each with around 90,000 kilometres, can be €14,000 apart, and the equipment list seldom explains much of that. The question of which equipment determines the price of a 997.1 therefore has an uncomfortable answer: less than sellers believe, and differently from what the new-car price list suggests.

This chapter breaks the market price down into its components. It is based on 1,186 offers recorded as sold (last asking price at market exit) and 1,426 currently listed offers from 911FINDER Market Monitoring and Analytics (MarqueScope). Where raw figures are given, they are taken from the key figures of this analysis. Where the question is which feature is worth how much, raw figures are not enough, because a Carrera 4S Cabriolet with manual gearbox differs from a Carrera Coupé with Tiptronic in five respects at once. For these questions we recalculated the data ourselves. The method is given in each case. The option list with codes and new prices is in chapter 3.2, the market situation with all charts in chapter 5.1.

4.1.3 Manual versus Tiptronic S: the most expensive single decision

No other single feature shifts the price of a 997.1 as much as the gearbox. According to 911FINDER Market Monitoring and Analytics (MarqueScope), the median of sold cars is €59,900 for the manual (n = 724) and €52,925 for the Tiptronic S (n = 442). That is a gap of €6,975. Part of it is mix: Tiptronic cars have a median mileage of 107,625 kilometres, manuals 92,000, and there are fewer Carrera S among the Tiptronic cars. Removing variant, body style, mileage and year of registration leaves around €6,000 or 9.8 per cent. For currently listed offers it is around €5,200 or 7.9 per cent.

The discount holds up. It appears in every sufficiently large group by variant and body style and in every mileage band from 50,000 to 200,000 kilometres, where it amounts to €4,490 to €4,915 in the median.

Group (sold)	n manual	Median manual	n Tiptronic S	Median Tiptronic S	Gap
Carrera Coupé	80	€51,700	54	€47,000	€4,700
Carrera 4 Coupé	32	€51,249	31	€49,990	€1,259
Carrera S Coupé	162	€59,900	70	€48,650	€11,250
Carrera S Cabriolet	106	€59,970	48	€50,450	€9,520
Carrera 4S Coupé	109	€65,000	79	€56,911	€8,089
Carrera 4S Cabriolet	117	€65,000	95	€58,950	€6,050

Own analysis based on 911FINDER Market Monitoring and Analytics (MarqueScope), medians of the last asking price of sold cars. Groups with fewer than 30 cars per gearbox are given no price statement. Carrera Cabriolet, Carrera 4 Cabriolet and Targa are therefore not listed.

The gap is largest on the Carrera S Coupé, a good €11,000 in the median. This is the variant that drivers most often seek as a sports car in the narrower sense, and it is there that the Tiptronic is penalised most heavily. On the Carrera 4 Coupé the gap is small. Anyone buying an all-wheel-drive 911 with the 3.6-litre anyway evidently asks less about the gearbox.

The irony lies in the price list. The Tiptronic S cost €2,945.25 extra. Today it costs its owner roughly twice that on sale, with the sign reversed. The technical reasons are in chapter 1.2: five gears instead of six with bigger jumps in engine speed, a torque converter automatic, expensive repairs, often neglected oil changes. The buyer base weighs more heavily. Anyone looking for a 997.1 as a driver's car in 2026 is usually looking for a manual gearbox.

For a buyer who mainly wants to tour, the Tiptronic S is a discount of around €6,000 on the same body and the same engine. For an investor, it is a feature that narrows the circle of future buyers. A Tiptronic at a manual price is too expensive in both cases.

4.1.6 The leather interior: the value driver no database records

Of all the 997.1's equipment, one item has the greatest effect on the interior and the least visibility in the data: the leather interior. It appears in no structured field, and the word the trade uses for it means three different things. Anyone wanting to measure its value must therefore first clarify what is being discussed, and then read the listing texts themselves.

Three levels of leather and one trade term

The price list from August 2007 grades the leather in levels (chapters 1.10 and 3.2). Standard on every 997.1 is partial leather: steering wheel rim, seat centre panels and front seat bolsters, front head restraints, plus some handles and lids. The leather seat package for €1,350.65 covers the seats completely. Only the leather interior, at €2,820.30 in a standard colour, €3,189.20 in a special colour or two-tone, €4,010.30 in natural leather and €4,313.75 in a custom colour, covers the interior: A, B and C-pillars, dashboard with airbag cover and

instrument cowl, door panels and the rear side panels. This is what the trade calls "Volllederausstattung" (full leather interior) or "erweiterte Lederausstattung" (extended leather interior), in French "cuir étendu", in Dutch "volledig lederen interieur".

In listings that reproduce the vehicle data card, it appears as number 981, described as dashboard and door panels in leather or as extended leather interior. The price list itself gives no number for the leather interior, only "Code". The assignment of 981 therefore comes from listings, not from a factory document. The trade term "Vollleder" (full leather), on the other hand, covers everything beyond partial leather, and often not even that: in the structured data of the listings it appears as a selection field for around half of all 997.1s, although according to the text analysis the leather interior is considerably rarer. The field therefore measures nothing.

How we identified the leather interior in the texts

Because no data field carries the leather interior, we searched the description texts of all 2,612 analysed listings for unambiguous wording, in German, French, Dutch, Italian and English. A text counts as unambiguous if it expressly names the leather interior ("erweiterte Lederausstattung", "Volllederausstattung", "cuir étendu", "pelle estesa", "extended leather"), mentions leather on the dashboard, names data card number 981 with leather, or names one of the leather interiors in natural leather or two-tone. A text counts as non-specific if it only says "Vollleder", "Lederausstattung" without qualification, or "volledig leder". These words stand for the leather interior just as much as for a leather seat package. We read a sample of fifteen unambiguous hits by hand; all of them did indeed describe leather-covered dashboards or door panels.

Mention in listing text	Sold n	Share	Median sold	Listed n	Share	Median currently listed
Leather interior unambiguous	190	16.0%	€58,970	194	13.6%	€57,900
Leather non-specific ("Vollleder" etc.)	185	15.6%	€59,900	251	17.6%	€59,500
only leather seats mentioned	21	1.8%	€51,990	28	2.0%	€59,400
no reference to leather	790	66.6%	€56,900	953	66.8%	€56,000

Source: own text analysis based on 911FINDER Market Monitoring and Analytics (MarqueScope), as of 23 September 2026, sold n = 1,186, currently listed n = 1,426; prices as last asking price at market exit or current asking price respectively.

Why the leather interior stays invisible in the standard calculation

If the leather interior is calculated in the same way as the other options in section 4.1.5, that is adjusted for variant, body style, gearbox, mileage and year of registration, its effect disappears almost completely: around zero per cent for the sold cars, minus 0.6 per cent for the currently

listed cars. That would be a false conclusion. The leather interior is documented most often in the countries with the most thorough culture of description, and least often where prices are highest. It appears in 30.1 per cent of French listings of sold cars, 25.2 per cent of Dutch, 15.5 per cent of German and 4.1 per cent of Italian ones. Italy has the highest price level with a median of €63,900, France is at €54,900, Germany at €52,900. Without accounting for location, the calculation mixes the value of the leather with the price gradient between countries. Figure 7 in chapter 5.1 shows both side by side.

With the country of location as an additional variable, the effect emerges. For the sold cars, the adjusted premium for an unambiguously documented leather interior is 3.6 per cent (95 per cent band plus 1.2 to plus 6.1 per cent), around €1,560. On the German market alone, where the price gradient between countries plays no role, it is 7.3 per cent (band plus 1.7 to plus 13.1 per cent), around €3,410, with 55 cars with an unambiguous leather interior among 354 sold. That is above the original extra cost of €2,820.30 in a standard colour. The currently listed offers show the same direction, but not with statistical certainty: plus €1,690 in Germany with an uncertainty of around €1,350.

Calculation (sold)	n	Unambiguous leather interior	95% band	Non-specific "Vollleder"
without country of location (as in 4.1.5)	1,166	0.0%	not significant	plus 1.9%
with country of location, all countries	1,166	plus 3.6% (around €1,560)	plus 1.2 to plus 6.1%	plus 2.5%
Germany only	354	plus 7.3% (around €3,410)	plus 1.7 to plus 13.1%	plus 3.3% (not significant)

Method: regression of the log price on variant, body style, gearbox, mileage, year of registration, leather level and, where stated, country of location; reference group "no reference to leather"; euro values from the same calculation with non-log price. Own analysis based on 911FINDER Market Monitoring and Analytics (MarqueScope).

Insider knowledge

The measured premiums are a lower bound. The group "no reference to leather" inevitably contains cars with a leather interior whose sellers did not mention it. This misclassification pulls the measured difference towards zero. The true value of a documented leather interior is therefore more likely to be above the 3.6 and 7.3 per cent than below.

The market pays only for what it sees. A seller with a leather interior who does not describe it in the listing is giving money away. A buyer who spots it on the data label or on the dashboard although the listing is silent has a negotiating advantage, because the asking price often does not include it.

How to recognise it

The check takes a minute and needs no tools (chapter 1.10). If the upper dashboard with instrument cowl and the door panels are covered in leather with visible stitching, the car has the leather interior. If the dashboard is finished in soft-touch paint and only the seats are in leather, it is at most a leather seat package, whatever the listing says. The proof is the vehicle data label (chapter 2.2). Natural leather (998) and two-tone (970) are variants of the leather interior and therefore automatically the comprehensive level. For natural leather, the sample of 13 sold and 14 currently listed cars is too small for a separate price statement.

Practical tip for investors

In a valuation, treat the leather interior as an item of its own, not as part of the "options". On the German market, according to our data, a leather interior documented on the data label justifies a premium in the order of €3,000 to €3,500 over an otherwise identical car; across Europe it is more like €1,500.

Conversely, "Vollleder" in the listing without a leather-covered dashboard is no reason for a premium. Ask for a photo of the dashboard before discussing the price.

PART 5

The Investor Dossier

Market data, charts, scenarios and a worked example

The Investor Dossier Model: Porsche 911 (997.1) Carrera, S, 4 and 4S · Coupé, Cabriolet and Targa

Chapter 5.1 - Market data, scenarios and return calculation

From chapter 5.1 (10 sections): introduction, 5.1.4, 5.1.9 and 5.1.10. Figures 1 and 7 appear in the book in sections 5.1.2 and 5.1.7.

What this chapter provides and what it does not

In the end an investor asks three questions: what is the car worth in the market, what does that value depend on, and what is left after a few years of ownership? The answers are based on 2,612 analysed cars, eight charts and a sample calculation with disclosed assumptions.

Two limits apply to everything that follows. The prices recorded are asking prices; for the sold cars, the last price before the listing disappeared, not the amount in the sales contract. And the data are a cross-section of the market between autumn 2025 and September 2026. No price development over years can be read from them. Anyone looking for a curve showing where the 997.1 is heading, up or down, will instead find three scenarios, expressly labelled as such, and a calculation of what each of them means for the owner. This is not investment advice. The decision remains with the reader.

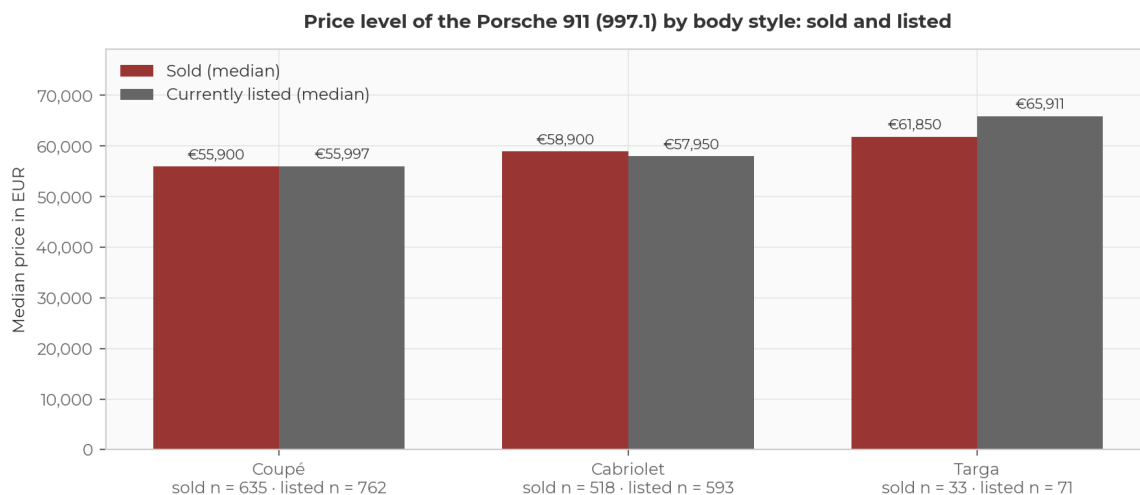


Figure 1: Median last asking price of sold cars and median of currently listed offers by body style, with case numbers.
Source: 911FINDER (MarqueScope).

5.1.4 The adjusted calculation: what really counts

Simple medians mix everything with everything. Anyone who attributes the difference between manual and Tiptronic to the gearbox also attributes to it differences in variant, age and mileage. To separate the influences, we analysed the data from 911FINDER Market Monitoring and Analytics (MarqueScope) ourselves: with a linear regression of the last asking price on mileage, variant, body style, gearbox and year of first registration simultaneously. It includes 1,166 sold cars for which all five features are available. The reference point is a Carrera Coupé with manual gearbox.

Feature	Influence on price (adjusted)	Standard error	Simple median comparison for reference
per 10,000 km more	minus €1,422	€61	minus €1,652 (simple regression)
Carrera S instead of Carrera	plus €5,996	€745	plus €8,353
Carrera 4 instead of Carrera	plus €2,117	€991	plus €2,948
Carrera 4S instead of Carrera	plus €9,802	€765	plus €10,903
Cabriolet instead of Coupé	plus €369	€536	plus €3,000
Targa instead of Coupé	plus €6,533	€1,651	plus €5,950
Tiptronic S instead of manual gearbox	minus €5,999	€547	minus €6,975
per year of first registration younger	plus €877	€253	not comparable

Source: own analysis of the data from 911FINDER Market Monitoring and Analytics (MarqueScope), $n = 1,166$, coefficient of determination $r^2 = 0.49$. The median comparisons are taken from the same data without adjustment. Standard errors rounded.

The calculation explains just under half of the price variance, around one and a half times as much as mileage alone. For investors, four results count.

First, the Cabriolet premium disappears. With the same variant, gearbox, year and mileage, Coupé and Cabriolet are only €369 apart in the market, with a standard error of €536. Statistically, that is no difference. The €3,000 from Figure 1 arises almost entirely from the composition, above all from the higher share of 4S models among the Cabriolets. This is the adjusted answer to the question left open in chapter 2.3.3.

Second, the gearbox gap remains. Around €6,000 separates Tiptronic S and manual gearbox even after adjustment, about a seventh less than in the simple comparison. That corresponds to around 42,000 kilometres of mileage. New, the Tiptronic S cost a surcharge of €2,945.25; today it counts in the market as a discount of around twice that.

Third, the engine is worth more than all-wheel drive: around €6,000 from Carrera to Carrera S, around €2,100 to Carrera 4, and for the 4S the two add up almost exactly to the measured €9,800. New, the S with its additional equipment cost a surcharge of €10,710 and all-wheel drive €6,307.

Fourth, the build year is a weak lever: after adjustment, around €900 per younger year of first registration. In the simple comparison, the 2004 and 2008 model years are around €10,000 apart, but most of this is mileage and variant, because the younger cars have covered fewer kilometres and are more often all-wheel-drive models, which were only available from autumn 2005. The €900 describes the gap between model years on the same reference date. It does not say how much a car loses when it becomes a year older. That would require a time series.

The variance that remains

The other half lies in features that no listing captures cleanly: engine condition, history, accident-free status, paint, equipment, colour and the seller's price expectation. The standard error of the estimate is around €8,800. Half of the sold cars lay between 8.6 per cent below and 7.4 per cent above the model value, one in ten more than 15.6 per cent above it. With a model value of €57,900, this middle half corresponds to a range of around €52,900 to €62,200.

Insider knowledge

For the investor, this residual range matters more than any scenario calculation. Between buying ten per cent below and ten per cent above the model value there is around €11,600 on a typical Carrera S. That is more than the sideways scenario in section 5.1.9 costs in value over five years.

The residual range mainly reflects the price of condition and documentation. Which findings are worth how much is shown in chapters 2.4 and 4.1.

Leather interior: why the country of listing decides the result

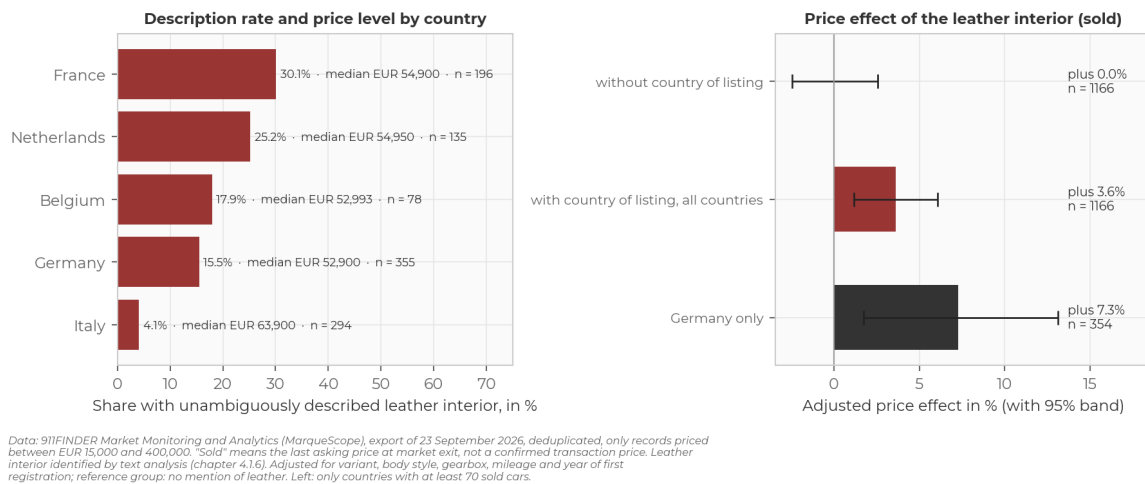


Figure 7: Leather interior. Left, share of sold cars with a clearly described leather interior and median price by country; right, adjusted price effect with 95 per cent band, without and with country of listing and for Germany only. Source: 911FINDER (MarqueScope), own text analysis.

5.1.9 Three scenarios for five years

The following scenarios are not a forecast. They calculate three conceivable developments of the market level over five years for a specific car. The percentages are set, not derived from the data. Only the mileage effect from section 5.1.4 is derived: around €1,422 per 10,000 kilometres.

The example car is the same as in chapter 2.5.11: a Carrera S Coupé with manual gearbox, bought at the median of €57,900, driven in the enthusiast profile with 6,000 kilometres a year. The 30,000 kilometres in five years cost around €4,270, regardless of which way the market moves.

Scenario A, erosion: the market level falls by 15 per cent in nominal terms over five years. Conceivable drivers: supply exceeding demand, as the turnover figures for some variants in chapter 2.3.2 suggest, rising mileages in the stock, continuing concern about the engines of the M96 and M97 family, or an interest rate environment in which enthusiast cars are less in demand.

Scenario B, sideways: the market level remains the same in nominal terms; the car loses only its mileage deduction. In real terms, after inflation, this too is a loss of value.

Scenario C, collector surge: the market level rises by 25 per cent in nominal terms over five years. Conceivable drivers are the shrinking number of well-preserved manual cars, reaching the 20-year threshold from which some youngtimer insurance tariffs are open to all model years (chapter 2.5), and its status as the last Carrera generation with manifold injection before the switch to direct injection in the 997.2. The H-Kennzeichen (German historic-vehicle registration) does not fall within this period: it is possible from 2034 at the earliest, and for the last cars only in 2039.

Scenario (assumption)	Market level	Value after 5 years	Change in value	Holding costs 5 years	Result for the owner
A: erosion	minus 15%	around €45,590	minus €12,311	€49,546	minus €61,857
B: sideways	unchanged	around €53,630	minus €4,266	€49,546	minus €53,812
C: collector surge	plus 25%	around €67,040	plus €9,142	€49,546	minus €40,404

Calculation: purchase price €57,900 minus mileage effect €4,266, multiplied by the factor for the market level. Holding costs from chapter 2.5.11, enthusiast profile over five years including forgone interest of 3 per cent on the purchase price. Not included are the costs of resale, such as listings, detailing or a dealer's margin on a trade-in.

Even in the most favourable scenario the owner pays around €40,400 for five years of use, around €673 a month; in the sideways scenario around €897, in the erosion scenario around €1,031. Between the best and worst case there are around €21,500, less than half the holding costs. The market level decides the size of the bill, not whether there is one.

5.1.10 The return calculation as an example

Turned around, the question of return is: by how much would the value have to rise for the holding costs to be covered? For the enthusiast, the car would have to fetch €107,446 after five years, purchase price plus holding costs. That is 85.6 per cent more than the purchase price, an annual average of 13.2 per cent. Including the mileage effect, the market level would practically have to double. Without the forgone interest, with only the expenditure of €40,861, it is still 11.3 per cent a year.

For the collector with 2,000 kilometres a year and holding costs of €40,186 (chapter 2.5.11), the results in the three scenarios are around minus €50,080, minus €41,608 and minus €27,488. To cover his costs, the value would have to rise by 69.4 per cent, an annual average of 11.1 per cent. He drives more cheaply, but not cheaply, and bears the risks of standing still from chapters 1.1.5 and 1.1.2. These data do not show an increase in value of more than 11 per cent a year over five years, but they cannot rule it out either. Anyone betting on it is speculating.

Where the return actually arises

Three levers work more reliably than any assumption about the market level. The first is the purchase price. Anyone who buys 10 per cent below the model value saves around €5,800 on €57,900, on the day of purchase. According to section 5.1.5, such cars are sold after a median of 13.5 days; the advantage belongs to the prepared buyer.

The second is the gearbox. The Tiptronic S discount of around €6,000 applies on purchase and on sale. The manual gearbox does not guarantee an increase in value, but according to the US estimates in section 5.1.8 it is the feature that a collector market can reward most strongly.

The third is the engine. With engine damage, the holding costs in the same calculation rise to €67,046 (chapter 2.5.11), on the assumption that a professionally rebuilt engine holds its value. The borescope inspection before purchase (chapters 1.1.9 and 2.1) is therefore the expenditure with the greatest effect on return in the whole undertaking: it prevents a known defect from being bought at market price.

Practical tip for investors

Calculate your own case with the same building blocks: purchase price, driving profile, holding costs according to chapter 2.5, around €1,400 per 10,000 kilometres. Set a bad, a neutral and a good value for the market level. If you cannot live with the bad one, the car is too expensive or the budget too tight.

Establish the model value of the car you want before the viewing, using the table in section 5.1.4. More than 10 per cent above it needs evidence; more than 10 per cent below it needs quick action and a thorough inspection.

What else is in the book

Eleven of 253 sections and three chapter introductions: that is the extent of this sample. In the engine chapter, the temperature measures are followed by the intermediate shaft, the health check before purchase, the oil question, the cost of a rebuild and a calculation that puts the engine risk in euros. Gearbox, chassis, brakes, body, electronics, cooling, exhaust, interior and all-wheel drive each have a chapter of their own with weak points, inspection points and costs. Cabriolet and Targa get two more, covering soft top and hydraulics, glass roof and drains.

The buying process opens with the complete protocol for the pre-purchase inspection. After that come history, chassis, engine and gearbox numbers, market research and price negotiation, finance and insurance, the sales contract and statutory warranty. The last chapter of this part covers the first 3,000 kilometres after handover. The book reads the factory brochure and price list option by option, asking which codes still count today. The investor dossier holds all eight charts, the regional differences, time on market and listing age, and where the 997.1 sits next to other Porsche model series.

Availability

The full edition is available from [911finder.de](https://www.911finder.de).