

# Flat Sixy: The Evolution of Porsche 911 Engine Size, Technology, and Output in the U.S.

Car & Driver

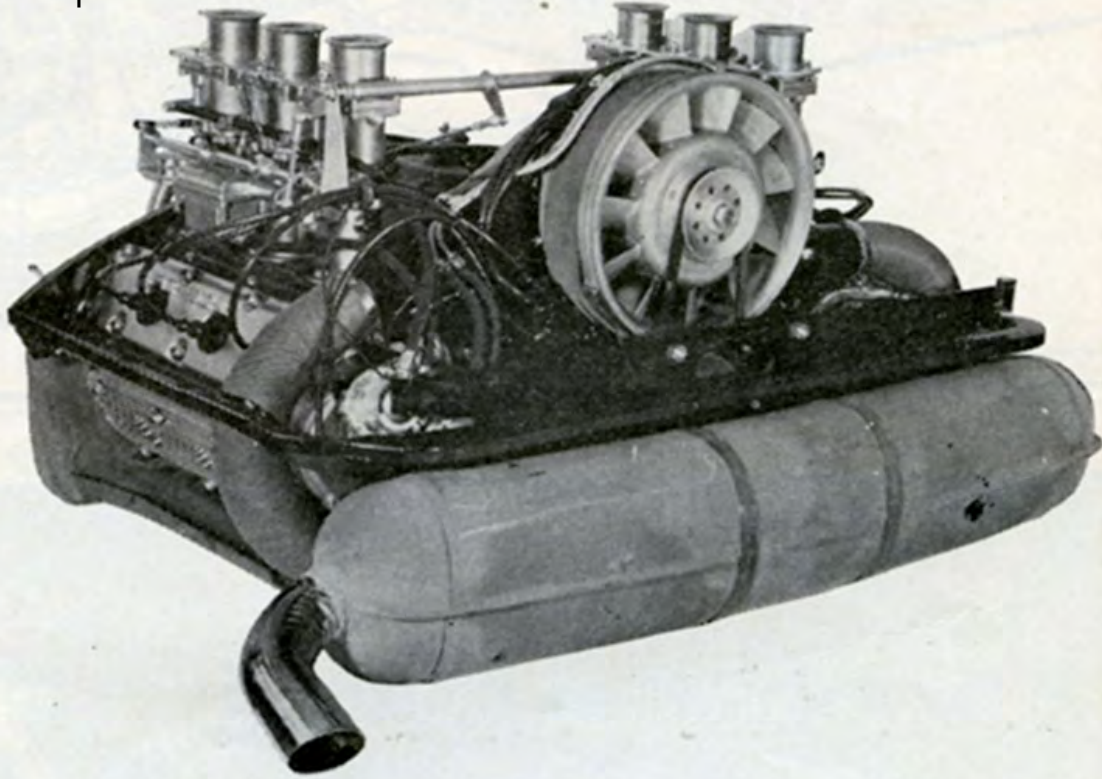
December 13, 2013 by Alexander Stoklosa



Someone once said that “a powerful rear end is a vitally important thing to possess,” and we’d be inclined to agree if that quote weren’t entirely made up. Still, the wizards at Porsche must live by a similar mantra. For more than 50 years, engineers in Stuttgart have been extracting greater and greater levels of power out of the 911’s signature rear-mounted flat-six engine. This despite the dynamic spookiness that stemmed from all that mass hanging out behind the rear axle, which used to reward cowardly drivers—don’t lift!—with some of history’s least-intentional drifts.

In 1964, the 911’s six displaced 2.0 liters and was air-cooled, but over the years it has gone up and down in displacement, strapped on a turbo or two, and—*gasp!*—incorporated a water jacket for cooling. As part of our celebration of the 911’s 50th anniversary, we’ve laid out a quick history of the iconic sports car’s engine size, technology, and output evolution as it relates to the U.S.

## 1964—1989 | 911 Classic Generation



**1965 Porsche 911 2.0-liter flat-6 engine**

**1964:** The 911 enters production with a 2.0-liter, air-cooled SOHC flat-six making 148 horsepower and 140 lb-ft of torque.

**1967:** Porsche adds the sportier 911S to the range with a modified 2.0-liter making 180 horsepower and 144 lb-ft of torque. A higher compression ratio, as well as changes to spark and cam timing and the carburetors, contribute to the added power.

**1968:** The 911S is pulled from the U.S. market thanks to stricter emissions standards; the base model is rechristened 911L and gets no engine changes.

**1969:** Porsche brings back the 911S, now with an emissions-compliant Bosch fuel-injection setup shared with the mid-level 911E. All 911 engines switch from aluminum blocks to magnesium, and power rises to 125 ponies and 131 lb-ft of torque on the 911T, 158 horsepower and 145 lb-ft on the 911E, and 190 horsepower and 152 lb-ft on the 911S. The 911T continues to use Weber carburetors.

**1970:** A new 2.2-liter flat-six is dropped into the 911T, 911E, and 911S; the block is again magnesium and the

basic aluminum head design is shared across the range. Output rises to 142 horsepower and 148 lb-ft of torque in the 911T, 175 horsepower and 160 lb-ft in the 911E, and 200 ponies and 164 lb-ft in the 911S.

**1972:** North American emissions requirements again force change, this time to a lower compression ratio; Porsche ups the flat-six's displacement to 2.4 liters to make up for the lost power. All 911s are now fuel-injected, netting the 911T 157 horsepower and 166 lb-ft of torque. Output in the 911E swells to 185 horsepower and 174 lb-ft, while the 911S delivers 210 horsepower and 181 lb-ft.

**1973:** Porsche introduces the Carrera RS 2.7, a homologation special that isn't officially imported to the U.S. It utilizes a racing-spec 2.7-liter flat-six, but as a result of horsepower ratings switching from SAE gross to SAE net, the RS officially makes "just" 200 horsepower and 188 lb-ft of torque. Regular 911 models see an on-paper reduction in output, with no mechanical changes save for the fitment of Bosch K-Jetronic electronic fuel injection to the 911T.



**1974:** All 911s get the RS 2.7's 2.7-liter flat-six with K-Jetronic fuel injection, and the 911T and 911E model designations make way for 911, 911S, and Carrera. Output inches up from its emissions-choked backpedal in 1973, but even with more displacement, the 911 makes just 143 horsepower and 168 lb-ft of torque. The 911S and Carrera pack a more-palatable 167 horsepower and 168 lb-ft.

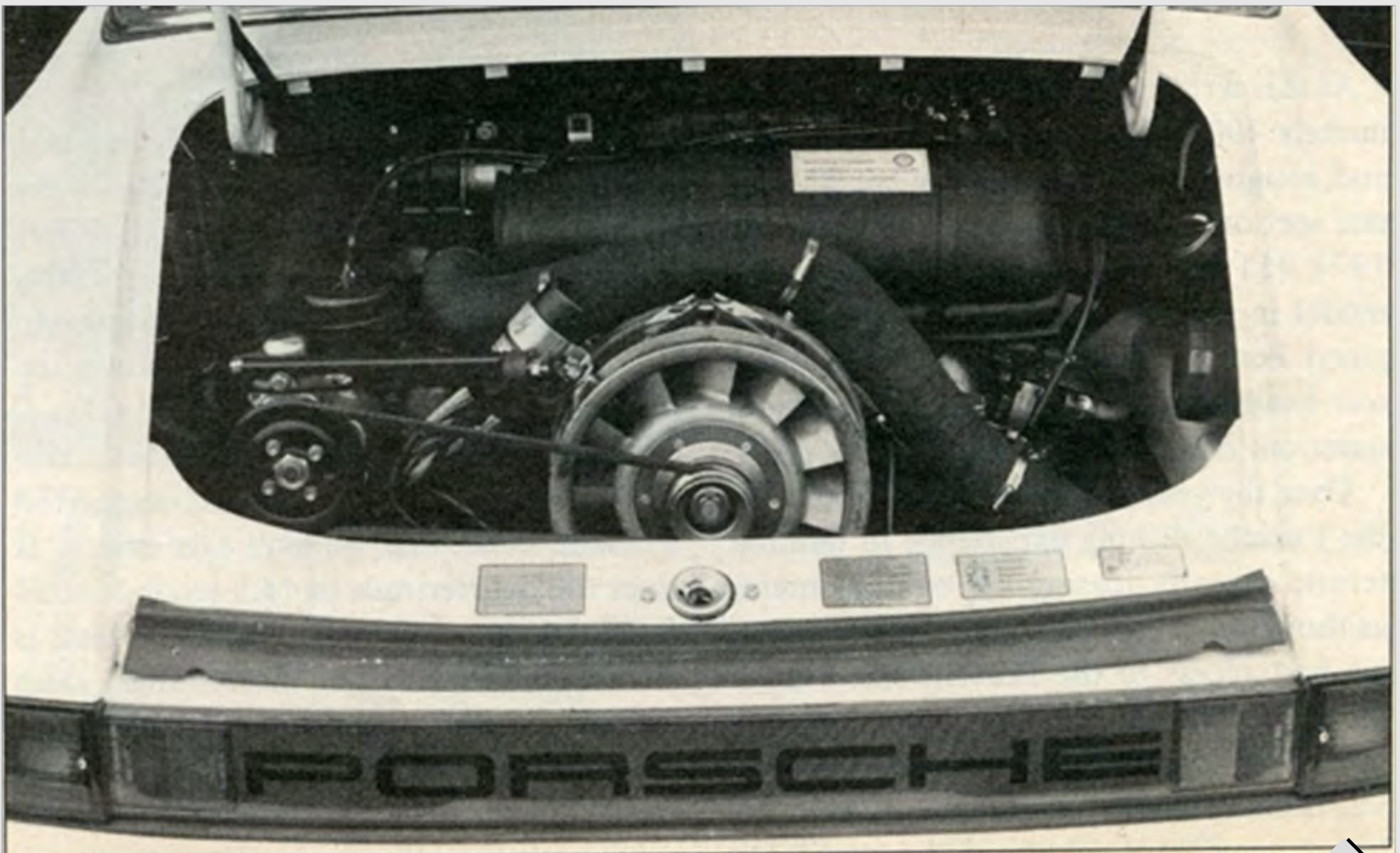
**1975:** More emissions restrictions push output ratings down further, and the base 911 goes on hiatus. The 911S and Carrera produce a meager 157 horsepower and 166 lb-ft—in California the horsepower figure is even lower.

**1976:** Enthusiasts welcome the Turbo to the 911 family. A KKK turbocharger fitted to the 2.7-liter flat-six boosts output to a healthy 234 horsepower and 246 lb-ft of torque, a huge improvement over the 911S's carry-over engine. The hand throttle between the 911's front

seats (essentially an idle-speed adjuster to ease cold starting) disappears. It is rendered obsolete by the fuel-injection system's new vacuum-operated warm-up regulator.

**1978:** A new, aluminum-block 3.0-liter flat-six replaces the 2.7-liter magnesium-cased unit. The 911SC—equivalent to the previous year's 911S—makes 180 horsepower and 187 lb-ft of torque. Thanks to an air-to-air intercooler, the Turbo moves further up the insanity ladder, producing an epic 265 horsepower and 290 lb-ft; turbo lag remains an issue.

**1980:** Those pesky emissions rules catch back up to Porsche, necessitating the Turbo take a vacation from the U.S. market. The 911SC continues unchanged, but with the 3.0-liter now uniform across the U.S., there are no differences between the California car and those sold elsewhere. Output lowers to '78 California car levels: 172 horsepower and 189 lb-ft of torque.



**1978 Porsche 911 3.0-liter flat-6 engine**

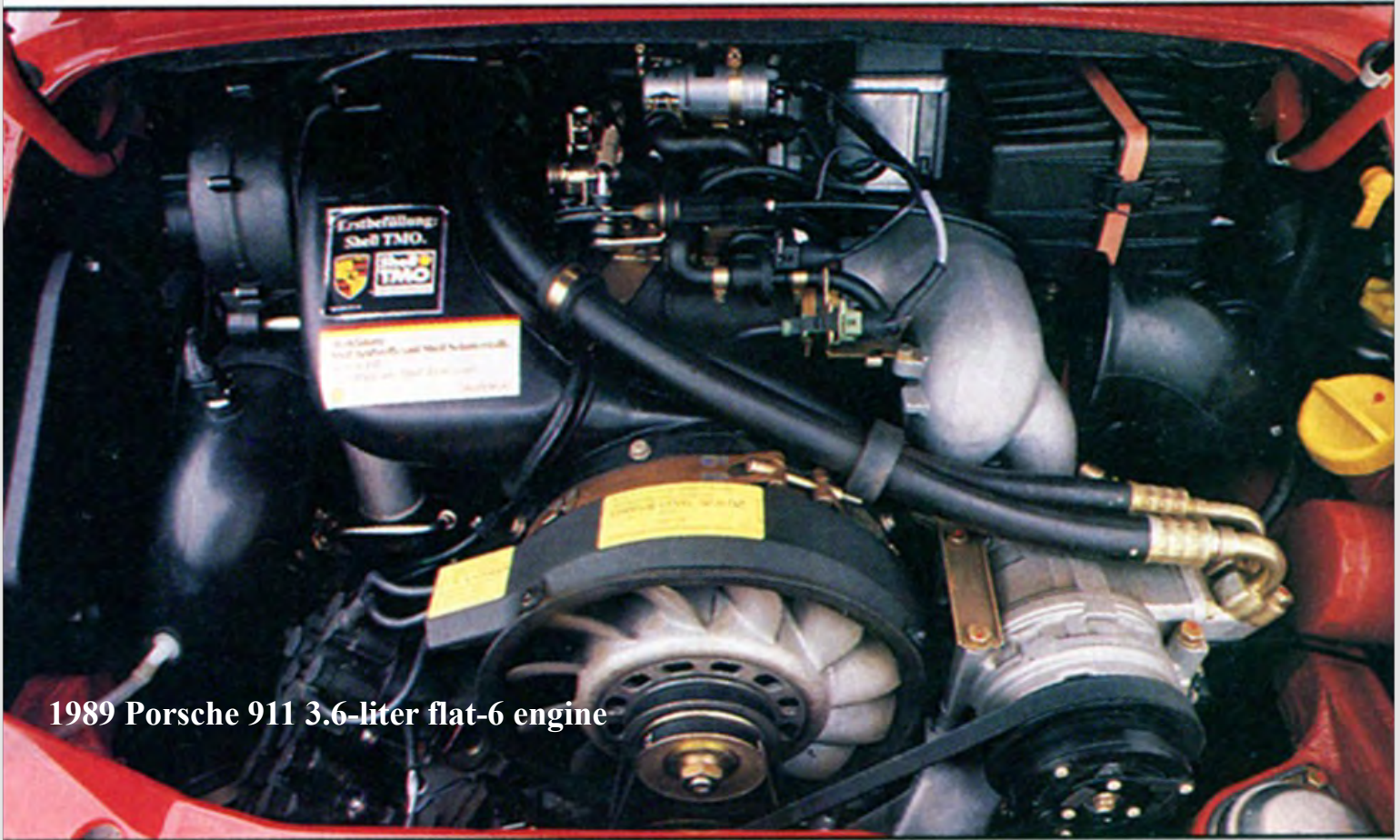
**1984:** The 911SC designation gives way to Carrera with the introduction of a new 3.2-liter flat-six. Still a SOHC engine, the 3.2-liter switches from Bosch's K-Jetronic fuel injection to the more modern Motronic system. Horsepower rises from 172 horsepower to a solid 200, but torque drops by 4 lb-ft from the 189 lb-ft of the previous year's 3.0-liter.

**1986:** The Turbo returns! This time, it's powered by a

282-hp, 3.3-liter flat-six. The Turbo's signature widow-making, boost-dependent dollop of mid-range torque checks in at 278 lb-ft.

**1987:** Changes to the 911 Carrera's Bosch fuel-injection system bumps the 3.2-liter's output to 217 horsepower and 195 lb-ft of torque. This necessitates the switch from the 911's long-running five-speed manual to a stronger Getrag unit.

## 1989—1994 | 964 Generation



1989 Porsche 911 3.6-liter flat-6 engine

**1989–90:** The C4 911 debuts with a much larger engine, a 3.6-liter flat-six that's still all-aluminum. Predictably, power rises. The base Carrera 2 now makes 247 horsepower and 228 lb-ft of torque. The new all-wheel-drive Carrera 4 is slightly heavier, but its 3.6-liter engine is identical to the rear-drive 911's.

**1991:** The Turbo returns in the new C4 body style, but keeps the old 3.3-liter. A larger turbocharger and intercooler push output to 315 horsepower and 332 lb-ft of torque.

**1992:** A limited-production Turbo S, dubbed S2 here in the States, benefits from a revised fuel-injection computer. This gives it an advantage of 7 horsepower and 38 lb-ft of torque over the regular Turbo.

**1994:** Porsche swaps the Turbo's old 3.3-liter six with a new 3.6-liter unit, keeping the turbo and intercooler from the outgoing car. Output jumps by a substantial 40 horsepower and 52 lb-ft of torque.



## 1995—1998 | 993 Generation



1994 Porsche 911 Turbo turbocharged 3.6-liter flat-6 engine

**1995:** The 3.6-liter flat-six gets hydraulic valve lifters and lighter internals, netting an extra 23 horsepower and 15 lb-ft of torque. There is no Turbo for 1995, but it would soon return.

**1996:** A new variable-geometry intake dubbed Vario-ram boosts output to 282 horsepower and 250 lb-ft of torque. The Turbo is reintroduced in the 993 body style, with twin turbochargers and dual intercoolers strapped to the 3.6-liter six. Porsche reigns in the Turbo's 400 horsepower and 400 lb-ft of torque with standard all-wheel drive.

**1997:** The Turbo is rejoined by a limited-edition Turbo S, which piles on an additional 24 horsepower thanks to increased turbo boost pressure. It is wicked expensive, costing \$150,000 at the time.

## 1999—2005 | 996 Generation



**1999:** The 911's flat-six receives its most radical update ever: It switches from an air-cooled design to a water-cooled setup. Engine displacement shrinks to 3.4 liters, but a bevy of added technology brings output up to 296 horsepower and 258 lb-ft of torque. For the first time, dual overhead camshafts operating four valves per cylinder are used, and Porsche even throws in Variocam, a new two-stage variable intake valve timing system.

**2001:** Porsche introduces the 996 Turbo, which is powered by a twin-turbocharged 3.6-liter flat-six derived from its GT1 race car. It, too, is cooled via water and features Variocam tech, and produces an impressive 415 horsepower and 413 lb-ft of torque.

**2002:** The six in base 911 Carrera and Carrera 4 models grows yet again, now displacing the same 3.6 liters as

the 993 model's air-cooled unit. Output swells to 320 horsepower and 273 lb-ft of torque. A new, Turbo-derived GT2 is introduced and lays a smack-down on the 415-hp Turbo with 456 horsepower and 457 lb-ft of twist. The huge power gain comes thanks to an additional 2.2 psi of boost pressure, for a total of 14.5 psi.

**2004:** The previously not-for-U.S. GT3 is brought over to the States. Essentially a naturally aspirated GT2, the GT3's 3.6-liter "Mezger" flat-six is borrowed from the RSR race car and utilizes the same construction as the GT2 and Turbo that allows for cylinder removal. The internals are also lighter, with titanium connecting rods, shorter pistons, and shorter hydraulic valve tappets. The GT3 is the highest-revving 911, with an 8200-rpm red-line; its 380 horsepower peaks at 7400 rpm, and all 284 lb-ft of torque is available at 5000.



## 2005—2012 | 997 Generation



**2005 Porsche Carrera S 3.8-liter flat-6 engine**

**2005:** Base 911s keep their 3.6-liter flat-sixes and output barely changes relative to the outgoing car, with output totals of 321 horsepower and 273 lb-ft of torque. The bigger improvements come from the Carrera S, which utilizes a larger, 3.8-liter flat-six making 355 horses and 295 lb-ft of torque. Besides boasting more displacement, the S's power advantage comes by way of unique fuel injectors and a reshaped intake.

**2007:** The 997 Turbo arrives with a twin-turbo 3.6-liter flat-six making an impressive 480 horsepower and 502 lb-ft of torque. New variable turbine vanes in the turbos account for most of the Turbo's increased output. Porsche's mighty GT3 also returns, this time with an even higher 8400-rpm redline and more power. Once again, it gets a 3.6-liter dry-sump engine, as well as lighter internals, a larger throttle body, and a higher compression ratio. Power grows to 415 horsepower and 300 lb-ft of torque.

**2009:** Direct fuel injection bumps the base Carrera to 345 horsepower and 287 lb-ft, while the Carrera S jumps to a GT3-challenging 385 ponies and 310 lb-ft of twist.

**2011:** The 911 family spawns yet another new member, the GTS, to bridge the gap between the S and the GT3. Its 3.8-liter six gets new cylinder heads, a unique intake, and a sports exhaust for a 23-hp advantage over the S.

**2012:** Along comes another special 911, this one based on the GT3: The GT3 RS 4.0. It features the largest engine ever fitted to a production 911, a 500-hp 4.0-liter flat-six. The crankshaft is pilfered from the GT3 RSR race car, and the connecting rods are rendered in titanium. A higher-flow air filter, modified intake manifold, and a freer exhaust are also part of the mix.

## 2012—Present | 991 Generation



2012 Porsche 911 Carrera S 3.8-liter flat-6 engine

**2012:** Porsche debuts the all-new 991-generation 911 Carrera and Carrera S. Engine size in the base 911 once again shrinks to 3.4 liters, but horsepower increases by 5 to 350. The Carrera S keeps its 3.8-liter six, now making an even 400 horsepower and 325 lb-ft of torque.

**2014:** Yet again, the GT3 returns, but this time its engine is derived from the Carrera S's six instead of that of the RSR race car. As a result, direct injection joins the mix, but old-school GT3 tricks like titanium connecting rods, forged pistons, and dry-sump oiling return. Redline increases to 9000 rpm, and power increases to 475 horsepower and 324 lb-ft of torque. This year also sees the return of the Turbo and Turbo S, which add direct injection and get—you guessed it even more power. The Turbo goes from 500 horsepower to 520 and from 480 lb-ft to 487. The S gets 30 more horsepower for a total of 560, while torque stands pat at 516 lb-ft.

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