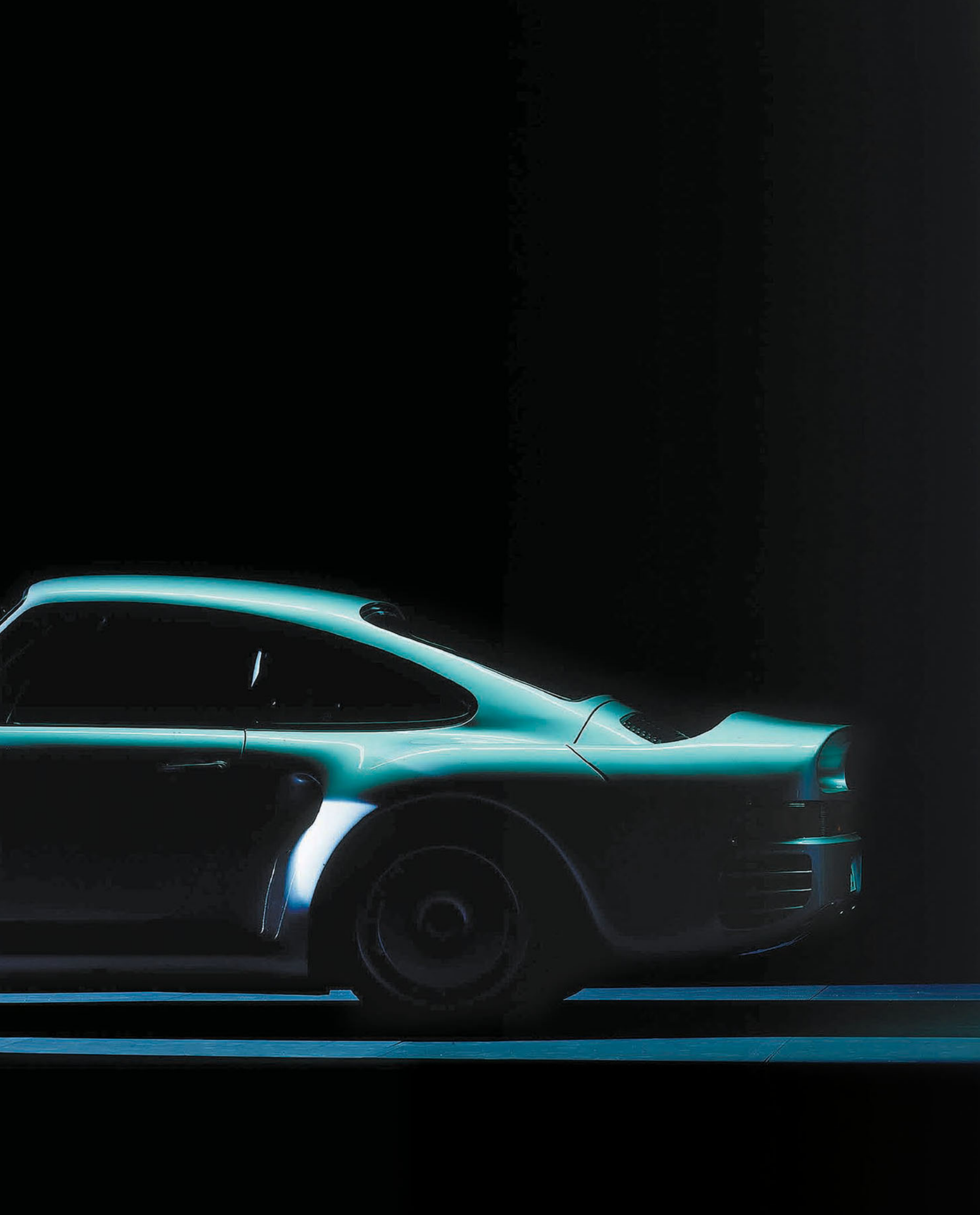
50 YEARS

RANDY LEFFINGWELL



PORSCHE

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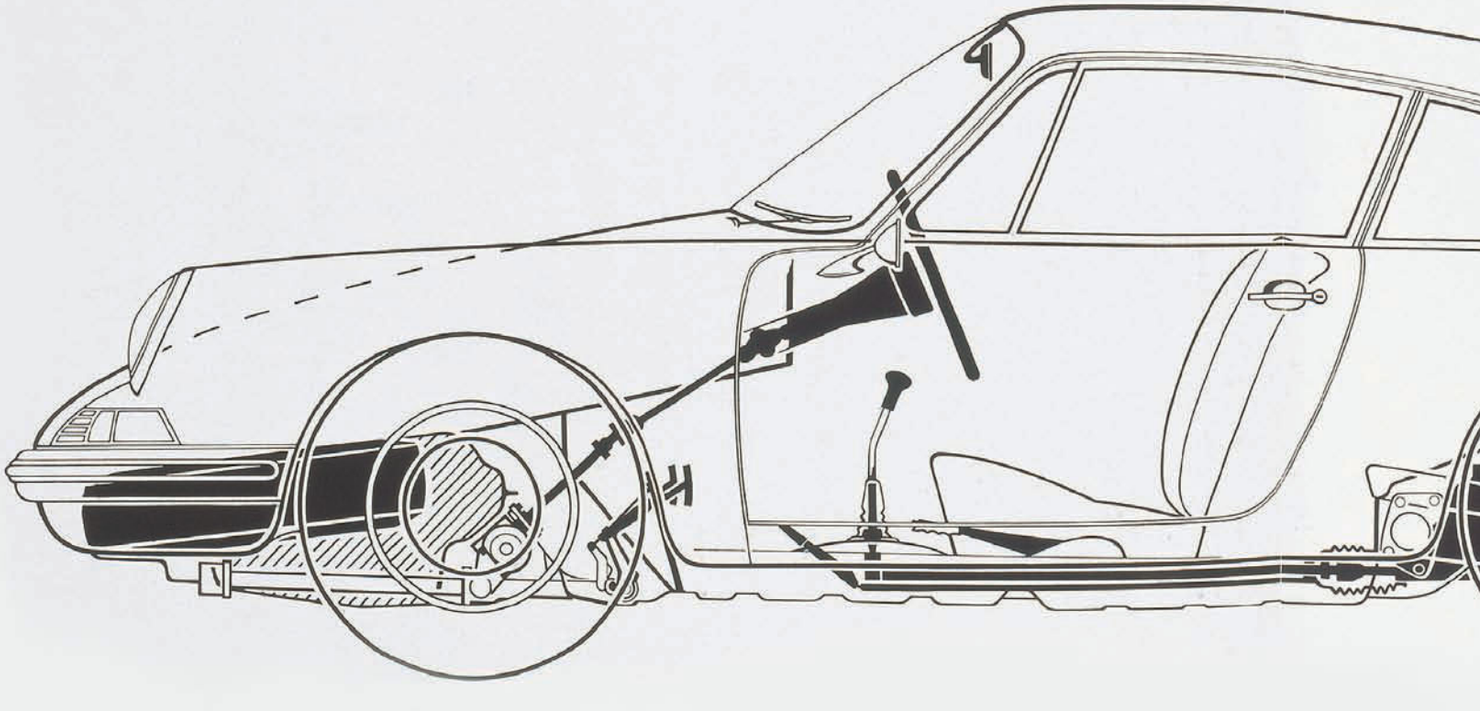
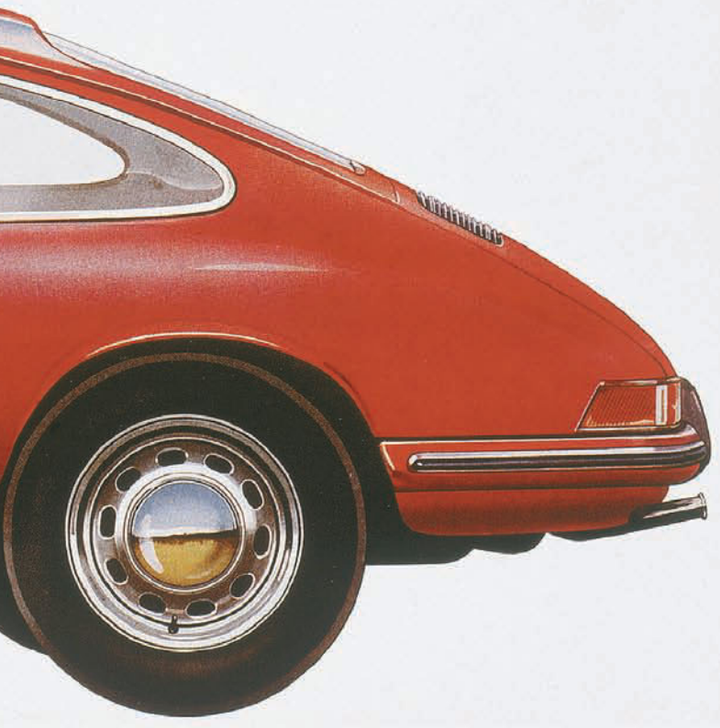
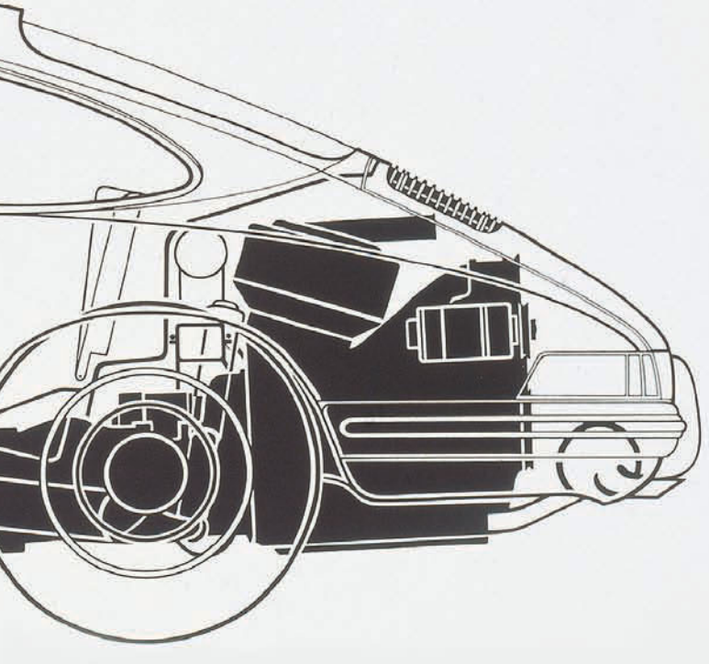




PORSCHE 911

50 YEARS

RANDY LEFFINGWELL



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STUTTGART

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I am deeply grateful to the late Ferdinand Alexander Porsche, Zell am See, and to his father, the late Professor Ferdinand Anton Porsche, Stuttgart, for taking the time more than a decade ago to speak with me for several hours about their work and philosophy.

Several individuals played important roles in completing this book and I really want to thank Gill Campbell, CEO/general manager, Mazda Laguna Seca Raceway, as well as John Clinard, Sean Cridland, Dave Engelman/Porsche Cars North America, Warner Hall, Brian Hoeweler, Riley Kelley, Yvonne Knotek/Porsche Archiv, Richard Newton, Mark Schlacter, Freeman Thomas, Barry Toepke, Dipl. Ing. Christian Will/Porsche, and Jeff Zwart for access, courtesies, ideas, images, and information.

I am most grateful to Dave Wendt for his wonderful and evocative cover image.

Finally I want to express my gratitude to Pete Stout, editor, Porsche Panorama, for sorting through this history with me. His insight and perception are without equal.

Randy Leffingwell — Santa Barbara, CA


targa

PROLOGUE

For decades, the “style” inside *Style* Porsche, the modern-day name for the company’s automotive design department, was to attribute credit for various cars to the department and its chiefs. Tony Lapine long received praise for the startling 928. Harm Lagaay was acknowledged for the 993, 986, and 996 siblings. But interviews with both men over a period of 20 years let the truth out, sometimes with a laugh attached.

“The 928?” Lapine said, always one to answer one question with another. “No, that was Wolfgang Möbius. My job was to stand at the door and not let anyone in to distract my guys from their work.” Lagaay released concept sketches showing Grant Larson’s name under Boxster concepts and production models, Pinky Lai’s name alongside 996 sketches, Tony Hatter with GT1 and Carrera GT ideas, and Steve Murkett with his vision of the Cayenne. He reiterated Lapine’s characterization as often being the door guard and staff protector.

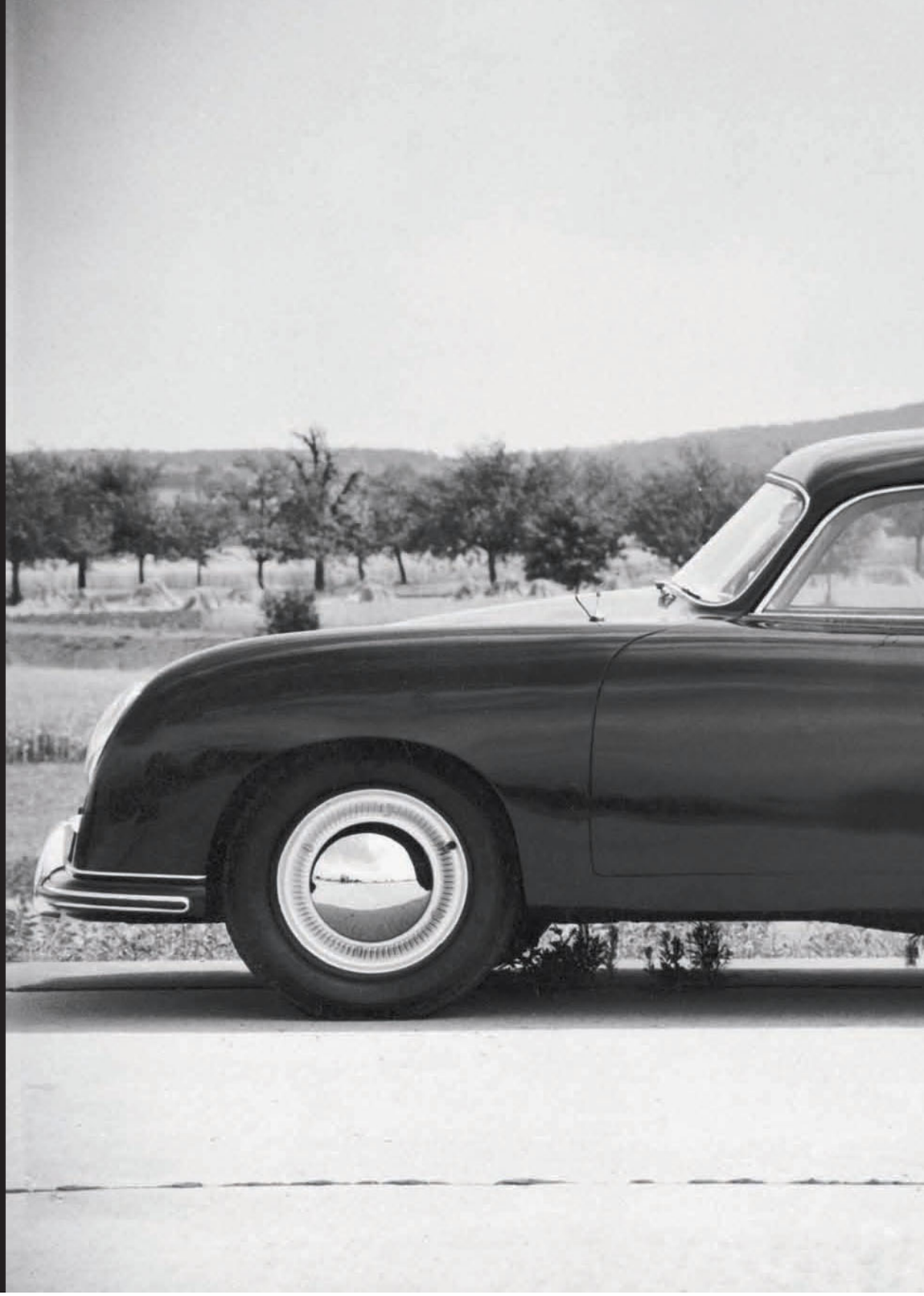
Modern-day design chief Michael Mauer followed a similar path. After an initial “You know, it really is a team effort,” the name of 991 stylist Peter Varga slipped out. It was Varga’s aggressive rear character line that redefined the 911.

Harm Lagaay described other responsibilities of the design chief, such as maintaining his designers’ focus with a well-timed comment or a discussion here and there, keeping peace among them, providing them inspiration and motivation, and otherwise ensuring them a proper atmosphere in which to do their work. Each of these men did a great deal more, guiding and directing design through deft gestures and thoughtfully chosen words, through rhetorical questions and sometimes suggestions that minute adjustment of a single line might be worth a look. The ability to draw can be less necessary than possessing the skill to communicate, to articulate, to motivate.

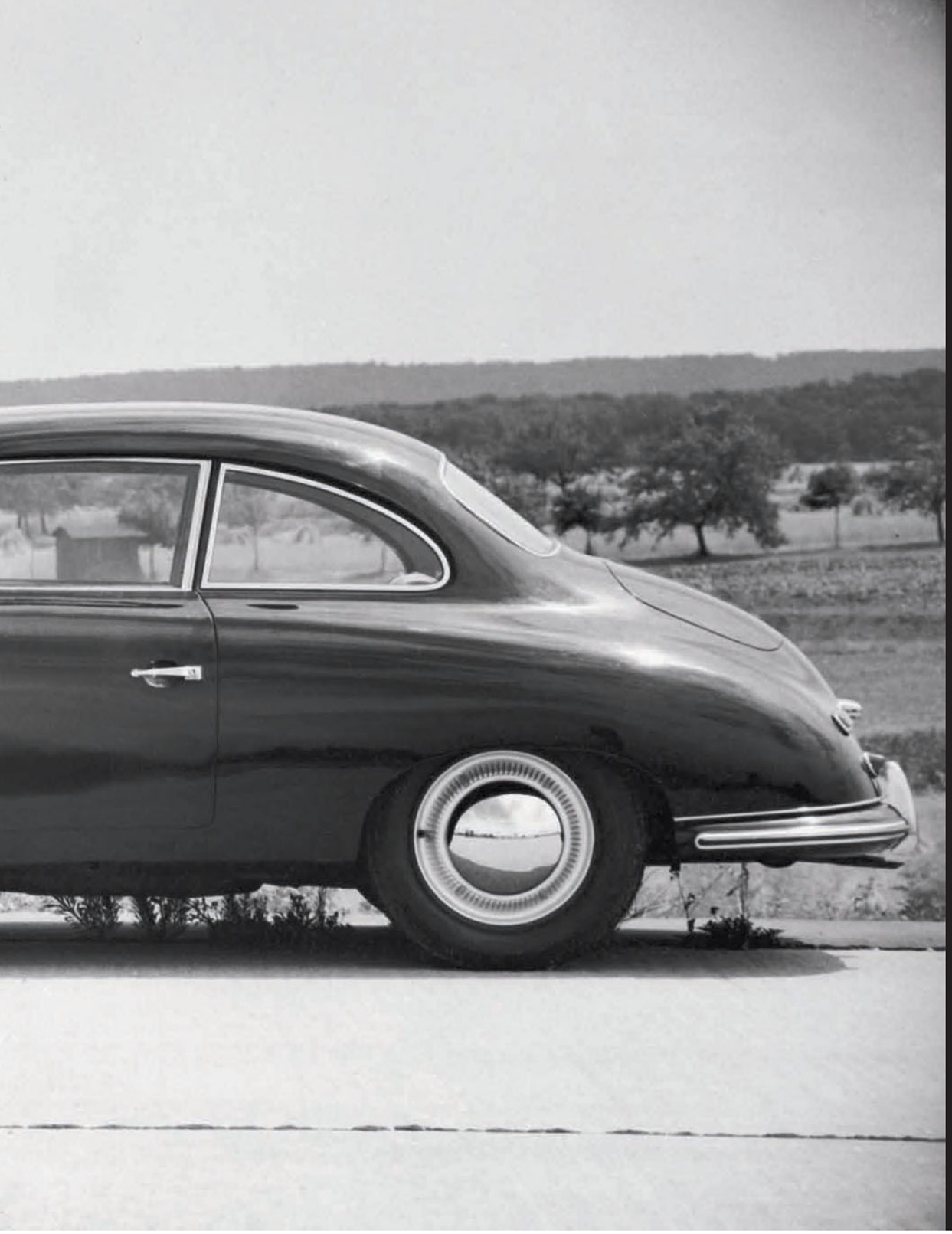
Which prompts a glance back into history: was there a Wolfgang Möbius, a Grant Larson, or a Tony Hatter on Ferdinand Alexander Porsche’s design staff? Did F. A. Porsche serve one of those roles himself, working as designer under someone else’s supervision? Did this set a pattern and a precedent for those who followed him into the job of design boss at Porsche?

The direct answer to these questions is yes.

What you read here may contradict what you know about Porsche 911 history. Some of this information simply was not available before now.



Was this the new Porsche or the next one? Erwin Komenda's 1952 proposal for the Typ 530 started the conversations, discussions, and disagreements that led to the Typ 901 a decade later. *Porsche Archiv*



CHAPTER 1

COLLISION COURSE

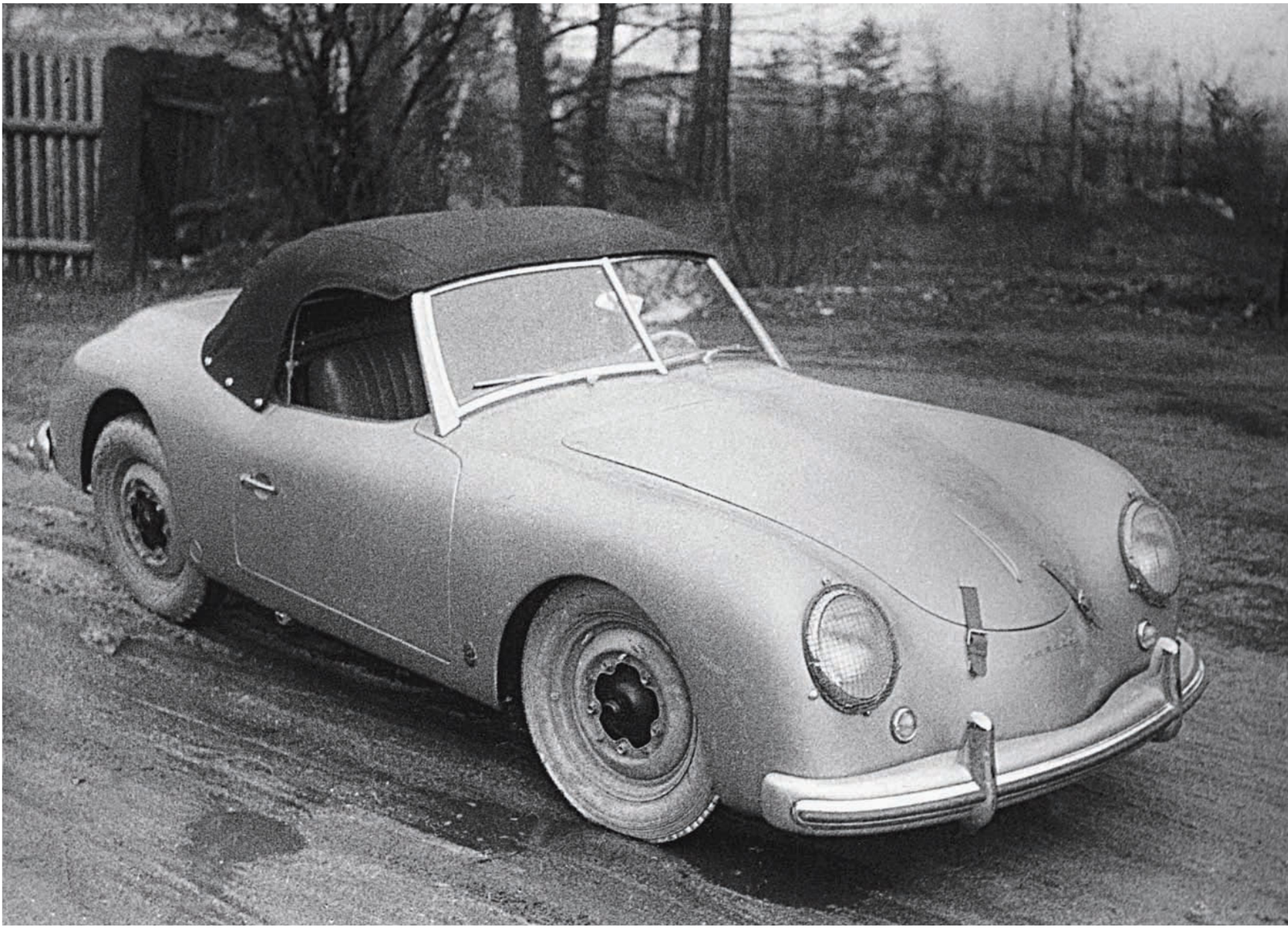
BETWEEN NEXT AND NEW

For two decades Erwin Komenda had success providing attractive vehicles to Porsche. By the early 1950s, that was about to change.

After meeting Ferdinand Porsche at Steyr in Austria in 1929, Komenda moved to Daimler-Benz. In late 1931, he joined Ferdinand Porsche's company where, among other projects, he created the shapes of the legendary Auto Union Grand Prix cars with Porsche's long-trusted aerodynamics engineer Josef Mickl. While working with Ferdinand, he fashioned the Volkswagen. He morphed it into the Typ 64K10 for the 1939 Berlin-Rome road race, an intra-national competition invented to show off Germany's fast, smooth Autobahn. While the race never occurred, Komenda and his craftsmen assembled three of the sleek Typ 64 coupes.

After World War II, Komenda adapted the forms and shapes of the Typ 64 into a prototype mid engine roadster in 1948 and from there, a series of production coupes and cabriolets in the 1950s. As an engineer, he formed the car bodies to surround the chassis, suspension, drivetrain, and passenger components in the most efficient way possible, working from the inside out. His job title at Porsche was head of the bodywork construction department and his training and experience convinced him that rounded forms imparted great strength to thin steel. He maintained that door and deck lid cuts set well inboard of curved metal welding seams were less likely to stress or tear the panels. These rules shaped his car bodies as characteristically as any panel beater's hammer.

Norman Hamilton, in the passenger seat at right, purchased one of the first right-hand-drive Cabriolets in early September 1951, in Melbourne, Australia. Friend and driver Ken Harper, and mechanic Ken McConville, prepare for another drive. *Porsche Archiv*



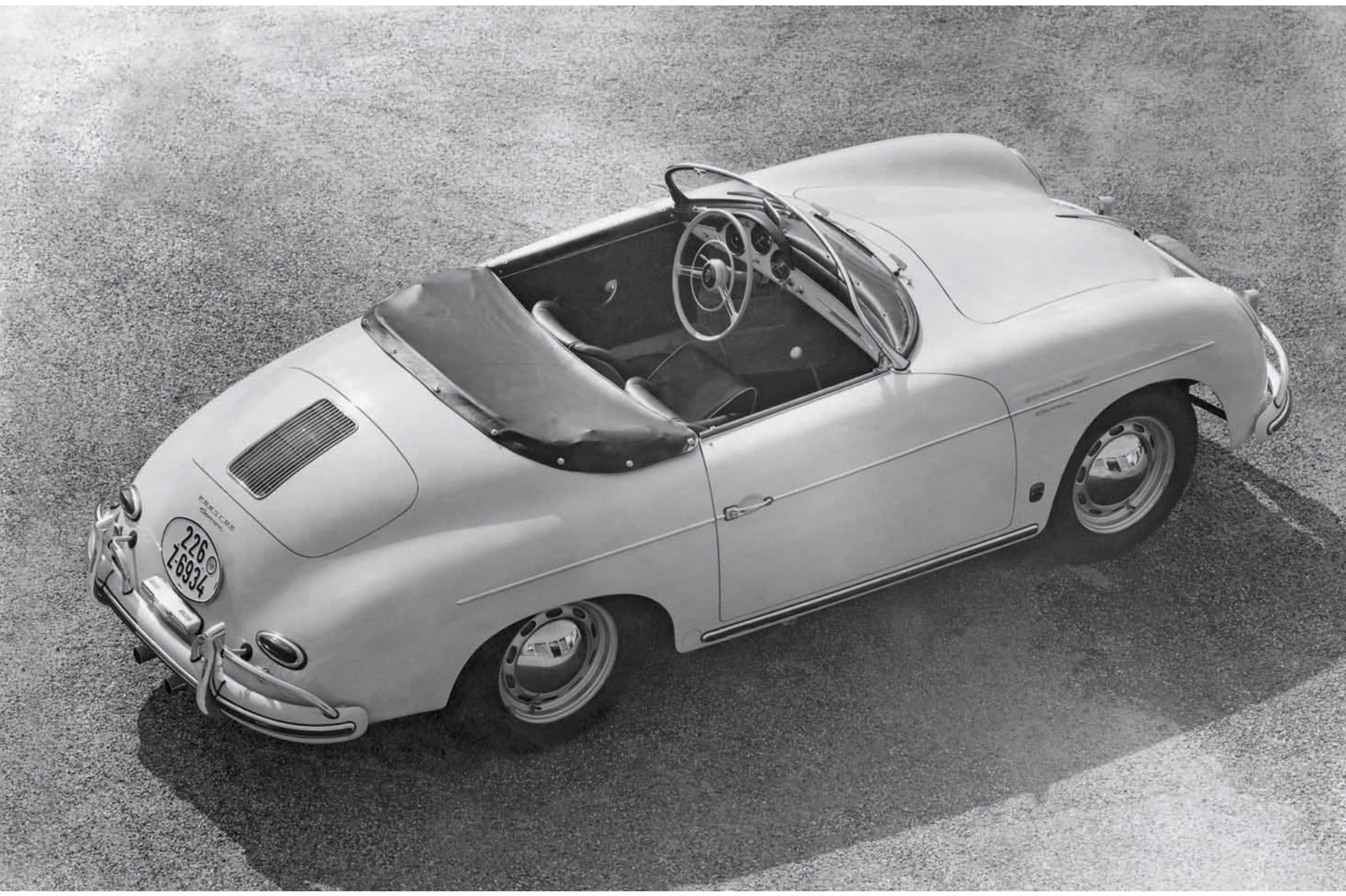
Porsche's American distributor Max Hoffman was a Viennese native, but he understood his U.S. racing customers well. It was for them that he proposed a stripped and lightened roadster, and Ferry responded with the 1952–1953 America Roadster. *Porsche Archiv*

Following the death of his father in January 1951, Ferry Porsche improved his 356 series performance by supplementing the original Volkswagen-derived 1,086cc 40-horsepower engines with a 1,286cc 44-horsepower engine and in October, the 60 horsepower 1,488cc version. Meanwhile Komenda showed Ferry his ideas for what might follow the Typ 356, displaying to him the Typ 530 four-seater. In this scale model Porsche saw an enlarged 356. By this time Komenda had a chief modeler named Heinrich Klie, a former confectioner with great skill in molding breads and cakes. Porsche hired Klie in 1951 to establish the model shop. Klie and Komenda stretched the 2,100mm (82.7-inch) wheelbase of the 356 out to 2,400 (94.5 inches) to provide room for rear seat adult passengers. The boss hadn't asked for these new models; Komenda simply was doing his job, keeping something new or different in front of Ferry's eyes.

Porsche admitted later to several historians that he had not yet given any thought to what might replace or supplement his 356 by this time. He had the Typ 514SL, widely known as the 356SL, in his race shops with engineers preparing to take the coupe with its streamlined covered wheel openings to compete at Le Mans, and he had the Typ 540 to think about. First marketed as the America Roadster, Klie and Komenda had bodied the Typ 540 for the U.S. markets. The short-run series of 17 cars sold out and its appearance and its racing performance generated big interest. The guardian of Typ numbers and company chief designer Karl Rabe recycled the 540 designation onto its successor, "the Sport Cabrio." The outside world called that car the Speedster.

The Typ 534 was not the most proportionally pleasing concept when it emerged from the design studio over the winter of 1953 and 1954. While wheelbase specifications are difficult to find, putting it in scale to the men holding the background, the car appeared to be Volkswagen Beetle length. *Porsche Archiv*

Porsche introduced the Typ 540 Speedster in 1954, carrying over the designation from the earlier America Roadster. This 1958 Carrera presented buyers the best combination of a lightweight and high-performance car. *Porsche Archiv*



PORSCHE AND KOMENDA: THE HORIZONTAL AND THE VERTICAL LINE

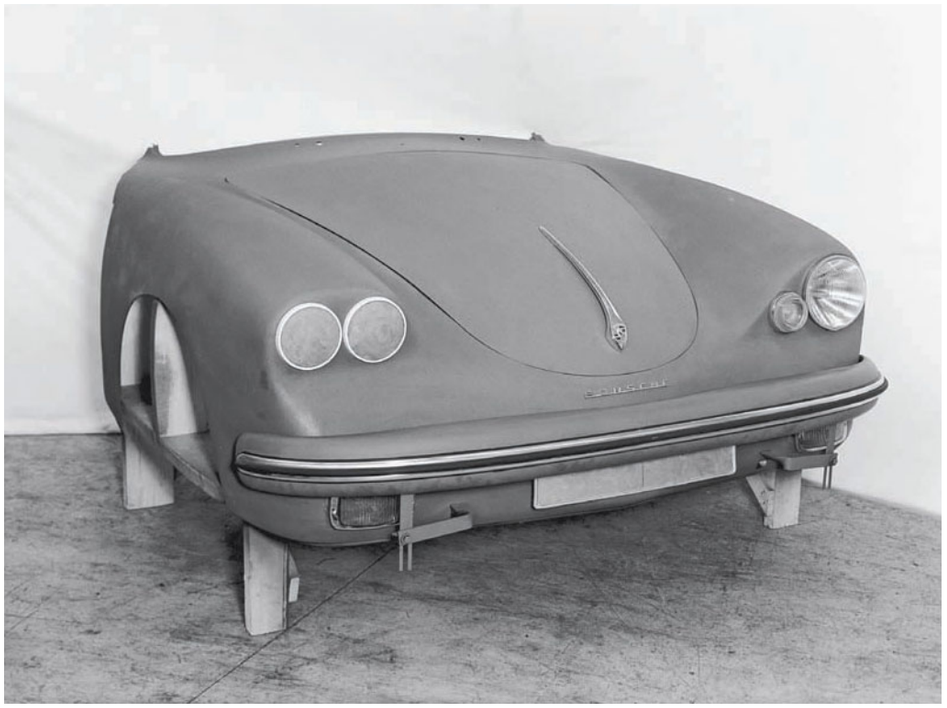
Ferry's philosophy was concise. Body engineer Eugen Kolb recited it in an interview in late November 2012: "Make a car that will sell. Then think of a new variation." Komenda's job included offering proposals for the variations. Since the boss had not yet signaled a direction, he followed his own instincts. As Porsche historian Tobias Aichele put it, Komenda "gave more thought to a four-seat body based on the 356, to expand the model line upwards, possibly with a more powerful engine, rather than a replacement for the successful four-cylinder." With that as Komenda's philosophy, later in 1952 he delivered the Typ 534, and then the Typ 555 appeared in 1953. These were new four-seaters to which modeler Klie gave alternate rooflines and rear window treatments. Aichele assessed Komenda's results:

"The external body could be given enormous strength by means of strong curvature. This led to a somewhat plump variant." These zaftig bodies were a little surprising from a team whose slimmer versions appeared in production as the 356A. Still, with sellable 356 models emerging from drawing boards and model shops, and a continual flurry of technical advances and updates from his engineering staff, Ferry didn't protest too loudly against the bigger cars his design engineer offered. Both men had expressed an interest in—and marvel of—American cars of the period. According to Kolb, however, in retrospect, the concepts Komenda presented weren't exactly what he had in mind. Or perhaps they weren't what he felt he could get away with.

»

The Neuester Sportwagen Typ 550 Spyder was one of Erwin Komenda's finest collaborations with modeler Heinrich Klie. This early model was photographed outside Wendler Karosserie, Reutlingen, before its first speed test. *Porsche Archiv*

That never deterred Komenda. Both Kolb and Gerhard Schröder (in separate interviews in 2012) described Komenda as a rebel. "There was a conversation with Ferry," Schröder recalled, "and he said, 'When I say to him to make a horizontal line, Komenda in general makes a vertical.' He always made the opposite to what Ferry said. He was always so. . . . It was his character." Whether this was Komenda's modus operandi, few people had real cause to complain. Although additional four-seat proposals emerged from Komenda's imagination as the Typ 656 in early 1955, he and Klie also had delivered the Typ 550 Spyder in 1953. If that was a "vertical line," it may be gilding the lily to imagine the horizontal line Ferry had in mind instead for his racer.



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Komenda and Klie developed a number of front-end models for the Typ 644 during 1954. Many of these utilized the 356A rounded-front deck lid in between a pair of concepts for headlight treatments. *Porsche Archiv*

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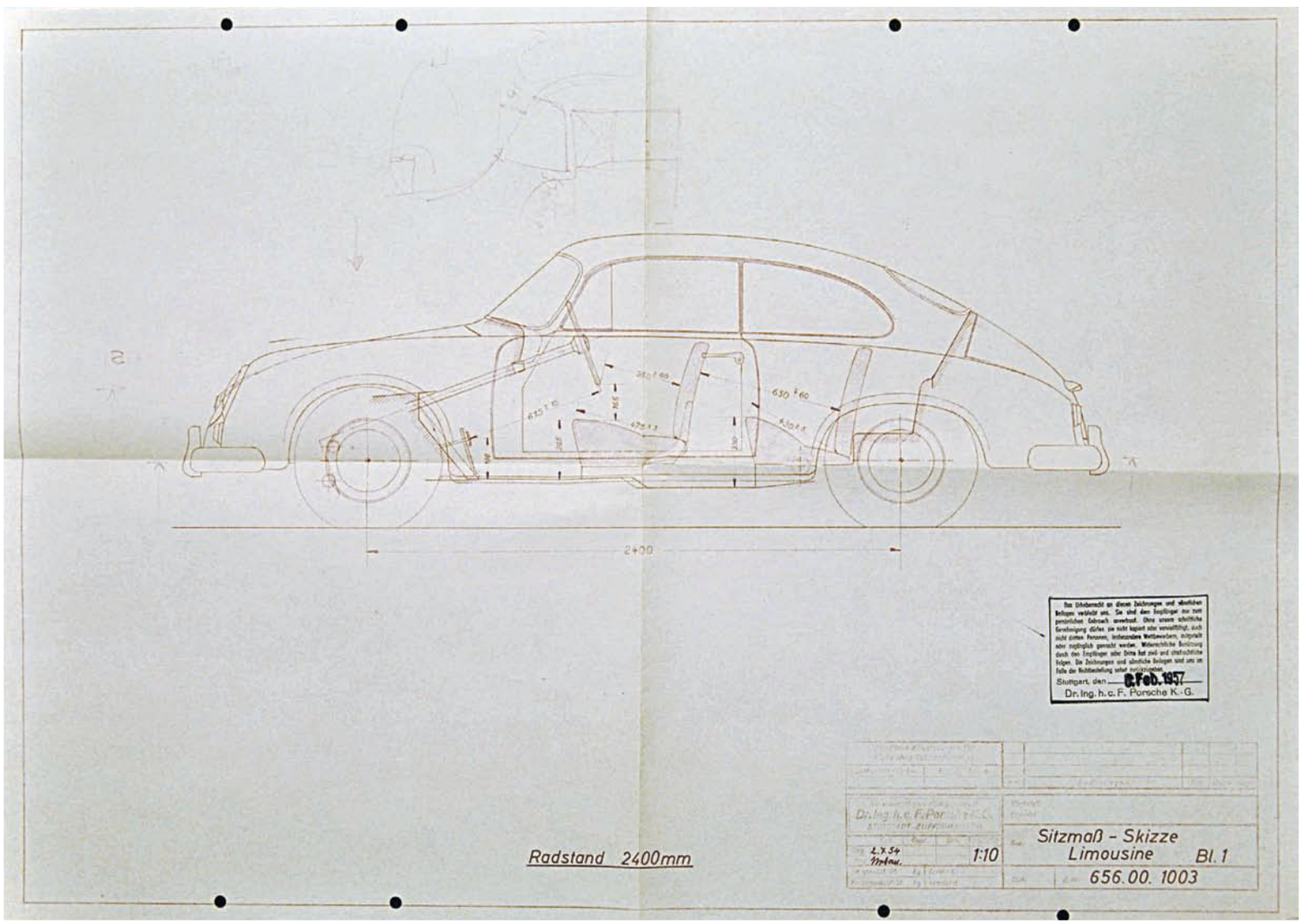
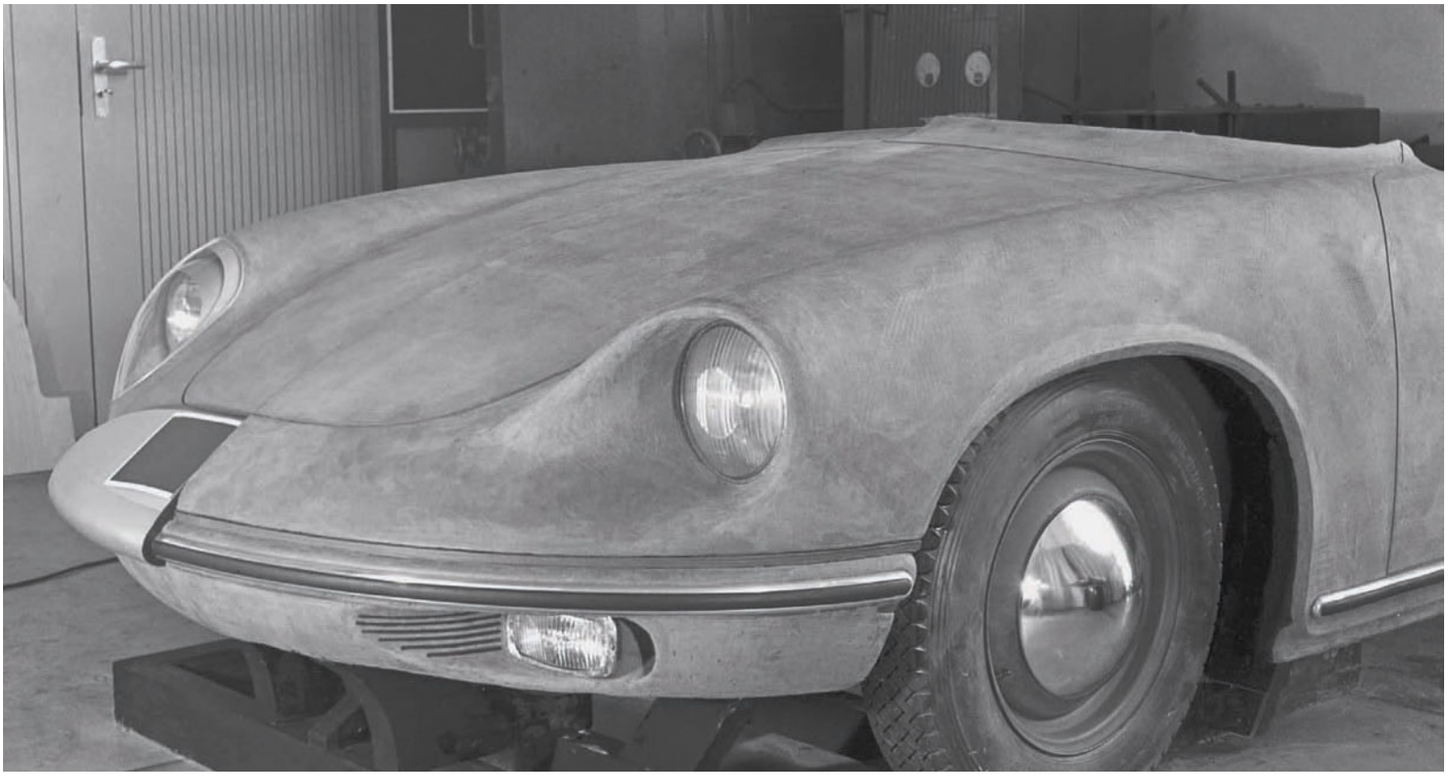
The Typ 656 on a 2,400-millimeter wheelbase provided comfortable rear seat room with two-thirds of a meter from seat back to seat back. This 1:10-scale seat measurement sketch appeared July 2, 1954. *Porsche Archiv*



Through 1955, Porsche had plenty to keep him busy. His company introduced the Typ 597 Jagdwagen, or "Hunter," at the Geneva Auto Show in March. Ferry's engineers developed this no-nonsense utility vehicle from VW pieces and he hoped to win a profitable contract to produce them for the German army. In Zuffenhausen, engineering work to replace the 1,488cc high-performance engines with a 75-horsepower 1,582cc version filled the spring and summer. The year ended on a high note when the U.S. Combined Forces finally returned Porsche Werk I to the family business. This date had been a moving target starting in 1950, forcing the company to rent space from neighboring Reutter Karosserie in February that year and then acquire a small building ten months later in December. Restored to its full capacity, Porsche expanded production. Relocation, reorganization, and racing updates to the Typ 550A ate up much of 1956.

Erwin Komenda's design team, with Heinrich Klie as his chief modeler, offered this full-scale proposal in 1955. This was the Typ 656. *Porsche Archiv*



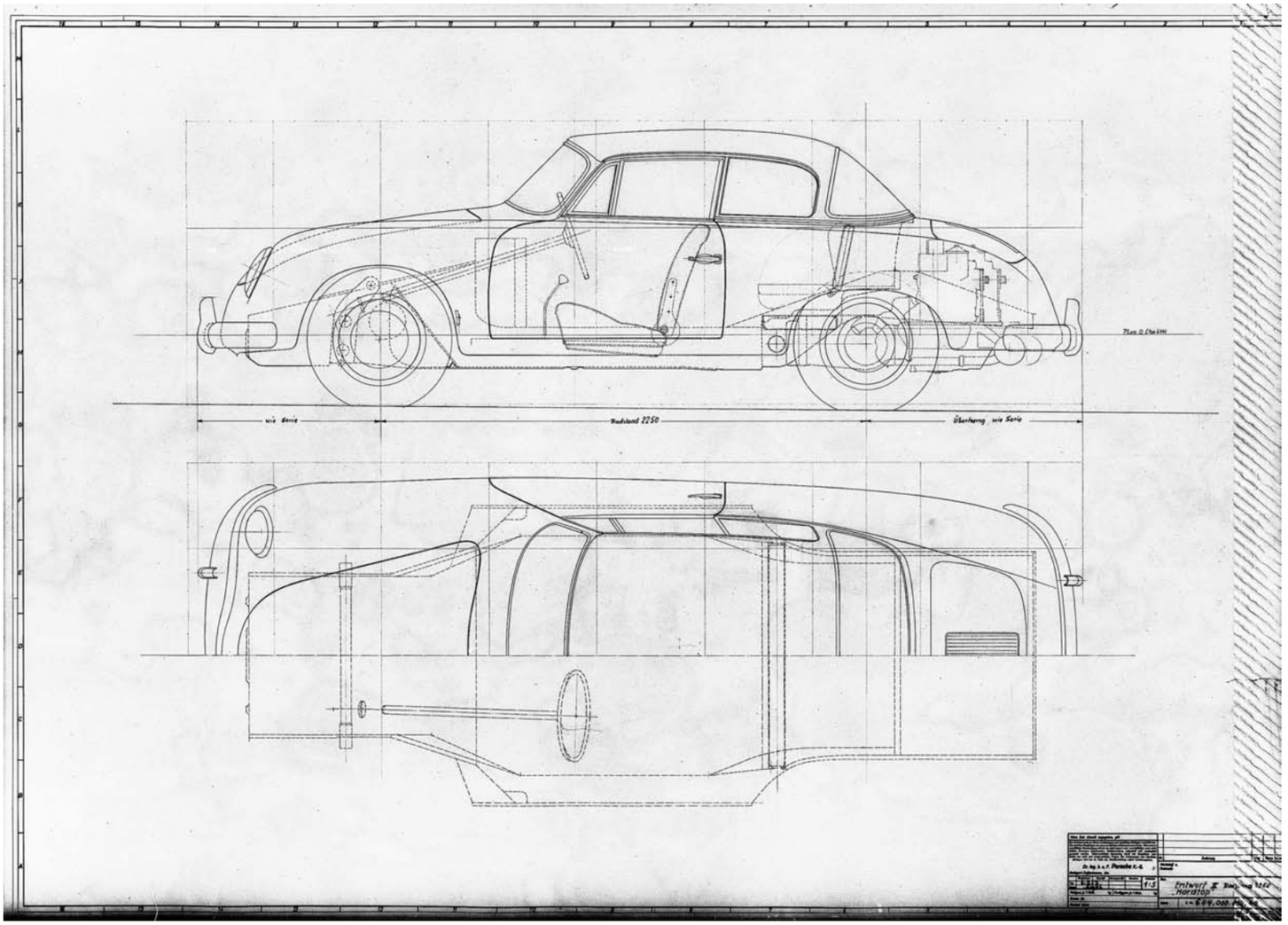
Through January 1956, Heinrich Klie experimented with new front-end ideas. This 1:1-scale clay was an early concept on the 695 platform. *Porsche Archiv*

Where the company passed milestones for its 500th and 1,000th cars assembled (in 1951 on March 21 and August 28, respectively), the company manufactured 2,903 cars in 1955 alone. On March 16, 1956, company officials watched their 10,000th car drive away.

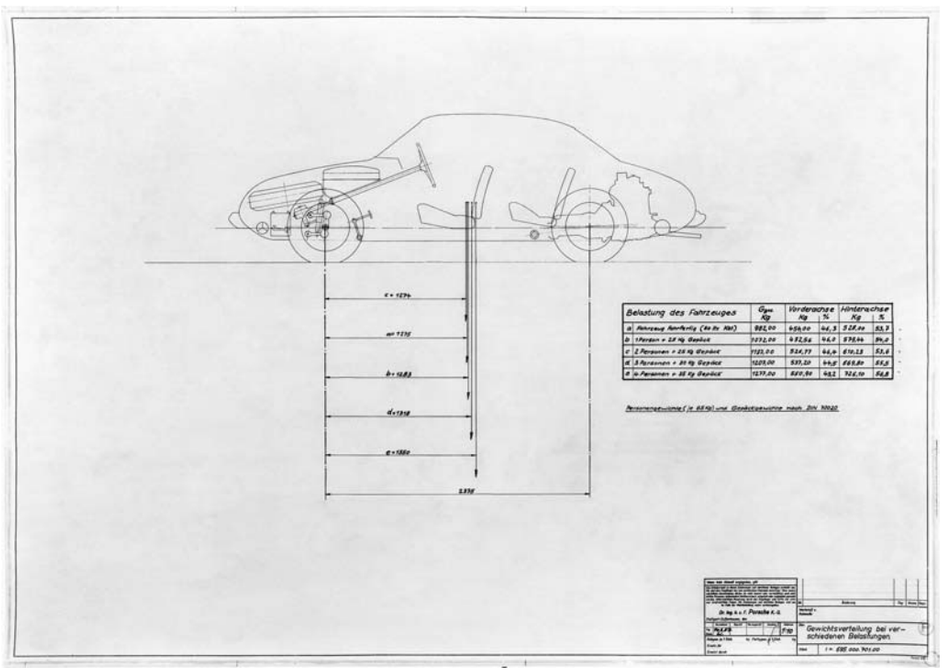
By this time Ferry had begun to consider some kind of new model. In his mind, however, that car looked different from what his willful body engineer was offering. And so in February 1957 Komenda tasted the first bitter flavors of competition. He had delivered yet another oversize "stepped roof form" proposal designated the Typ 644 that too closely resembled one more swollen 356. In July Ferry reached outside the building and found a man who came highly recommended as one who might deliver other ideas for The Next Porsche. Because Komenda followed up every few months with slight variations from his 644 notchback concept, Ferry's decision seemed ever more understandable. Historian Jürgen Lewandowski characterized those 644 variants in his book *Porsche 901—Die Wurzeln einer Legende* (*Porsche 901—The Roots of the Legend*). It did not matter, Lewandowski observed, "how many different designs of Typ 644 came from the drawing boards," he wrote, "the 356 was still strong."

"We could have made the model out of butter for what it cost."
— Eugen Kolb

Ferry's outsider was Albrecht Graf von Goertz. He was a German who had emigrated to the United States in 1936. While he worked his regular jobs, he also modified Ford Model A and B cars, putting his own custom body on one he kept. He served five years in the U.S. Army, but soon after the war, he encountered industrial designer Raymond Loewy. Loewy saw Goertz's personal car, funded his design school education, and then put him to work. After several years with Loewy, Goertz left in 1953 and opened his own studio. He met Max Hoffman, the Viennese auto dealer in New York City who sold Mercedes-Benz, BMW, and Porsche cars from his Fifth Avenue showroom. Through Hoffman, Goertz had earned the commission to create two new models for BMW in Munich. One was the smart-looking 503 as a 2+2 coupe and cabriolet, and the other was the sleek muscular two-seat 507 introduced in 1955. Ferry understood the impact the American market had on his sales because of his distribution arrangements with Hoffman; he believed Goertz might have valuable ideas for The Next Porsche.



This February 6, 1957, plan of the Typ 644 put the car on the 2,250-millimeter wheelbase. This 1:5 drawing designated the car as a hardtop. *Porsche Archiv*

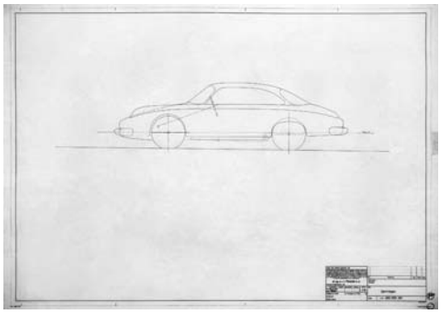


Nothing is left to chance in the design of an automobile. This drawing, made on the 695 platform on February 14, 1957, examined the change in weight distribution by the number of occupants and luggage. *Porsche Archiv*

Goertz made initial sketches in his New York office and then moved into Klie's Werk I basement studio to make his model. He followed Ferry's guidelines and created a fastback coupe that offered greater interior and front trunk space. But as it took form on the 2,400mm wheelbase (designated the Typ 695,) it became too "American" for Porsche's conservative Swabian tastes. Quad headlights and sharp creases with square edges seemed to take "Porsche" out of this car. For better or worse, Erwin Komenda had defined Porsche "style." Years later, Ferry acknowledged that the details on Goertz's proposals moved the car in the wrong direction for his aesthetic. (Ironically, Komenda's team had developed concepts with quad headlights and separate, chrome bumpers. That had proven to be the wrong direction as well.)

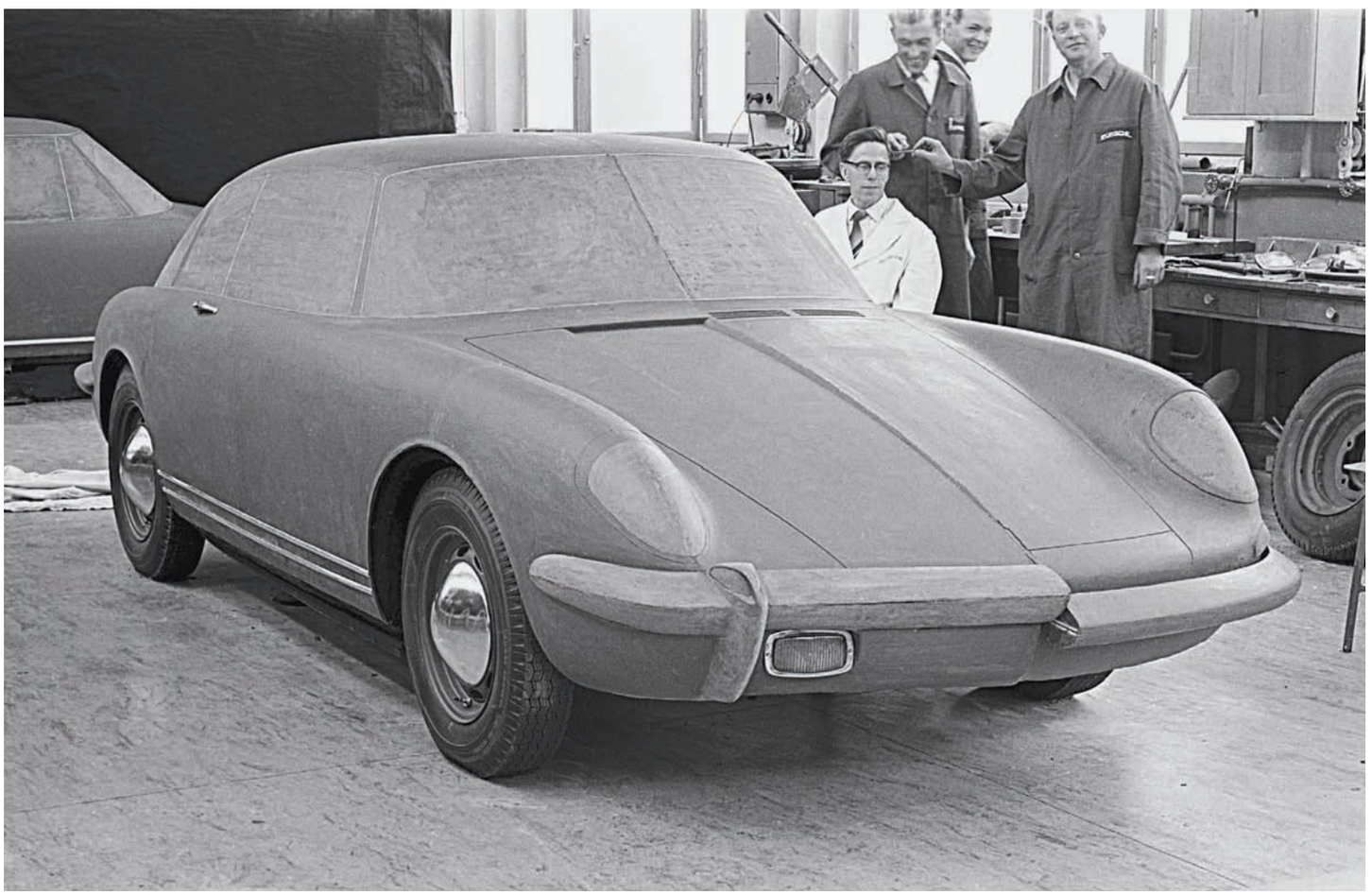
But Ferry had paid for Goertz's design, so Porsche assigned his modelers to sculpt a full-size representation. It proved to be a false economy. As Eugen Kolb explained, Goertz insisted on using Plasticine, introducing the modeling medium to Porsche designers. It suited the subtle sculpting required for automotive shapes, but it was expensive. Kolb recalled that Ferry complained about the material, saying, "We could have made the model out of butter for what it cost." Porsche modeler Ernest Bolt told historian Tobias Aichele that Ferry had them sweep up the valuable scrapings to use them again rather than send them out the door as trash.

Porsche asked Goertz to try again. At the same time, despite his dissatisfaction with the first design, Porsche hired two Stuttgart plasterers to cast a mold from which he considered making a full-size fiberglass model with simulated windows to provide a realistic sense of the design. While Goertz worked on a second presentation as a body half, modeler Heinrich Klie developed his own concept. A clever system allowed them to mount each half together for comparison viewing. This two-faced model carried on the project 695 designation.



Ideas flew fast and furiously from the body engineering design studio. This 1:10-scale concept appeared on June 15, 1957, labeled "Sportwagen." *Porsche Archiv*

In the design studio, these were known as "A" and "B," done in 1:1 scale. Photographed on July 24, 1957, the version on the A passenger side was Porsche staffer Heinrich Klie's work while the B driver's side represented Goertz's second approach to the 695. *Porsche Archiv*



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With little modification, Goertz's Typ 695 concept would have worked well as either a front- or rear-engine model. By this time in 1957, no single Porsche model used such hard edges and abrupt cut lines. *Porsche Archiv*

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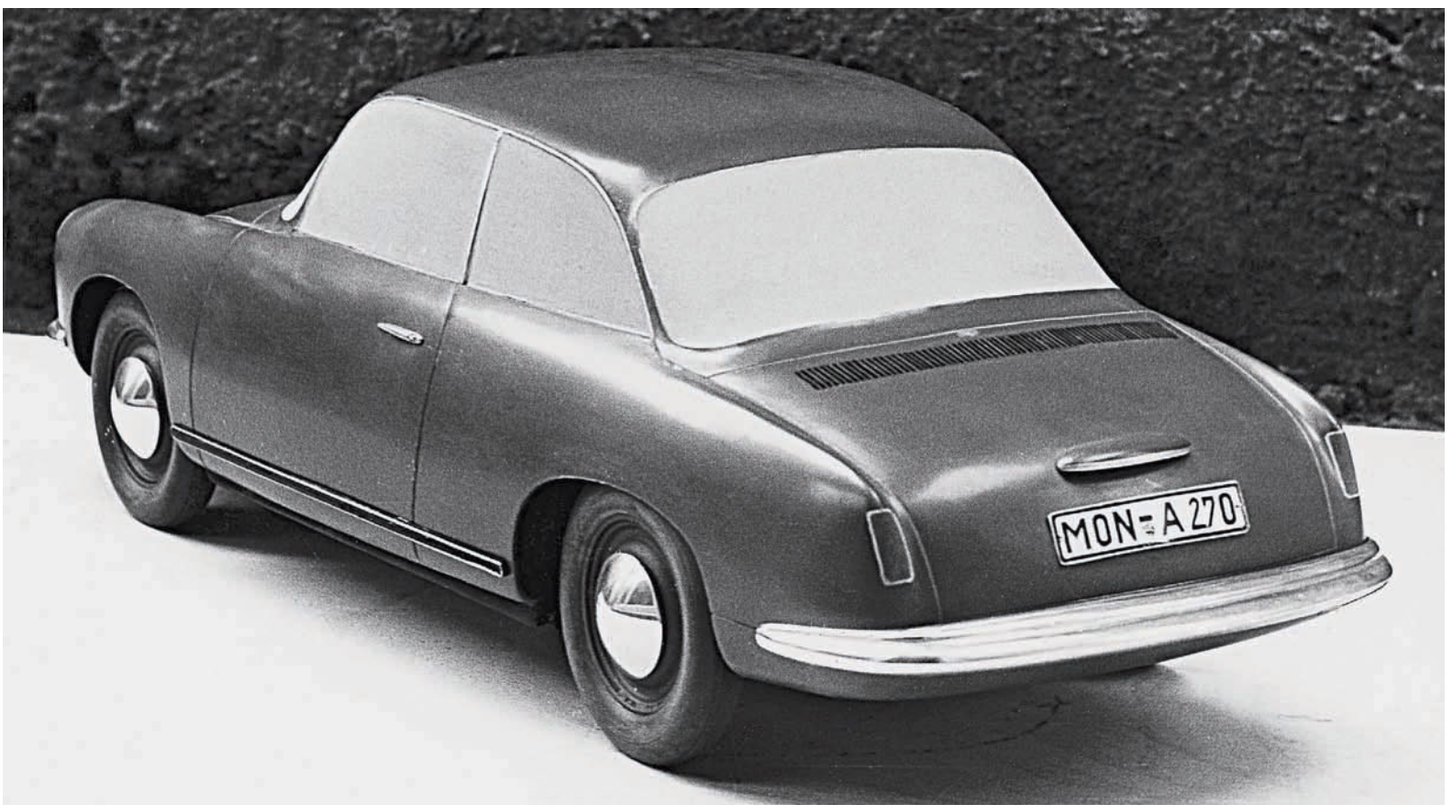
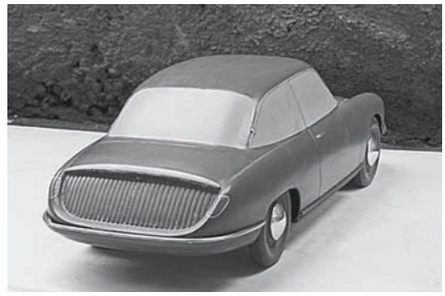
Body designer Gerhard Schröder offered this step-down rear window variation on the Typ 695 on July 26, 1957. He completed the Plasticine model in 1:7.5 scale. *Porsche Archiv*



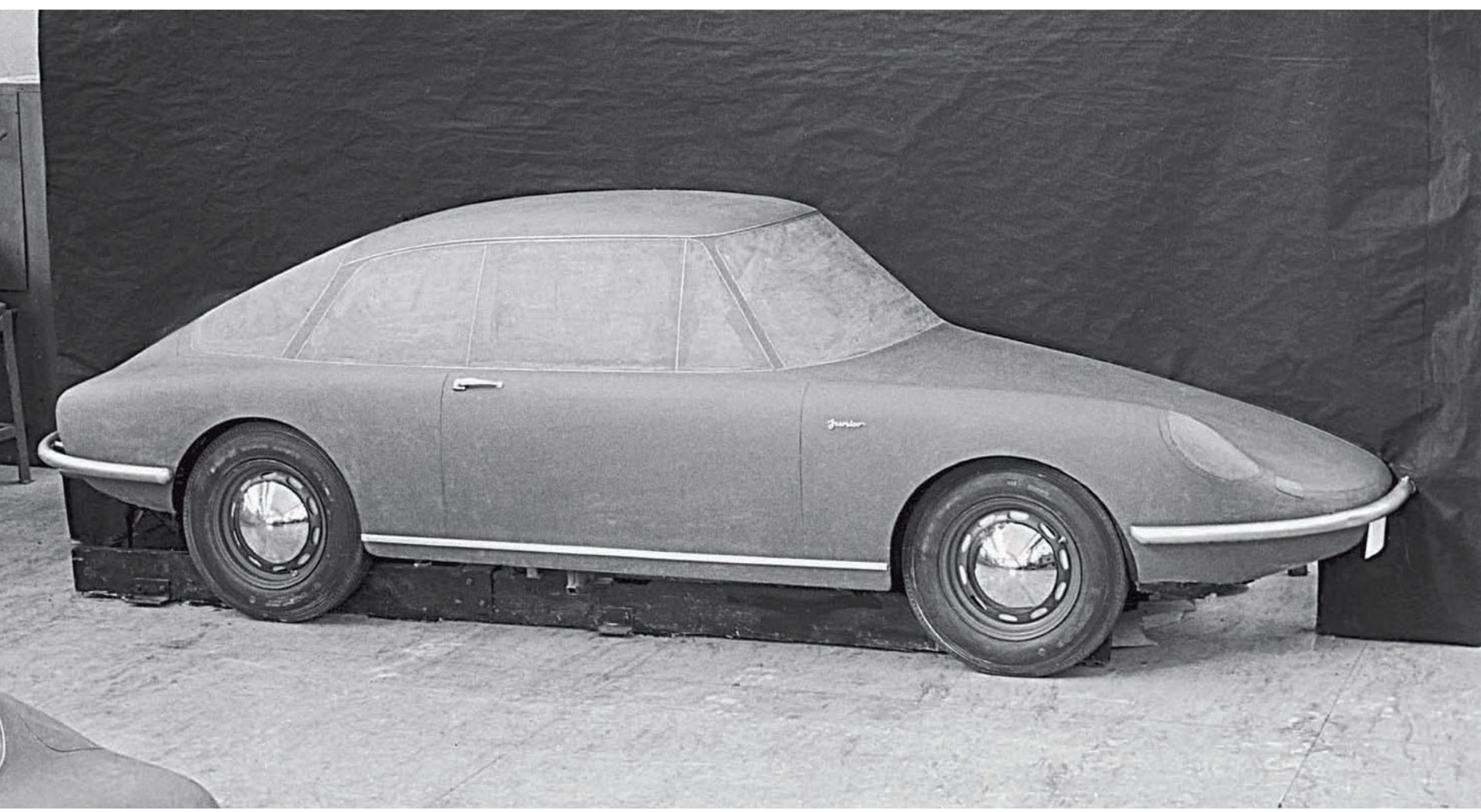
In Gmünd and then in Stuttgart, Ferry's sons regularly visited his production facilities, design studios, and engineering workshops. When Goertz arrived, eldest son Ferdinand Alexander was 22. Throughout his lifetime, he was called a variety of names; in later years he was referred to as F. A., though he was better known at home and around the shops as "Butzi." In written memos circulated to management in the 1950s and 1960s, he was F. Porsche Junior, or just "Junior." He and his younger brothers Gerhard, then 19; Hans-Peter, 17; and Wolfgang, 14, were familiar faces to all the employees. F. A. had displayed some sensitivity to design, and in the summer of 1957 he spent a fair amount of time in the model shop learning from Goertz and Klie as they worked. It is unclear if F. A. participated at all in the process; however, in a recently discovered photo of that project, the name "Junior" appears on the right front fender—the side Klie modeled—in a generous nod to a contributing collaborator, and a suggestion for a potential name for the next Porsche.

A few months later, in the fall of 1957, F. A. entered the Hochschule für Gestaltung (HFG), the prestigious upper school for art in nearby Ulm. It was a short-lived experience, however. As F. A. explained in an interview in October 1991 at his design offices at Zell am See in Austria, he admitted he "wasn't so good at drawing," and his young untrained sculpting skills barely were better. The school asked him to leave after his first semester, an occasion that prompted a bit of his own rebelliousness. When he returned to school from Zuffenhausen to retrieve his belongings, he took one of the factory's Jagdwagens. Fellow students remember that when F. A. reached the school, he found a suitable stair-climbing gear and drove the Jagdwagen up inside the building hallway to load up his possessions.



At the same time Klie worked alongside Goertz on the full-size A/B twins, he continued developing smaller-scale concepts for consideration. This 1:7.5 clay model appeared on July 26, 1957, two days after he and Goertz had completed the full-size twins. *Porsche Archiv*

Heinrich Klie adopted design elements from Albrecht Goertz that Ferry Porsche admired, including the long sweeping arch from windshield to rear end. Perhaps acknowledging suggestions from F. A. Porsche before he left for school at Ulm, this model briefly bore a name, "Junior." *Porsche Archiv*



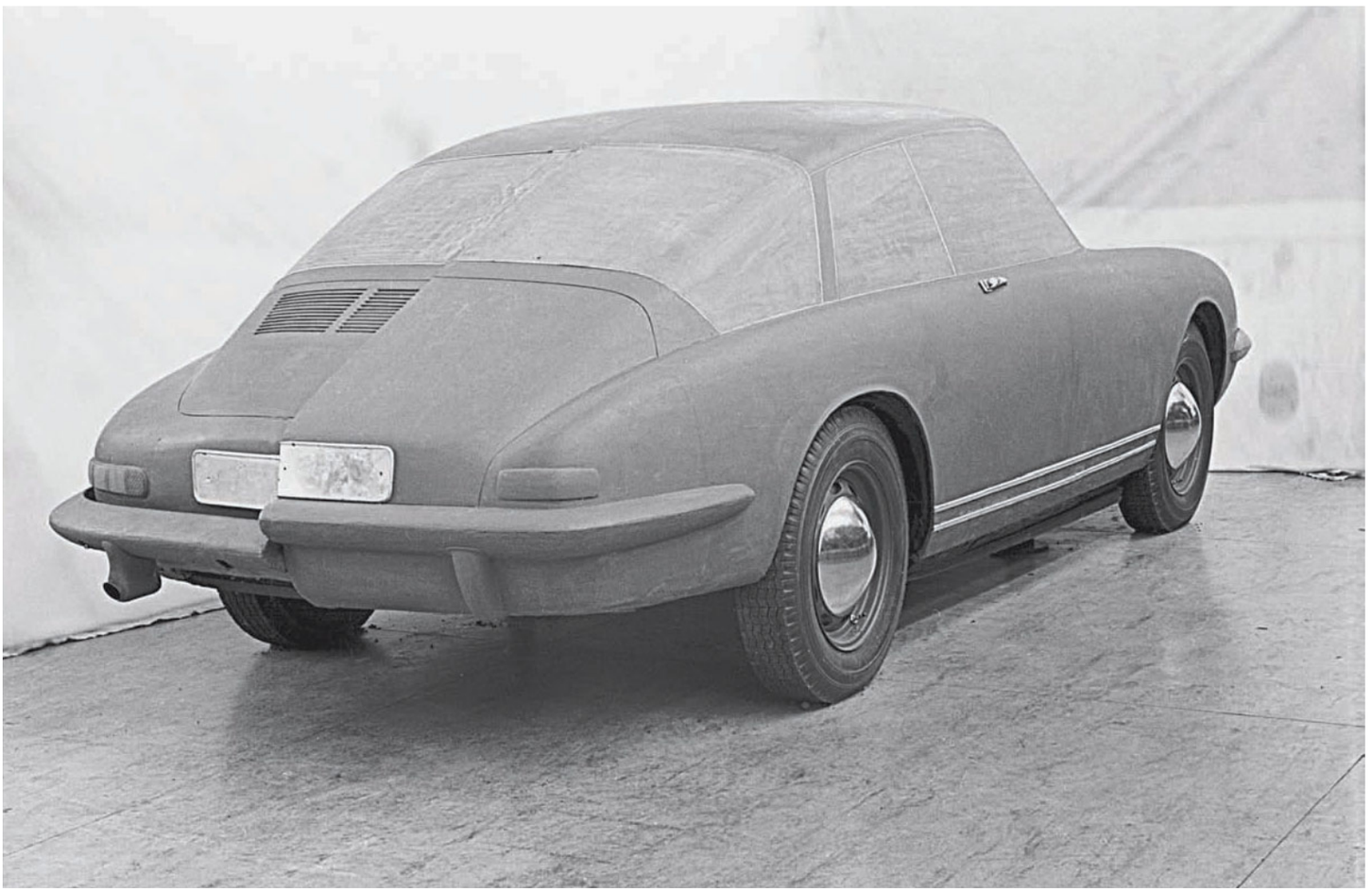
The Goertz concept provided abundant glass supported by thin pillars. Ferry saw his first hints of the long fastback roofline of the production 911 in this model. *Porsche Archiv*

The rear of Klie's B side appeared to offer a bit more room for the engine with higher bumper height as well. Klie may have known of pending regulations, or he meant only to do something differently than Goertz. *Porsche Archiv*

It remains one of the sweet ironies of unfinished formal educations that this particular dropout went on to supervise, direct, and influence the design of some of history's most style-setting vehicles and significant products. That it proved to be no drawback apparently was a family legacy. While Ferry had taken evening courses in mathematics, physics, and engineering, the luxury of completing formal university education had eluded F. A., Ferry, and Ferdinand Porsche as well. Back in Zuffenhausen, F. A. entered the company's apprentice program in early 1958. For his first nine months, he worked for engine chief Franz-Xaver Reimspiess for whom he drew all the pieces of the Typ 547 Carrera engine. "I had to memorize them," he said. "The specifications of the screws, of the cylinder head, the cylinder itself, crankshaft, camshafts. All these things I had to recite and draw a profile of the Carrera engine.

"I was then sent to the car body division to work with Mr. Komenda. Then I worked . . . on the lights from the 356C, the bumpers. . . . It was my father's wish that I get to know the car body division and simply gather knowledge 'from scratch' with the people there and work together with them. I knew Mr. Komenda and Mr. Reimspiess from my childhood, dating back to Gmünd and the old Stuttgart days before the war," F. A. continued.

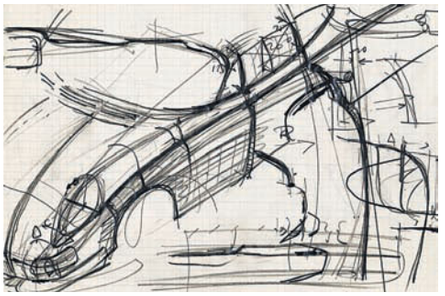
"I worked with Komenda. He was very strict. He naturally had formal views. So many areas were parts of that division; there was the electrical department that was part of Mr. Komenda's division, and the car body department. The steering wheels and all the parts were manufactured there," F. A. said. There were many times that F. A. heard, "No, no, that's not the way it's done."



Komenda started him off in the racing division. “I was well acquainted with Mr. [Wilhelm] Hild and Mr. [Hubert] Mimler and the whole staff of the racing division,” F. A. recalled. As one of the seven people in Heinrich Klie’s design studio, F. A.’s first design assignments were to work on the Formula Two Typ 718/2 and then the first Formula One car, the Typ 787 planned for the 1960–1961 season. It was during this time, through 1958 and into 1959—not at Ulm—that his thoughts grew clearer. This was not an Introduction to Design or Fundamentals of Sculpture education he was getting. This was Ferry’s “Porsche Management 101” curriculum. F. A. sought ideas, insight, and learning wherever he could find it. Modeler Ernst Bolt told Tobias Aichele that, “Butzi wandered back and forth between the body department and the model department,” from Komenda’s workshop to Klie’s. As Aichele wrote in his history, *Porsche 911: Forever Young*, “Suggestions from the young designer were gladly incorporated, but overall responsibility for the Goertz-Porsche cooperative project remained with Heinrich Klie. The half-models were considerably closer to the later 911 silhouette than the first Goertz creations.”

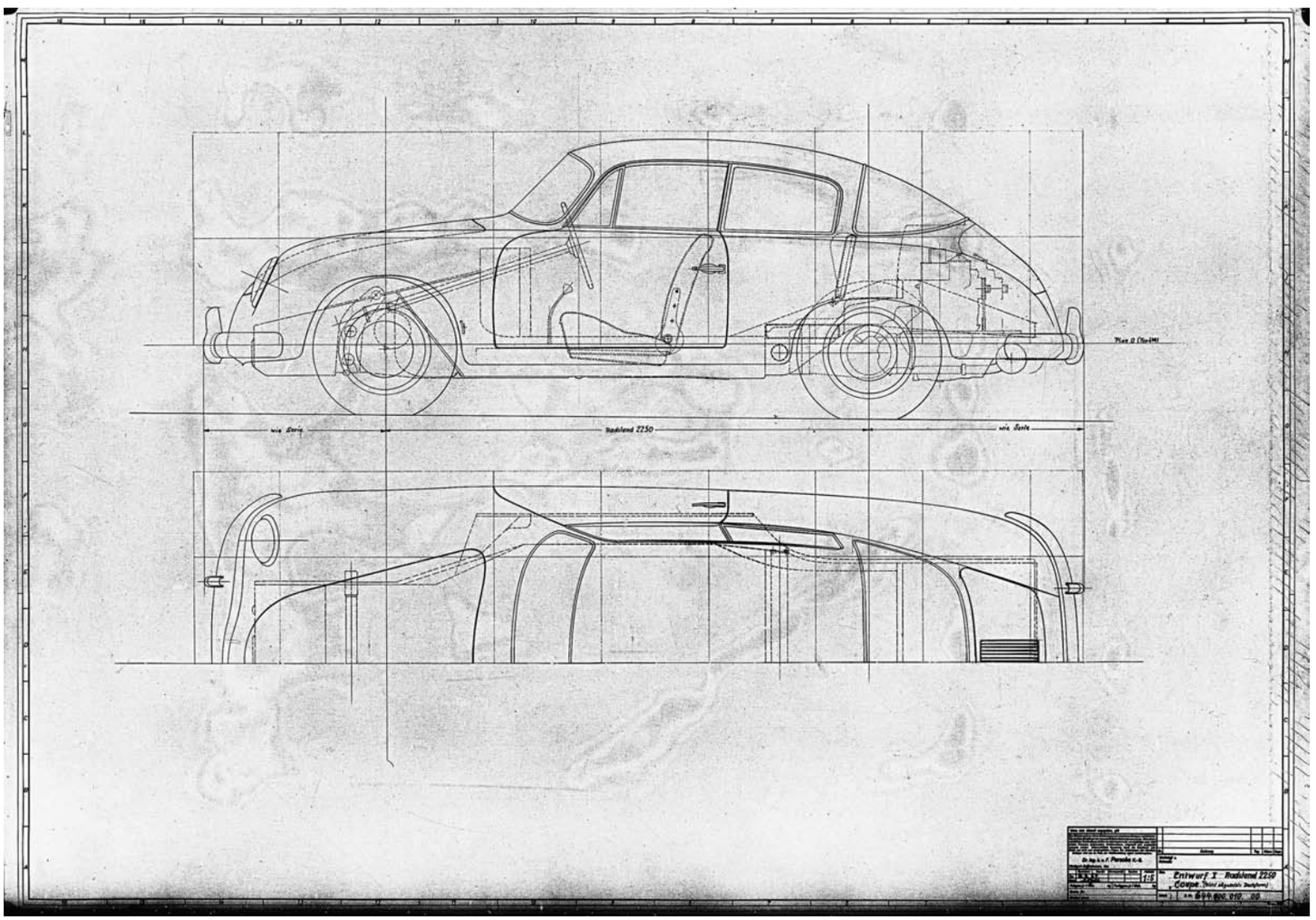
“I was never convinced, that we must build a new Porsche just like the old one.”

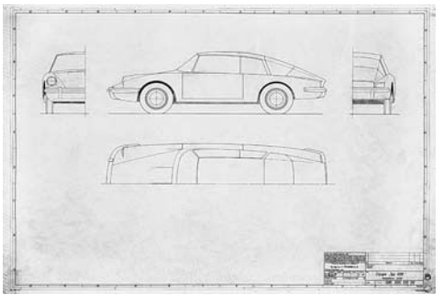
— F. A.



This unsigned 1957 sketch of ideas for the 695 appeared to overlay a perspective view of the driver’s front fender with the profile of the door. The covered headlight was a popular idea in those days, but the elliptical rear window suggests this may be a concept from F. A. Porsche. *Porsche Archiv*

This Typ 644 coupe followed rooflines Komenda favored as they experimented with further Typ 356 forms. This full-four seater, drawn in 1:7.5-scale on August 6, 1957, used a 2,250-millimeter wheelbase. *Porsche Archiv*



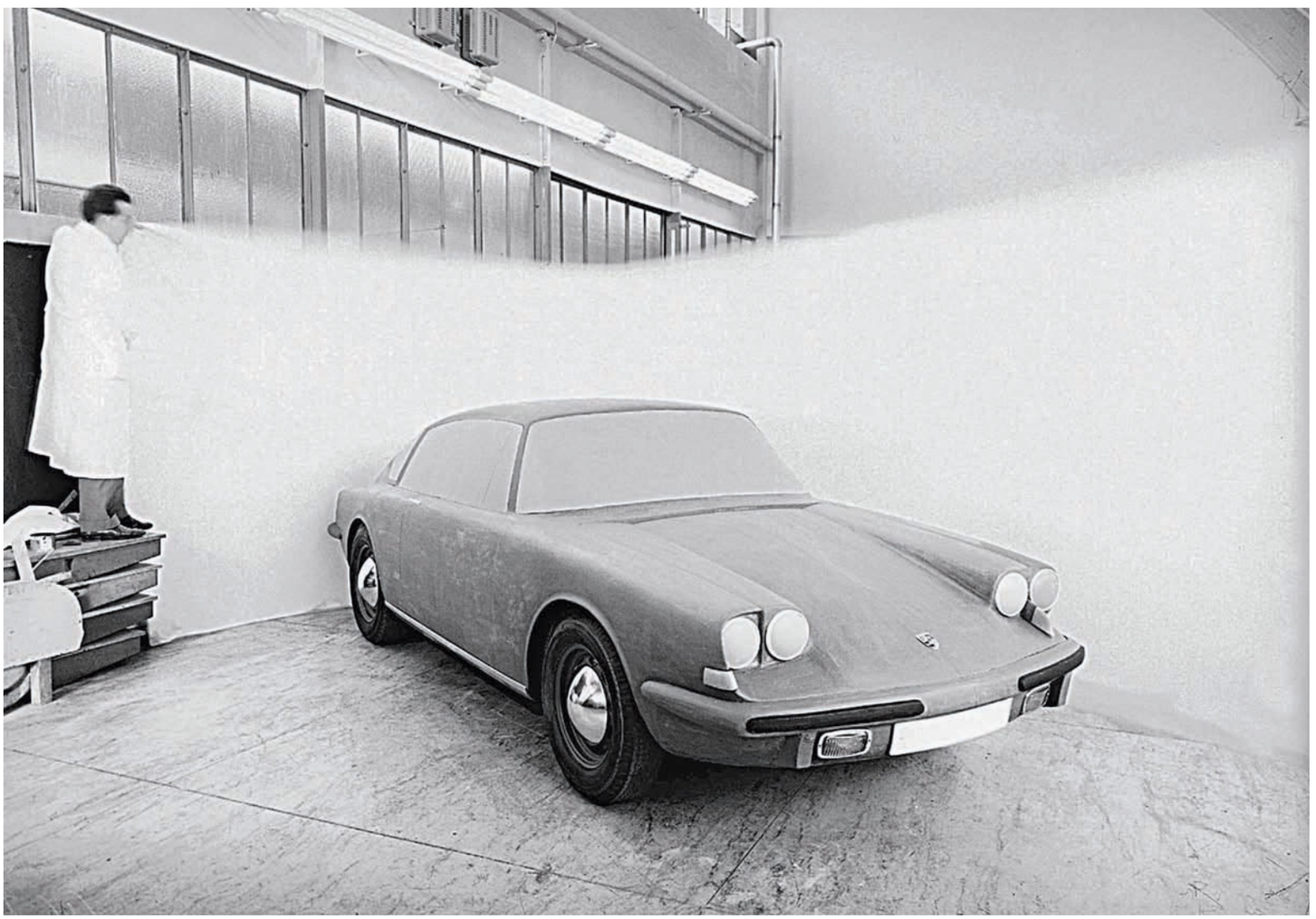


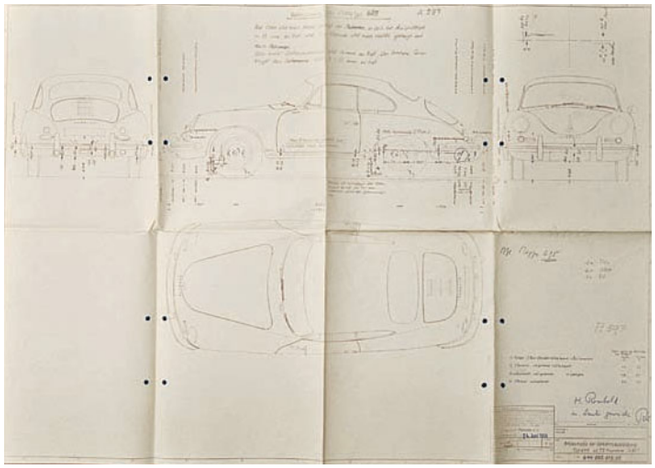
An Albrecht Goertz Typ 695 concept drawing placed the car on the 2,400-millimeter wheelbase. Drawn in 1:10 scale, it was completed on October 18, 1957. *Porsche Archiv*

Goertz's first full-size Plasticine model of the Typ 695 presented Ferry Porsche a radical departure from the rounded forms Erwin Komenda and his staff offered. Ferry had the model photographed in early March 1958. *Porsche Archiv*

A pattern and operating procedures moved into place as well. Throughout F. A.'s youth, he had watched his father run the family business. Ferry was neither a graduate engineer, nor an artist, nor an accountant, nor a salesman. Yet he knew how to find those people, how to keep them challenged and satisfied, how to respect and appreciate them. He was perceptive and imaginative with the ability to influence a line, suggest a suspension alternative, discuss an engine configuration, or recommend financial terms for an international distributor. He became a jack-of-all-trades and a master of managing people. It was a skill, and it became the job his son emulated. Their family's name was on the buildings and on the cars, and everyone who worked for Porsche understood they moved toward the same goal of producing the best automobiles possible for their customers as part of the growing Porsche family. Klie's designers and modelers took significant elements from Goertz's second efforts: First, they replicated the tubular front fenders that emerged from the low sweeping front deck lid, and they improved the fastback roofline that developed during the Goertz/Klie side-by-side collaboration. Second, at some point they realized that although Erwin Komenda continued to offer proposals for the *next* Porsche, they were developing the *new* Porsche. "I was never convinced," F. A. explained in 1991, "that we must build a new Porsche just like the old one."

It remained a busy time at Porsche. At the end of 1958, the company discontinued the popular Speedster, replacing it with a more civilized Convertible D assembled up the road at Drauz Karosserie in Heilbronn. In the engineering department, Technical Program V (T5) entered its final development phase as the company prepared to replace its 356A series with the new B models for introduction at the Frankfurt auto show, the Internationale Automobil Ausstellung (IAA), in September 1959. In Zuffenhausen, construction laborers hurried to complete Werk III, the next phase in building expansion providing additional workspace.





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This technical drawing, completed July 14, 1959, did not identify wheelbase or overall dimensions. Instead, this plan, described as “Body measurements for Traffic equipment Typ 644 on T5 Program (695),” addressed in detail placement of lights and reflectors. *Porsche Archiv*

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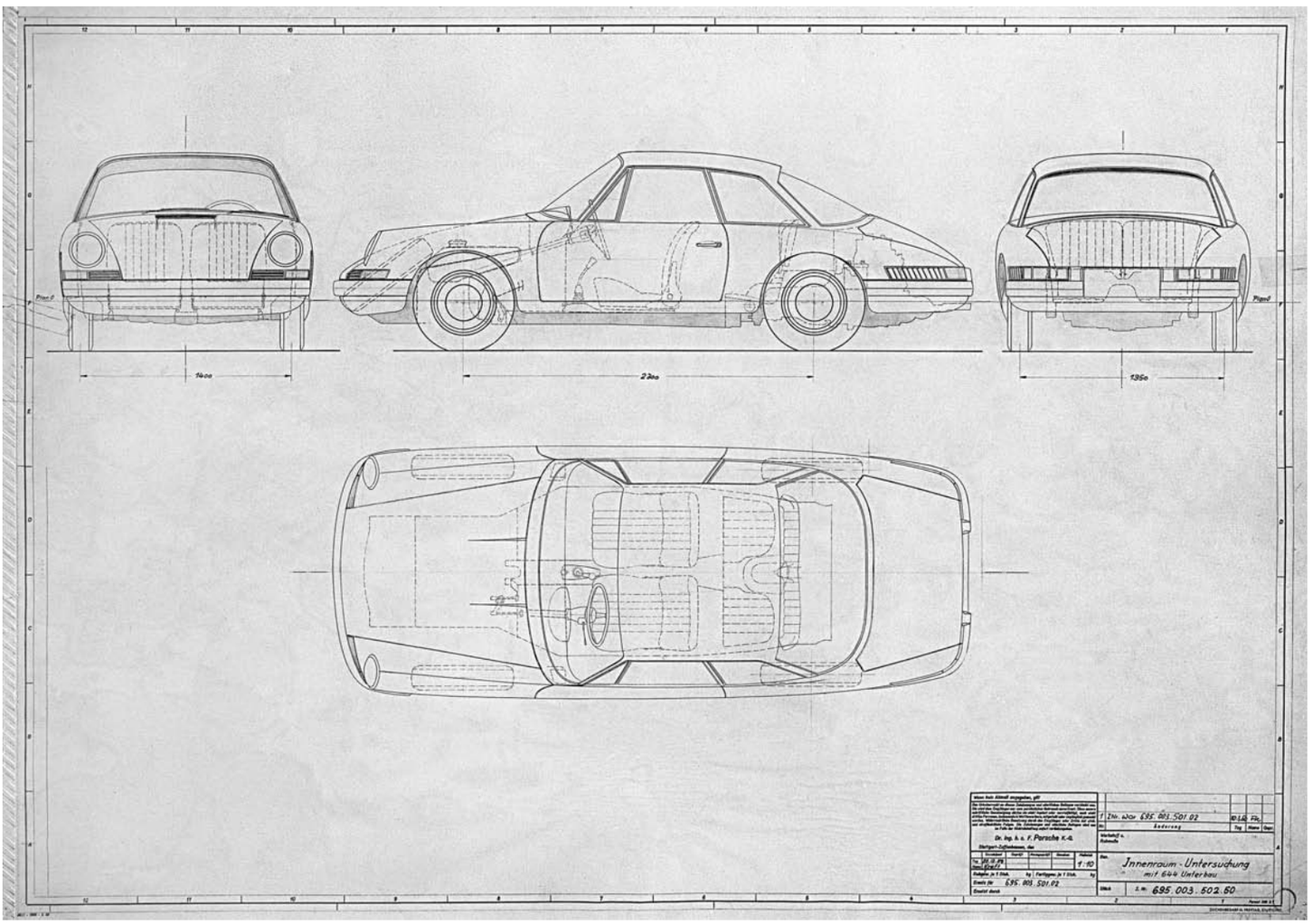
Porsche introduced the 356B in late 1959 as a 1960 model. Within Porsche it was known as Technical Program 5, or T5, and this was a chassis and platform that saw much use in developing the next and the new Porsche. *Porsche Archiv*

In an effort to fill out starting grids in Formula One and Two races, the Fédération Internationale de l'Automobile (FIA) invited manufacturers with enclosed-wheel sports cars to enter. Porsche's success in these races emboldened Ferry to enter the open-wheel fray. What's more, a corollary to FIA regulations for the 1961/62 sports car season led Porsche to contact Carlo Abarth, an Austrian ex-patriot living in Italy. Abarth was an old friend of Ferry's father from the 1930s. He had introduced Ferry to Piero Dusio and his Cisitalia in 1946. While visitors milled around the just-introduced 356B series cars at the Frankfurt show that September, Ferry and Franz Reimspiess met Abarth to discuss his manufacturing a lightweight racing coupe based on the 356B to take advantage of the rules loophole.

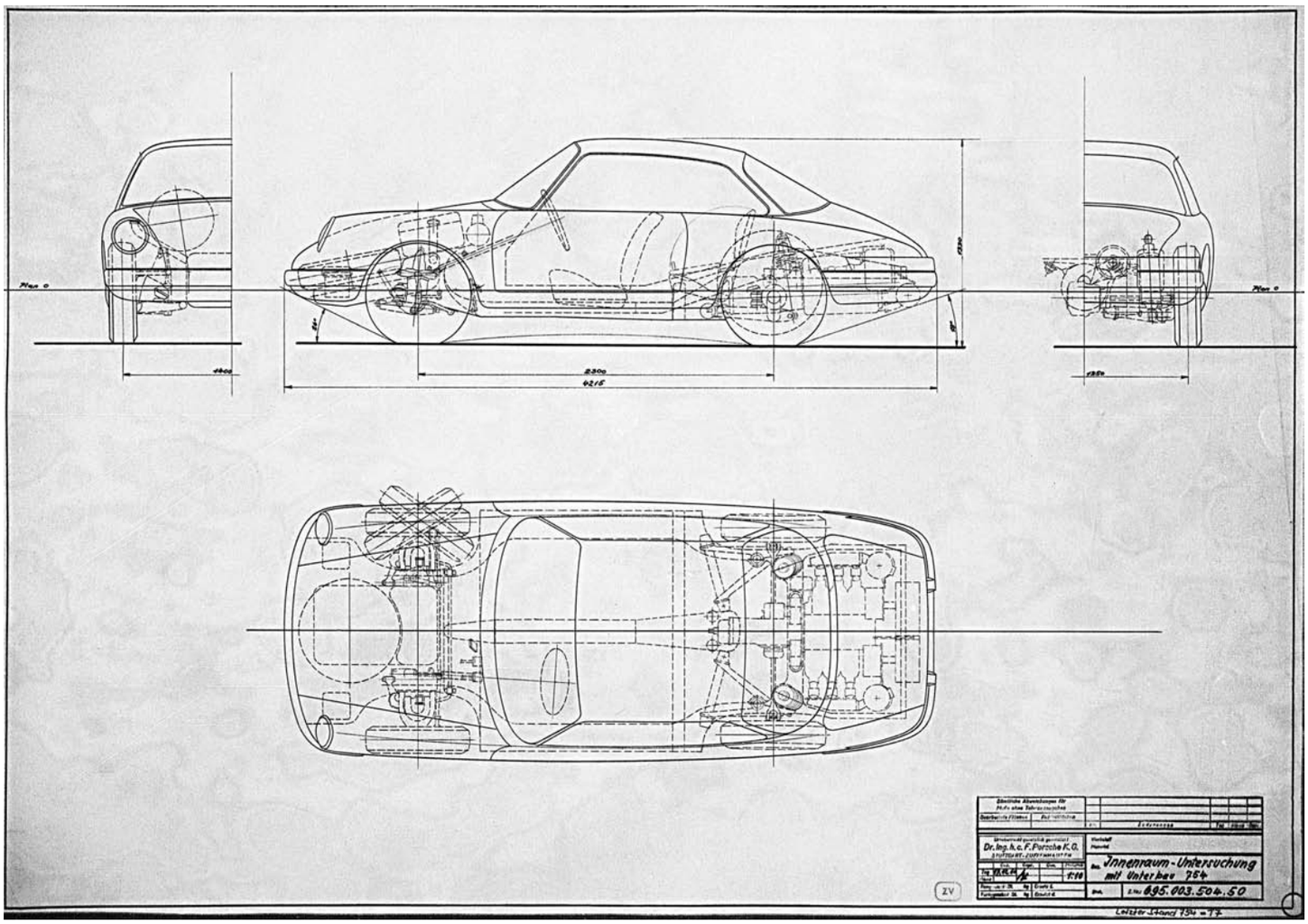
Concept proposals from Komenda's body engineers and Klie's prolific model shop for the next Porsche appeared in front of Ferry like clockwork. Typ numbers ratcheted up as engineering innovations in chassis, wheelbase length, and suspensions encouraged new bodies. The 695 experiments gave way to the 754 series around the middle of 1959. Whatever development procedures Komenda's staff may have followed, Klie's designers had a smoothly polished routine.

Designers Gerhard Schröder, Fritz Plaschka, and Konrad Bamberg were part of Klie's studio and as F. A. explained, "Mr. Klie was there in those days. He was in charge of the studio."

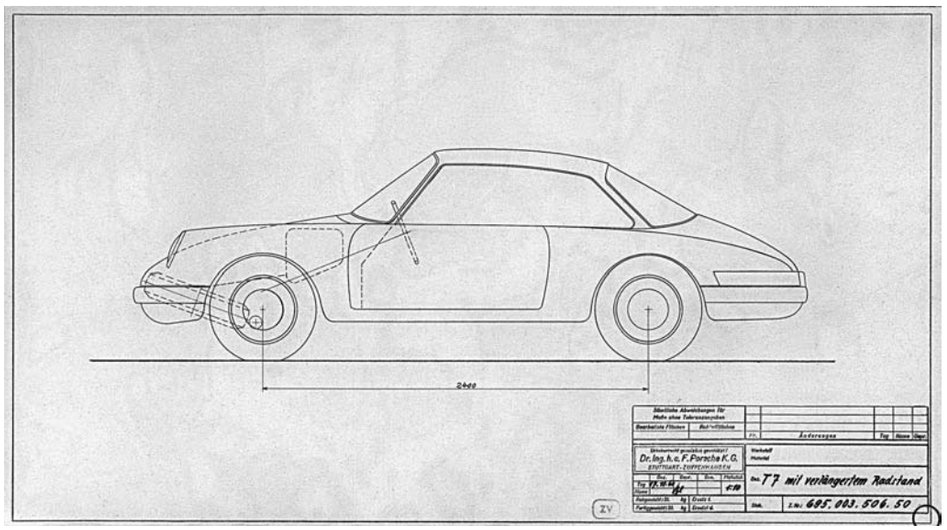
They and three other men, Ernst Bolt, Hans Springmann, and Heinz Unger, worked together on scale models. Nicknamed the "Three Musketeers," Bolt, Springmann, and Unger modeled car bodies in 1:7.5 scale and 1:10 scale. It was a painstaking and painful process that began with forming the models using Plasticine heated to between 120 degrees Fahrenheit and 140 degrees Fahrenheit (50 degrees to 60 degrees Centigrade) to soften it and keep it pliable. (Clay, Heinrich Klie's medium of choice, was even less forgiving.) Blisters were common. F. A. contributed ideas to



The notched roofline appeared in this Typ 695 drawing on the 644 undercarriage. Drawn December 22, 1959, this concept fit the car on the 2,300-millimeter wheelbase but with very short rear emergency seats. *Porsche Archiv*



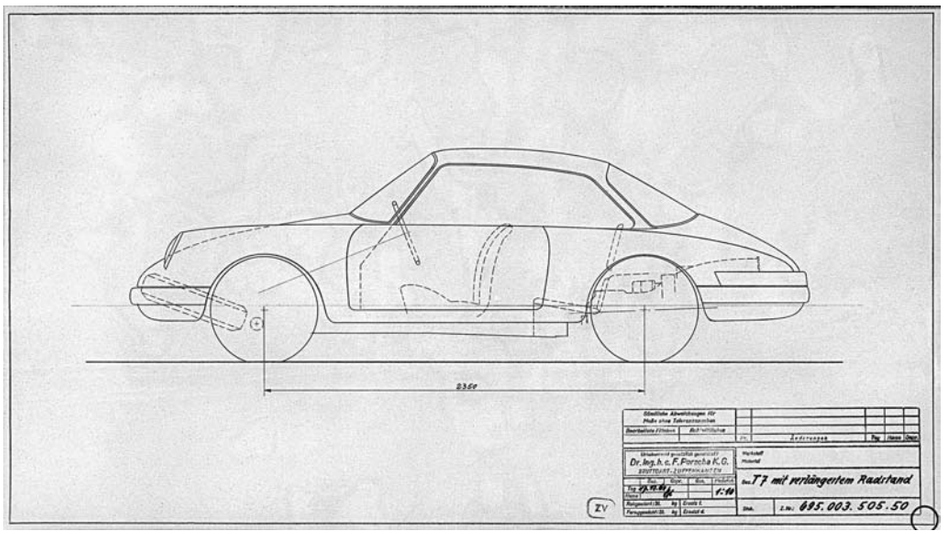
This drawing examined interior space and accommodations of the 695 body on the 754 undercarriage using a 2,300-millimeter wheelbase. Completed on December 17, 1960, it was labeled "final state 754 = T7." *Porsche Archiv*



Another in a series of December 17, 1960, drawings analyzed the 2,400-millimeter wheelbase on the 695 T7 platform. Every change to wheelbase or overall length affected hundreds of other elements, most of which were ignored in this simplified illustration. *Porsche Archiv*

the Three Musketeers, often developed from his own hastily made sketches roughed onto paper or chalked onto a blackboard. Each of the models—no matter whose authorship—went to Ferry Porsche for his judgment. If it earned his approval, then Fritz Plaschka and Gerhard Schröder translated those into full-scale drawings.

Klie's model department delivered a bold and shining new concept to Ferry on October 9, a few weeks after the 1959 IAA show closed and one month after the chairman's 50th birthday. It was designated the Typ 754 on the Technical Program VII chassis (or T7). The T6 designation belonged to the next generation of 356s that were due to reach customers in 1963. Proud of his team's concept, Klie quickly had cast a resin model from their original and they finished it in blue paint. Ferry authorized a full-size model, and Plaschka and Schröder raced to complete it. On December 28, after viewing the 1:1 Plasticine representation, Porsche immediately authorized advancing the concept to the next phase, a see-through model. Crucially, as Aichele reported, Ferry Porsche "ordained that no feature of the 356 era should unconditionally be carried over to the new model."



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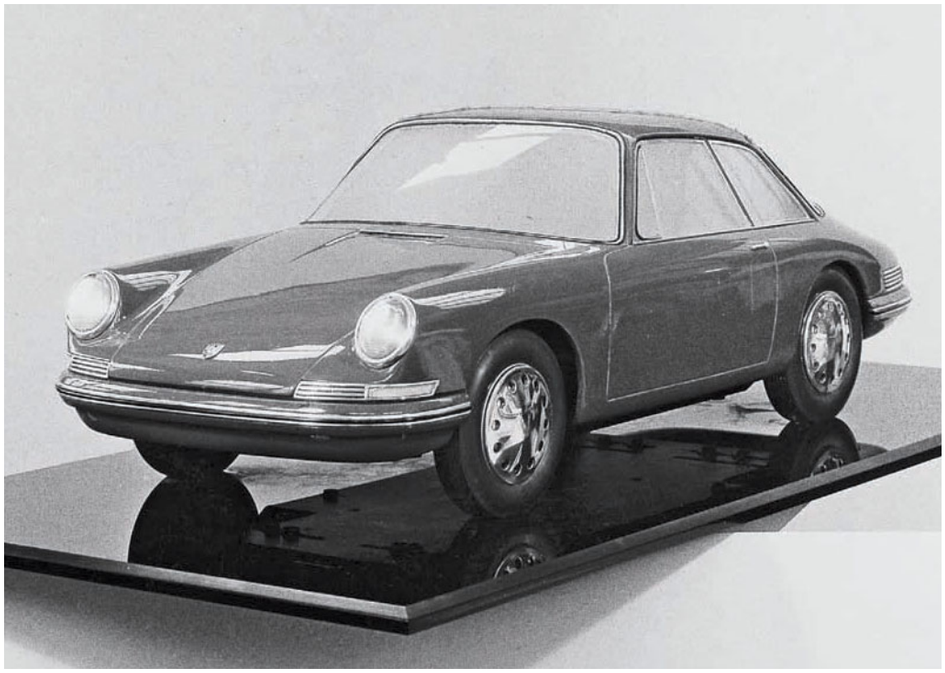
Still another December 17, 1960, drawing considered the 2,350-millimeter wheelbase as the engine, transmission, and seating areas fit into the altered package. Subtracting 50 millimeters, roughly two inches, without lengthening the body, changed suspension designs and handling and also affected interior space. *Porsche Archiv*

PORSCHE STYLING: AVERAGING THE ALPS

Kolb explained the technique of making full-scale drawings of model concepts. They used a three-dimensional grid system to identify points on the model that they transferred to the wall-size sheets of paper. This proved an inexact method of upscaling a car model that measured roughly 400 millimeters long—not quite 16 inches—to a drawing stretching 4,100 millimeters or 13-plus feet long. Such large changes in scale guaranteed that "no matter how carefully you transferred the points," Kolb said, "the roofline looked like the Alps. Picking which of the peaks or which of the valleys represented the real silhouette took special talent."

That talent belonged to Fritz Plaschka. Most designers at Porsche and elsewhere favored using vast French curve forms or sweeps. These were slender pieces of wood sanded smooth and trimmed in long gentle bends to help steady their hand in an arc across the long span of a fender curve or a descending roofline. Some of these were just thin strips that the designers could bend to meet the contour they had in mind. Komenda had a set that were his specifically and legendary in the minds of other designers, "the Komenda sweeps." Plaschka, by contrast, made this roofline, his so-called big line, by hand. His steadiness formed the profile of the new Porsche.



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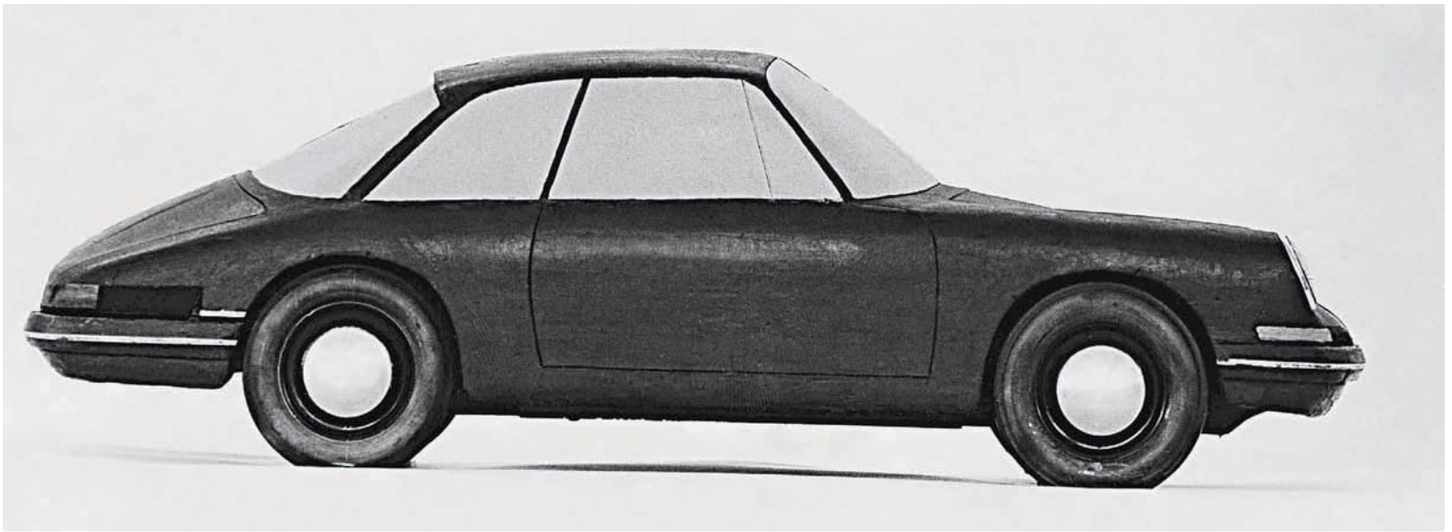
On May 5, 1961, Heinrich Klie had this 1:7.5-scale model cast in resin to present it to Ferry. It excited Porsche enough that he authorized moving ahead with a full-size version immediately. *Porsche Archiv*

"The next step was to 'industrialize' it," as Schröder explained. Before joining Porsche in 1954, he had worked with independent coachbuilders Ramseier & Cie, in Worblaufen, Switzerland, and Karmann in Osnabrück, Germany. At Karmann his first job was in "construction development," where he established the body forms for Volkswagen's Karmann Ghia coupes and convertibles prior to casting body stamping molds for production. These experiences gave him the knowledge and perspective to understand "if it was technically possible to build it," as he put it. Working side by side with Eugen Kolb, the two men took Klie's scale model and Plaschka's 1:1 drawings, and from these, they made sectional diagrams by applying narrow black tape onto large paper to develop all the forms and contours of the automobile. Their task relied as much on interpretation and inspiration as it did adherence to the small-scale model. Along each step, there was design. Schröder, Kolb elaborated, regularly corrected and improved forms, shapes, and the overall appearance. "We always make this first line of the body. And then we [him, Plaschka, and Klie] asked Schröder, and we discussed this line. He had a perfect feeling for the shape."

The rapid pace of activity around Zuffenhausen continued into 1960. It grew so much that despite the new Werk III completed the previous September, Ferry sent finance manager Hans Kern and corporate secretary Ghislane Kaes on a mission to find land for a separate research and development facility. Expansion around the Zuffenhausen works was impossible with the land occupied by Reutter and other manufacturers.

Klie and Porsche's longtime aerodynamicist Josef Mickl took the blue-painted 1:7.5 scale model of the Typ 754 into Stuttgart University's wind tunnel. The body required a few minor tweaks. Throughout this time, F. A. Porsche's role underwent tweaking as well. As a design team member, he offered nudges and suggestions in their projects as they morphed from a three-dimensional miniature to two dimensions in life-size on paper and then onto the full-size Plasticine for final approval and first body molds. He changed the rear side windows from pointed ends on the 754 to the curve that became an element of the production car's silhouette. He recessed the top of the rear window—not only to provide ventilation, but also to break up the large roof surface. The time Mickl and Klie spent in the wind tunnel located the optimum placement for that inset and this improved airflow over the car body.

Prototype development and series introductions continued in Zuffenhausen. Few ideas were discarded. Komenda's earlier Typ 530 notchback roofline entered production when Karmann began manufacturing the 356B Hardtop Coupe. The forms were nearly identical; Karmann's workers began with a cabriolet body onto which they permanently welded the hardtop roof in place.



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The 695 continued to take shape as this model from May 1961 suggests. Executed in 1:7.5 scale, it revealed the inset rear window for ventilation that F. A. Porsche proposed as a means to break up a large surface. *Porsche Archiv*

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das AUTO MOTOR UND SPORT

DAS MOTOR-FACHBLATT FÜR ALLE

INHALT

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37. JAHRGANG
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Unser Titelbild:
Den Mercedes vor der in Nebel getauchten Alblandschaft fotografierte Julius Weitmann.

KENNEN SIE DEN?

Der Porsche Carrera im italienischen Kleid, nach der neuesten Gran Turismo-Mode von Abarth in Turin angezogen. Ende März sollen die ersten Exemplare dieser Sonderausführung des Carrera in den Handel kommen – aber da das Zuffenhausener Werk angekündigt hat, es werde nur 20 Exemplare von diesem 220 km/st schnellen, 797 kg schweren und 25 000 DM teuren Wagen geben, sind diese wenigen längst disponiert. Ein großer Teil geht nach den USA. Abarth hat besonders auf die aerodynamische Form, auf ausreichende Belüftung des Motorraumes und auf gute Rundumsicht Wert gelegt. Der bauchige Ansatz vor dem hinteren Kotflügel freilich scheint uns mehr ein spielerisches Element zu sein.

»

Many auto enthusiasts in Germany got their news through *Auto Motor und Sport*, and this was the first view many had of Porsche's new GT racer, the 356B 1600 Abarth Carrera GTL. The March 12, 1960, issue teased its readers: "Recognize this?" *Porsche Archiv*

In February the first of Carlo Abarth's 356B Carrera GT Lightweight coupes arrived from Turin. With a roof height compatible with shorter Italian technicians, few of Ferry's taller team racers fit in. Wet weather testing soaked the drivers inside as much as the observers trackside. Ice formed in the foot wells of the Abarth Carreras that Porsche ran in the winter rallies. With Abarth subcontracting body manufacture to three Italian coachbuilders, it became clear to Ferry that not everyone could match the quality he demanded in car manufacture.

Klie's designers developed a new series on the shorter 2,100-millimeter Typ 644 chassis under Technical Program VIII, the so-called T8. They showed these to Ferry in March 1960 even as engineering work advanced on the T6 series 356B models for introduction in mid-1961. By yearend, The Three Musketeers along with Schröder, F. A., and the others offered yet another submission to F. A.'s father, this dubbed the Typ 695 T7, designed on a 2,375-millimeter wheelbase. Investigating how passengers and the rear-mounted engine fit inside the bodywork was a recurring theme in their efforts.

On December 2, 1960, Hans Kern met Ferry to look at a piece of property midway between Weissach and Flacht, some 25 kilometers from Zuffenhausen. It was more than three times the area Porsche had wanted. In a moment of lucid foresight, however, he moved ahead on the purchase.

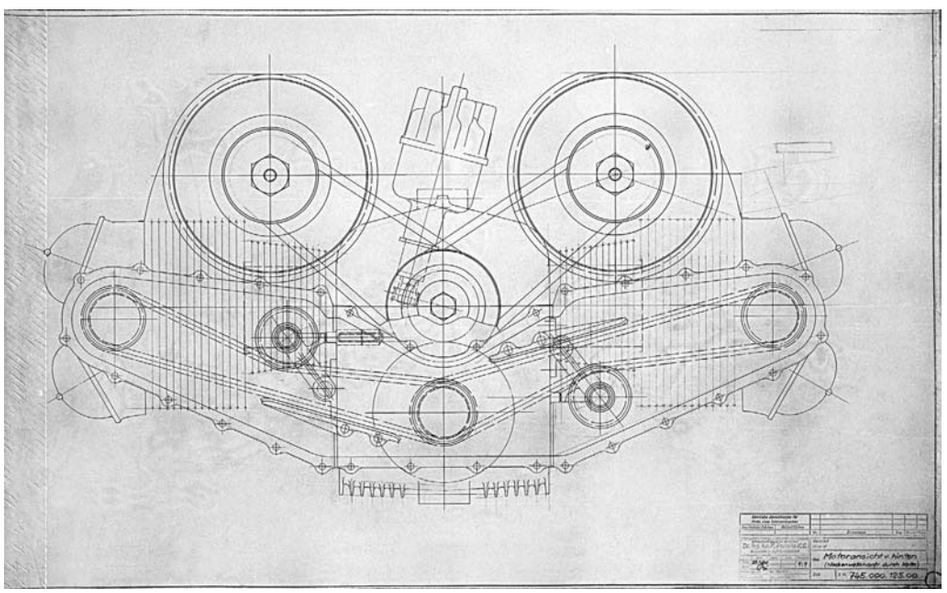
Who influenced the appearance of the car was one question Ferry had to resolve during its transition from Komenda's next Porsche to Klie's new Porsche. Issues of another kind of power proved equally vexing: what sort of engine was to drive this new car?

Almost as soon as Ferry concluded it was time for the new Porsche, he had performance targets in mind. He enjoyed the acceleration of the two-liter Carrera engine, but he was less fond of its noise and its complexity. If this were to be the basic engine for the car, "it should be quiet," he told Tobias Aichele, "not as noisy as a race car."

To reach Ferry's target of 130 horsepower, his engineers calculated they needed a minimum two-liter displacement. Ferry required no loyalty to four-cylinder configurations: That was then; this is *new*. Engine designer Hans Mezger already had developed the opposed one-point-five liter eight-cylinder Typ 753 engines for the 1962 season Formula 1 car, the Typ 804. The Typ 718 W-RS *Grossmutter* sports racing car ran on two-liter flat-eight Typ 771 engines. These were pure racing powerplants, loud and volatile, with narrow power bands of explosive performance and fantastic complexity; it took trained mechanics 220 hours—27 and a half workdays of eight hours—to rebuild a single 771. That was enough of a challenge for a racing effort; it was inconceivable for a series production car.

"It should be quiet, not as noisy as a race car."

—Ferry Porsche



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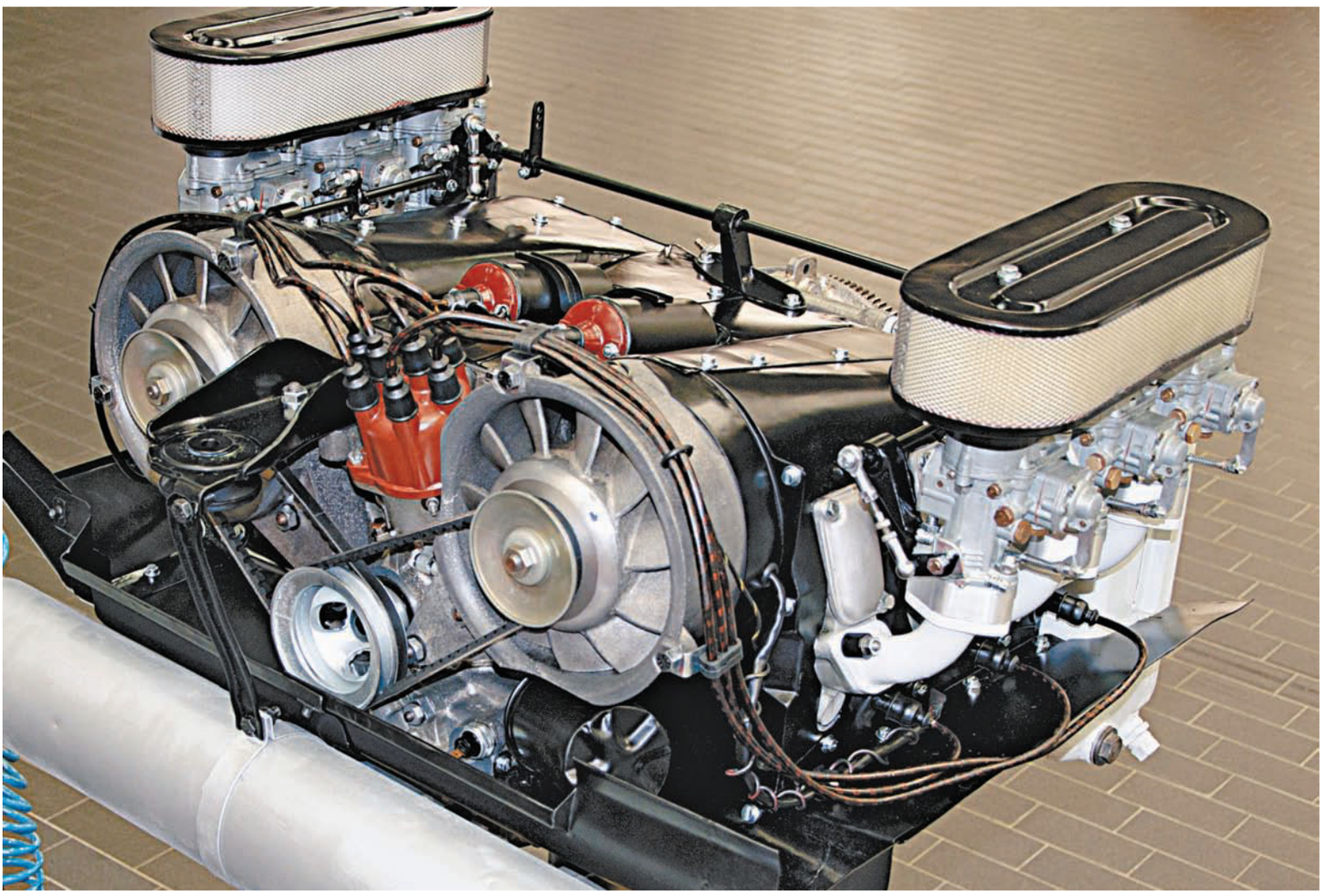
The 745 opposed six-cylinder engine was a clever solution to the challenge of fitting a high-performance engine into a compact space. Its chief designer, Leopold Jäntsche, had created a similar design for Tatra with a fan for each bank of cylinders.
Porsche Archiv

Porsche, the company, had lost engine designer Ernst Fuhrmann when Ferry promoted newcomer Klaus von Rücker over him to be chief engineer. Von Rücker joined the company in November 1955 after several years at Studebaker, the American car manufacturer in Indiana that had hired Porsche engineering in 1952 to develop a sedan (the Typ 542) for them. When Porsche, the engineering service, completed the project, Ferry hired von Rücker to gain his intimate knowledge of American engineering and manufacturing capabilities and automotive tastes. Von Rücker appointed engineer Leopold Jäntsche to head new engine development. Jäntsche arrived from a similar position at Tatra, the Czechoslovakian carmaker who, in 1955, introduced its Model 603 with a 2,545cc air-cooled V-8 engine. For the road, the 603 developed 95 horsepower, but in racing tune, Jäntsche and his team had reached 175 horsepower on dynamometer tests. The engine utilized a pair of axial fans, one for each bank, as well as tubular oil coolers for engine temperature management. This soon became familiar technology to the engineers at Porsche.

Jäntsche and his assistant Robert Binder developed an engine designated the Typ 745. It displaced two liters and used pushrod-activated valves. Unsurprisingly, a small fan cooled each bank of three cylinders. Two camshafts—a legacy of Ernst Fuhrmann's Typ 547 Carrera motor but not used the same way—operated intake valves (by one camshaft fitted above the crankshaft) and exhaust (by the other one below.) Three-barrel side-draft carburetors fed fuel into each cylinder bank through the valley between the valves; this established the engine's dimensions.

As Aichele pointed out in his book, *Porsche 911: Engine History & Development*, this configuration "permitted a low engine profile, with the added advantage that each cylinder bank had its own cooling system. The low height implied that the Type 745 would be a so-called 'under-floor motor,' that is, the engine would not be much taller than the transmission. . . . This concept is usually reserved for commercial vehicles." One proposal that Ferry reviewed did show the engine under the rear seats. It's a safe bet that he had other configurations in mind as well.



The two-liter flat-six developed 120 horsepower using pushrod-operated overhead valves. Between the valve system and the twin fans, the engine was too loud for anyone's liking. *Porsche Archiv–Photo by Jens Torner*

Early engine tests showed that the pushrods limited engine speed. Horsepower output never exceeded 120 at 6,500 rpm. Jäntsche and Binder enlarged cylinder bore from 80 millimeters to 84 millimeters to reach 2,195cc displacement. They reached their goal of 130 horsepower. Ferry, whose hope never flagged—witness his willingness to expend further development funds and personnel to Goertz's body designs—ordered a prototype 745 engine installed in the 754 T7 body. One night early in November 1960, Helmuth Bott took the new car out for a test run. His postmortem was devastating: *"Das können wir vergessen"* (We have to forget about it), he wrote. Bott had little problem with the body, suspension, or its handling.

"It is as loud as a threshing machine," he explained in his report. In the best of the tradition of an engineering firm that loved nicknaming its successes and its failures, the "threshing machine" stuck. The busy clatter of the pushrods and the howl of the twin fans helped doom the engine. More significantly, racing engineers vetoed the design because it required displacement increases, not simply higher engine speeds, to elevate horsepower to competitive levels. This situation literally sent engineers back to their drawing boards.

In early spring 1961, Porsche introduced the Karman-built/Komenda-designed 356B hardtop coupe and six months later, the company replaced the T5 engineering series with 356B T6 body and chassis improvements. Through the summer, Klie's model department pressed ahead with open-wheel plans for racing. The seven-man team worked rapidly on the slim 804 body for Formula One for 1961–1962. Then on October 16, Ferry climbed on a bulldozer and broke ground on the new testing, research, and development center near Weissach. The first thing on his engineers' agendas was a proper skid pad—190 meters in diameter—for chassis, suspension, and tire testing.

Outside the confines of Werk I, II, and III, Ferry's racing efforts met success with the new lightweight Abarth-bodied 356B Carreras. But the workmanship from Italian subcontractors had forced extra work hours on Porsche's racing mechanics and body technicians before a single customer took delivery—and many of the Abarth GTLs returned with "warranty" complaints not from Porsche drivetrains or chassis but from the ill-fitting body panels.

For Ferry, as the 52-year-old chairman of a multivehicle manufacturing concern that shipped road-going and racing cars to customers and events around the world, the challenges were endless. Testing revealed the new, highly technological flat-eight Typ 804 grand prix engine still was down on power compared with its competition. This was a development hurdle that could not be cleared. In road racing, the FIA changed the rules for Grand Touring cars once again, affecting those who planned to compete in 1962. Carlo Abarth warned Porsche he wanted to upgrade one of his cars into a class that raced directly against the lightweight coupe he had done for Ferry.

Porsche's body engineer continued undermining design efforts that, in some cases, came from Ferry's own son. It came to a head at a design review that Ferry Porsche scheduled for mid-October 1961. According to Kolb and Schröder, Ferry had made clear since mid-1958, seeing Klie's half-model mounted against Goertz's second proposal, that he preferred a fastback roofline with a 2+2 seating arrangement that both of these concepts showed, one that incorporated shorter rear seats for occasional or emergency use. Kolb was there for this next review. He recalled that the full-size drawing for the Typ 754 T7 with Plaschka's long sloping roof and rear window representing Klie's group was on a large board, as was one for Komenda's latest notchback four-seater.

"There was a big meeting at Werk I about the rear seats," Kolb said. "Ferry, Komenda, Schröder, Butzi, they were all there. The designs for both versions of the car were on frames away from the wall. It was usual at Porsche to have two cars developed, parallel versions. It was quite normal. And then Komenda measured the rear seats of the other car [the Schröder development drawing] and wrote new measurements for the rear seats—as everyone was looking. Then Komenda said, 'How do you choose now? This or this?'

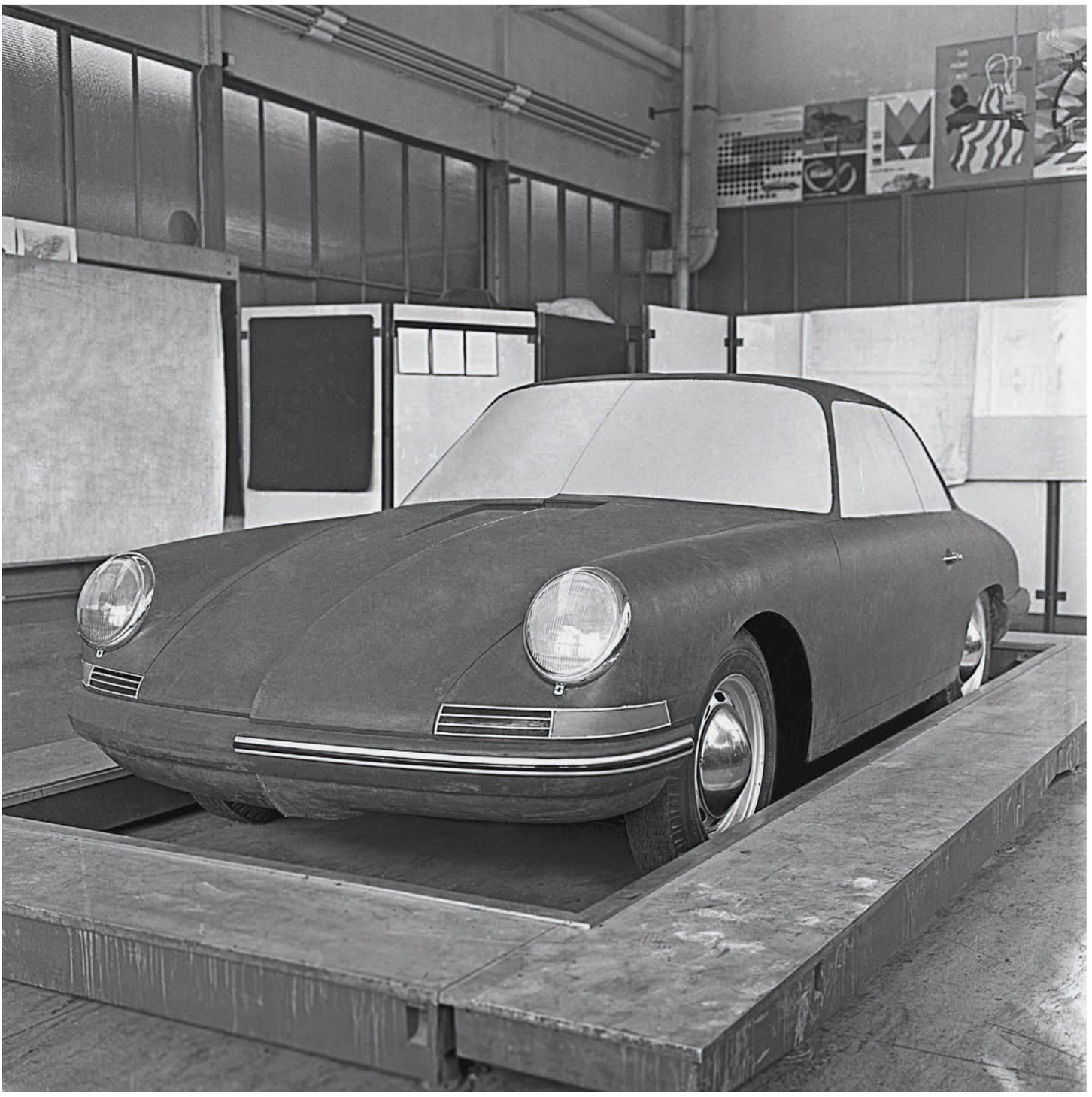
"Komenda, Ferry, and others discussed the shapes of the rear seats. More comfortable, Komenda wanted to do. And Butzi was clear: More sporty, less comfortable.

"Ferry recognized the problems between these two guys and the bodies. And then Ferry said, 'We make this,' and it was the Butzi version. In front of all the people, Komenda was in second place." That day advanced the 2+2 to full-size preparation. And, it turns out, this is when Ferry's—and his son's—relationship with Erwin Komenda began to deteriorate.

Following Ferry's approval of the Klie/F. A. Porsche resin casting, modeling started in Werk I on the full-size Plasticine 754 T7 model. As with every concept proposal, an "A" and a "B" side were mandatory. *Porsche Archiv*

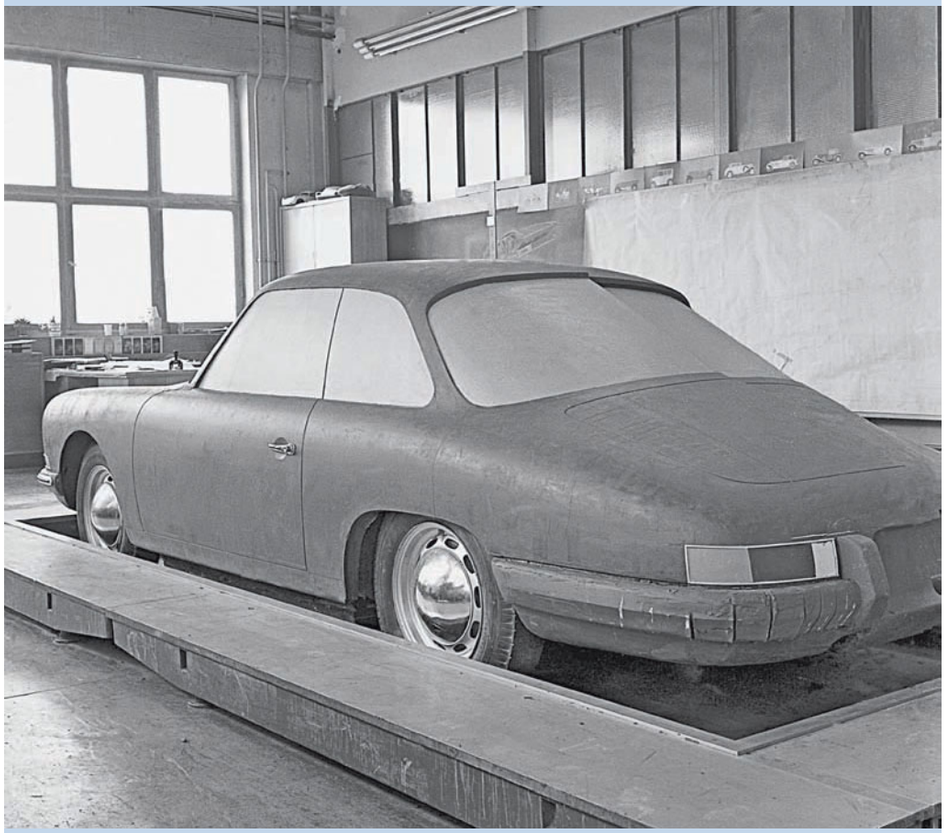
"Komenda, Ferry, and others discussed the shapes of the rear seats. More comfortable, Komenda wanted to do. And Butzi was clear: More sporty, less comfortable."

— Eugen Kolb



FENDING OFF THE VERTICAL LINES

"Those were the design parameters," F. A. explained in 1991. "The 911 was first of all required to have emergency seats . . . jump seats, and there was the rear engine. And there are headlights for the 911, for driving at night. They are markedly more important than it was for, say, the 904. Aerodynamics were given a higher priority in the 904, while the lights were given the priority in the 911." These were crucial considerations to F. A. the designer. But his role within his father's company continued to evolve.



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The T7 at this stage in early 1961 still carried over the slight break in the rear body. A and B rear window treatments made the inset more apparent.
Porsche Archiv

F. A. found that his greater task was protecting the design staff, blocking the door, keeping out prying eyes, and those with opinions that might bring nothing to the design but certainly would slow and distract his colleagues. "As you can imagine," F. A. recalled, "there were many people who were interested in the new car, who wanted to see it, who had their own ideas of what it should be."

Chief among those, it turned out, was Erwin Komenda. Within weeks of Klie's wind tunnel work, Komenda's team offered Ferry their next candidate on which he drew another metaphorical vertical line in answer to Ferry's request for a horizontal one again. But worse, while he and the rest of his staff continued designing models for a larger four-seater, Komenda routinely changed the drawings that emerged from Klie's studio so they reflected his own ideas more closely. Admittedly there were skills, experiences, and techniques—ways to resolve surfaces between bumpers, headlights, and turn signals, as an example—that Komenda's team knew intimately and that F. A. could not have known even if he had spent 20 years at Ulm, but it went on for more than a year and it steadily became clear to Ferry.

A recent interview with Karl Rabe's son, Heinz, who has been working on his father's diaries as a memoir, revealed a turning point in office politics. Komenda was humiliated by this design review. It was his independence, but also his view of the German auto industry, that motivated and inspired him. As Rabe explained, "He never saw the successor as a 2+2 car, always as a four-seater." In his mind, Ferry Porsche was making a mistake—not being true to his interest in bigger American-type cars. Heinz Rabe knew this because his father Karl was Komenda's boss in the Konstruktionsbüro Aufbau, always abbreviated in documents as KBA (literally "design department body").

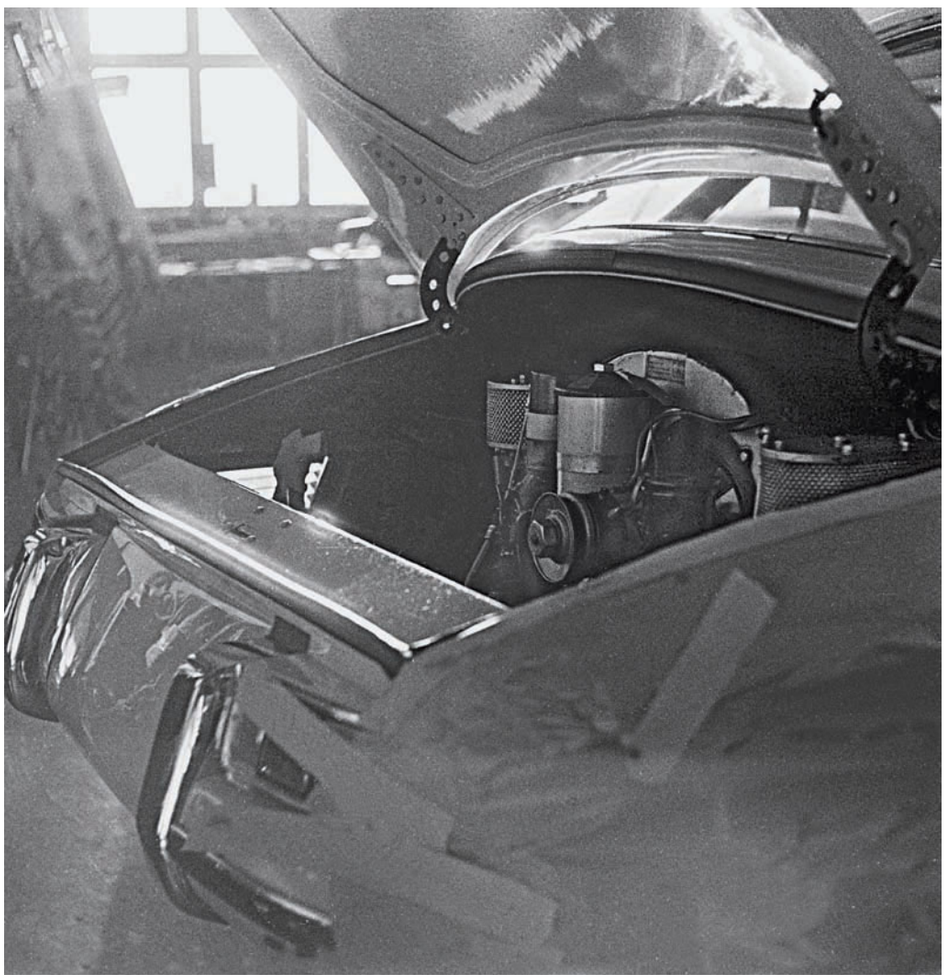
Work in the basement studio at Reutter saw the prototype 754 T8 come together. Wheel covers from the 356C model accommodated the disk brakes. *Porsche Archiv*

"Ferry understood that Reutter had a department for design and development," Eugen Kolb went on. "To separate the two competitors at this time, Ferry told Butzi to take the model to Reutter. Reutter and Porsche employees worked on the car side by side and the coordinator was Schröder. This was Ferry's decision. To keep the peace. Because Komenda wanted to do a bigger body with more space. And Ferry did this because he did not want to have the bigger car." This was consistent with his publicly espoused philosophy of Porsche's place in the market: shoemaker, stick to your lasts. As Germany's sports car producer, he believed he knew his place, whatever his true interests may have been.

That day also solidified in Ferry's mind something he had suspected for a while. The roles of his body construction department and of the design team working with his son were competitive, but not necessarily compatible. As he later told historian Tobias Aichele, "I had to realize that a body designer was not necessarily a styling man, and vice versa." To Aichele he admitted something more: "Besides which he always changed my son's styling concepts in the direction represented by him and his team."

Komenda's independence was no secret. Racer/journalist Paul Frère wrote in his *Porsche 911 Story*, "Komenda insisted on following his own ideas, rather than the instructions given to him by the head of the company." Within days of that review, Ferry took steps to protect his styling men and to ensure that his own preferences for the new Porsche prevailed. He contacted Walter Beierbach, Reutter's managing director next door to Porsche's Werks. Ferry wondered if they had room in their body development studio to help Klie's designers finish a project. Beierbach responded quickly.

As Aichele reported, on October 20, 1961, Reutter assumed responsibility for developing "the approved T8 body on the T6 [356] chassis, assuming a production start in July 1963." Three days later, Porsche asked Beierbach to "study options for delivering a simplified and lower cost cabriolet, which can fill the market niche of the discontinued Roadster."



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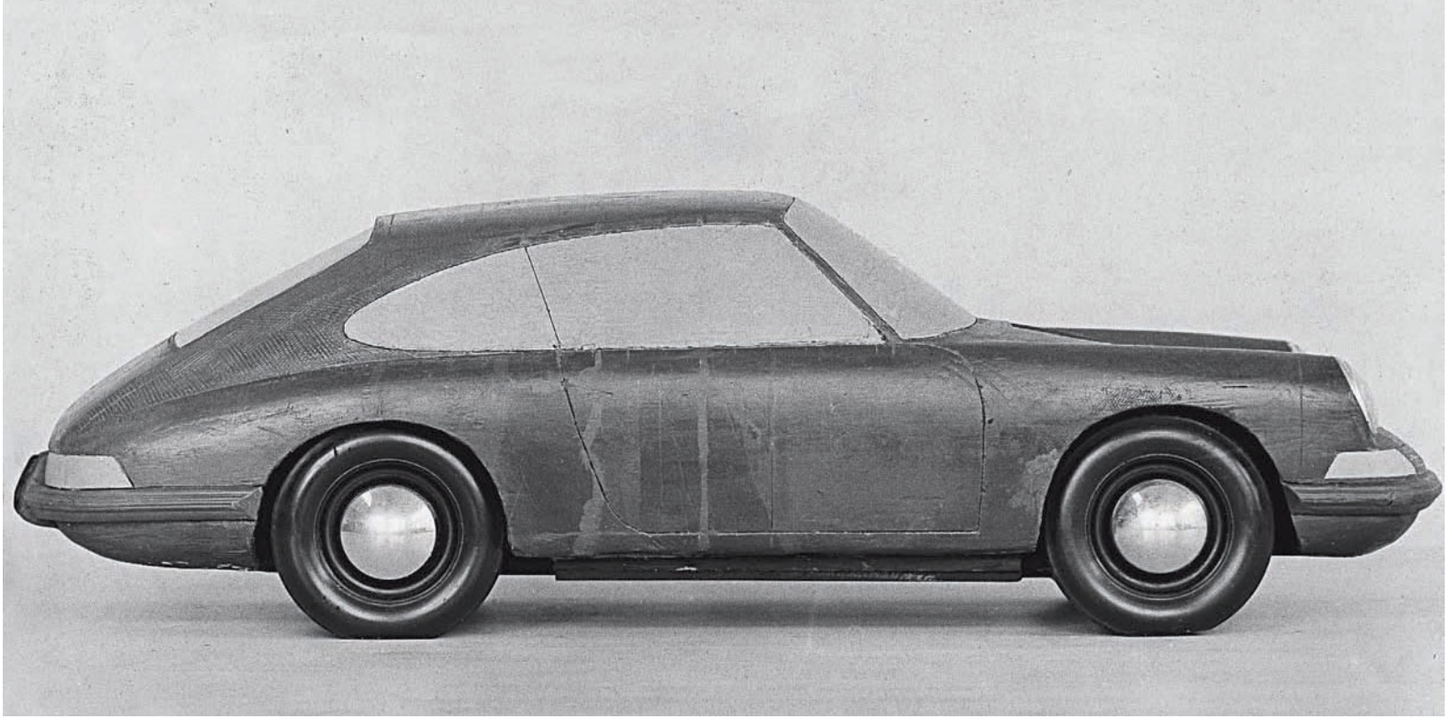
With the new engine still in development, Reutter mechanics installed a 356B version in order to create a running prototype. Gerhard Schröder recalled that Porsche staff and Reutter personnel worked long days, regularly returning to the studio after a dinner break with family and then laboring long into the night. *Porsche Archiv*



With every model, a few more changes massaged the forms into place. On this late-1961 1:7.5 Plasticine version, the roofline stayed straight for a longer distance, but on the sides of the model, the first indications of door cut lines appeared. *Porsche Archiv*

About three weeks after that, Ferry took everything a step further. Hans Tomala issued an interoffice memo on November 10, 1961. Referring to the Typ 644 T8, it read in part:

> The model is provided as a two-seater, the rear seat space under the luggage compartment is released for the [fuel] tank. This will leave a much larger, accessible front luggage compartment. In addition, the rear window is to be made as an opening flap [hatchback] whereby the rear luggage compartment is externally accessible . . .
>
> The installation of a sunroof is not provided. However, in parallel with the coupe a cabriolet is to be developed.
>
> The body style of the new type is being developed by the Styling Department; Mr. Porsche Jr., and all the documents are made available to the company Reutter.
>
> As liaison and staff of Porsche, Herr Schröder is available to Reutter. In this capacity, he is under Herr Beierbach, who is responsible for development.

Ferry set an ambitious deadline for all this work. He wanted series production of this new car to begin in July 1963, just 20 months away. The following day, Schröder moved with the designs and models to Reutter's. For the next six months, working in a basement studio, he and a few Reutter technicians completed development of the new Porsche.

To further insulate the model department from interference, Ferry made another decisive move: He named his son head of the design department. Heinrich Klie, who had been Porsche's head of design in all but title, slipped to second spot. As Heinz Rabe explained, "All the familiar Porsche employees, Klie, Ploch, and Schröder, all worked in the new F. A. department."

This was the next logical step in F. A.'s management training that had begun the day he returned from school in Ulm. Komenda retained his title and influence as head of KBA, the body design department, the group that developed designs into cars that could be manufactured. In his role as body developer of the T8 while at Reutter, Gerhard Schröder, strictly speaking, still worked for Komenda's department. His loyalties, however, had shifted elsewhere.

Within days Ferry transferred two engineers, Theo Bauer and Werner Trenkler, into the design department. His idea was for engineers to work for his son and alongside the designers so as their creative renderings appeared, there were accurate engineering drawings that bore unadulterated witness to the concepts as they emerged. What's more, with engineers in his department, F. A. got minute-by-minute feedback on the practicality of their ideas.

For their home away from home, F. A. Porsche, who was design boss by this time, hosted a Christmas party for his and Reutter's workers. Gerhard Schröder remembered that F. A. not only hosted the party, but he played chef as well, preparing the sausages and other Swabian specialties. *Porsche Archiv*

As Aichele learned, "The engineers had been referring to the model makers as 'mudscrapers' and had not taken the department seriously. . . . Butzi's intent was to prevent the design and development team from shooting down a concept on the ground that it 'couldn't be done.'" F. A. explained it himself in 1991: "The advantage of my times was the fact that I was the son, which can entail advantages and disadvantages. From my time with Mr. Reimspiess, Mr. Hild, Mr. Mimler, I had an understanding of the technical." He was a "mudscraper" who understood—and could speak—the language of the engineers. Under F. A.'s leadership, the model department took on credibility it hadn't enjoyed before. He seized the advantage, issuing his own inter-office memo that read: "If there is to be a required change on existing studio designs, any department involved first is to obtain studio approval."

"People [paid] more attention to what I said," he explained, "due to the fact that I was the son and had a direct line to the boss. I would be able to work out a proposition, put it in front of him, and say: 'See, that's it.'" The concept became the Typ 644 T8, designed on a 2,100-millimeter wheelbase as a two-seater. Because of the need to carry over the 356 front suspension into the new car, a configuration that limited front luggage space, F. A.'s staff designed the T8 with its fuel tank in the rear.

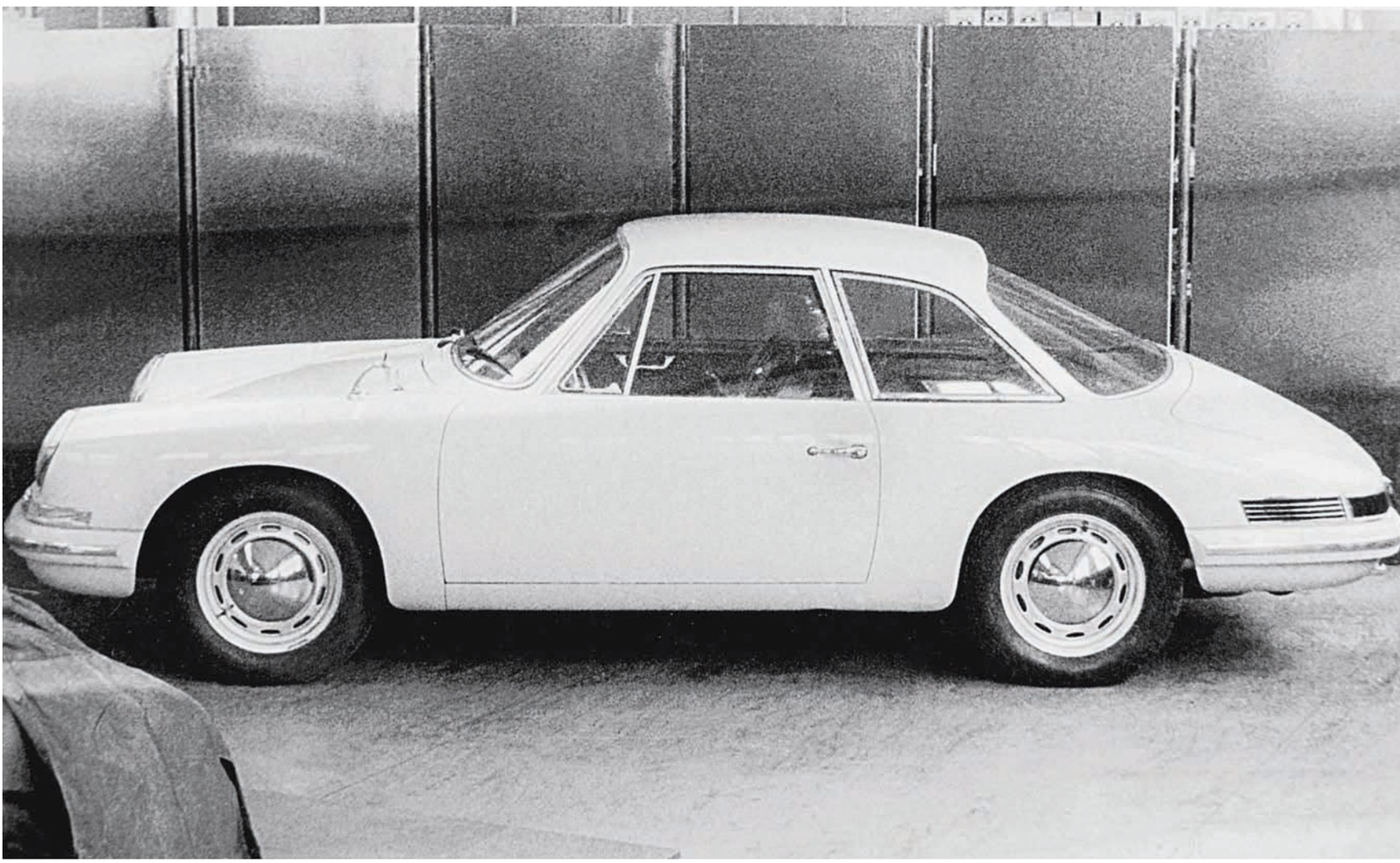
Ferry, who was watching Deutschmarks fly out of his offices for racing and testing purposes, hoped to hold costs somewhere and he threw a challenge to his engineering staff that the T8 body should cost no more than the T6 just introduced on the 356B cars. This tied some hands, including Leopold Schmid who was design chief for engines and suspensions, and his development engineer Helmuth Bott. In a meeting January 11, 1962, Bott declared that it was impossible to design and develop a new front suspension in time for July 1963 production. Schmid proposed that they adopt the 356 system, but with ball joints allowing longer suspension travel than the 356's king pins had provided. Yet Ferry and Hans Tomala argued that although Porsche engineers had created a long-lived 356, a modern suspension was vital for the new car. How the T8 rode and handled had to be adaptable for as many years as the 356 had flourished.

Four days later, on January 15, Helmut Rombold, head of the test driving department, reported that the rack-and-pinion steering system he developed for the Typ 804 Formula One car not only improved response and turn in for the new production prototypes, but also offered the company a chance to provide left- or right-hand drive models without changing the chassis. What's more, with its articulated steering column, it did not move into the passenger compartment in a front-end crash.

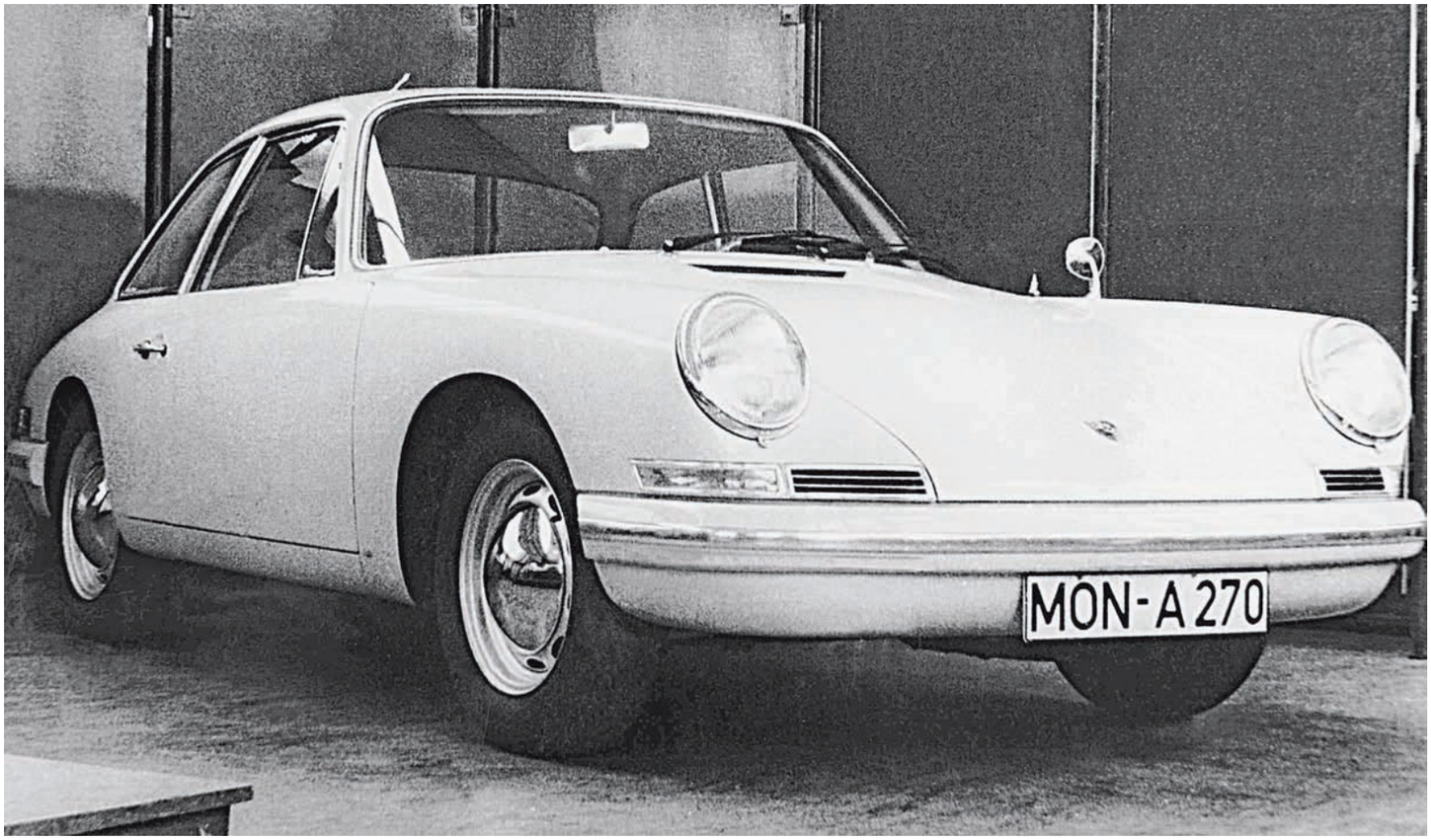
At this point, all those involved with the new car took a breath and reconsidered what they had accomplished and what remained on their lists. On January 24, Tomala summed up the new thinking on the T8. The wheelbase grew 100 millimeters from 2,100 to 2,200, better accommodating the rear "emergency" or jump seats. Front suspension changes provided room to relocate the fuel tank to the front of the car.

Meanwhile Beierbach, who had a nearly decade-long working relationship with Komenda, regularly updated the Porsche body man on the progress F. A.'s department was making on the new 2+2. Despite Gerhard Schröder's best efforts to assure him otherwise, Ferry accepted Komenda's veto of the opening rear hatch after he and Beierbach convinced Porsche the new body was not rigid enough and the rear hatch would rattle.

Komenda further unsettled the time schedule. On January 31, 1962, two weeks after Rombold's rack-and-pinion steering introduction, he submitted to Ferry three new full-size wood, metal, and glass models painted as finished cars on the Typ 754 chassis, the T9/1, T9/2, and T9/3. Ironically, these concepts suffered as had Albrecht Goertz's models, from being more Komenda than Porsche. What Klie's team had shown Ferry hinted at the Industrial Design influence that directed everything in the 1960s; Komenda's cars held onto the 1950s. His cars grew in size and bulk with full rear seating, and their details, atypical of Komenda's earlier work, were fussy and unresolved.

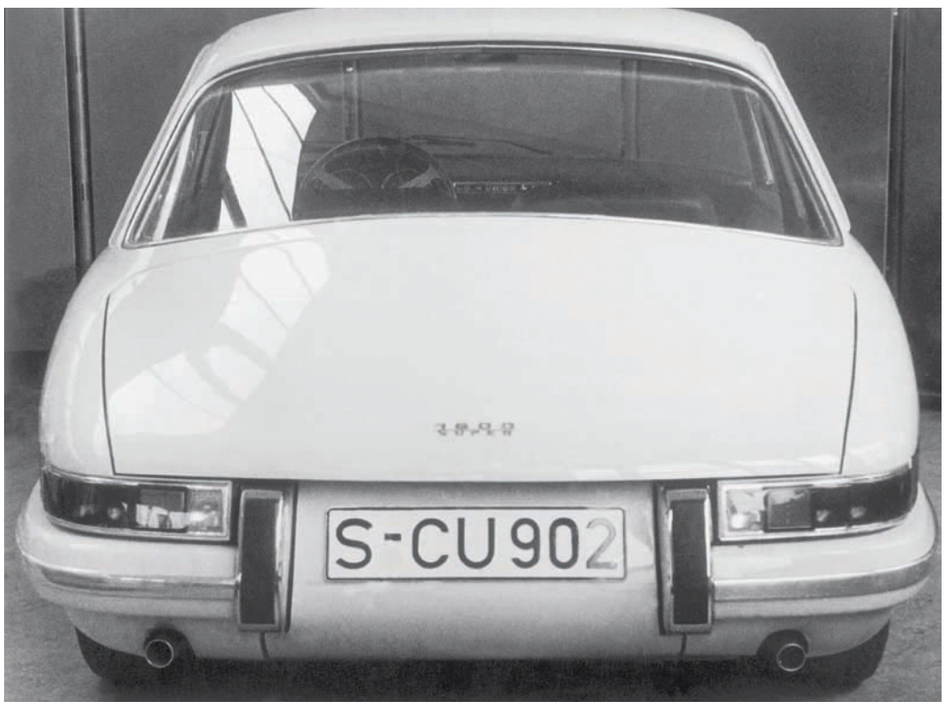


The completed Typ 754 T7, while it represented the work of dozens of stylists and modelers, revealed clearly F. A. Porsche's strong interest in industrial design sense. Erwin Komenda believed in floating doors and deck lids within expanses of body panels while F. A. utilized the seams of those panels as boundaries for functional panels. *Porsche Archiv*



"People [paid] more attention to what I said due to the fact that I was the son and had a direct line to the boss. I would be able to work out a proposition, put it in front of him, and say: 'See, that's it.'"

— F. A. Porsche

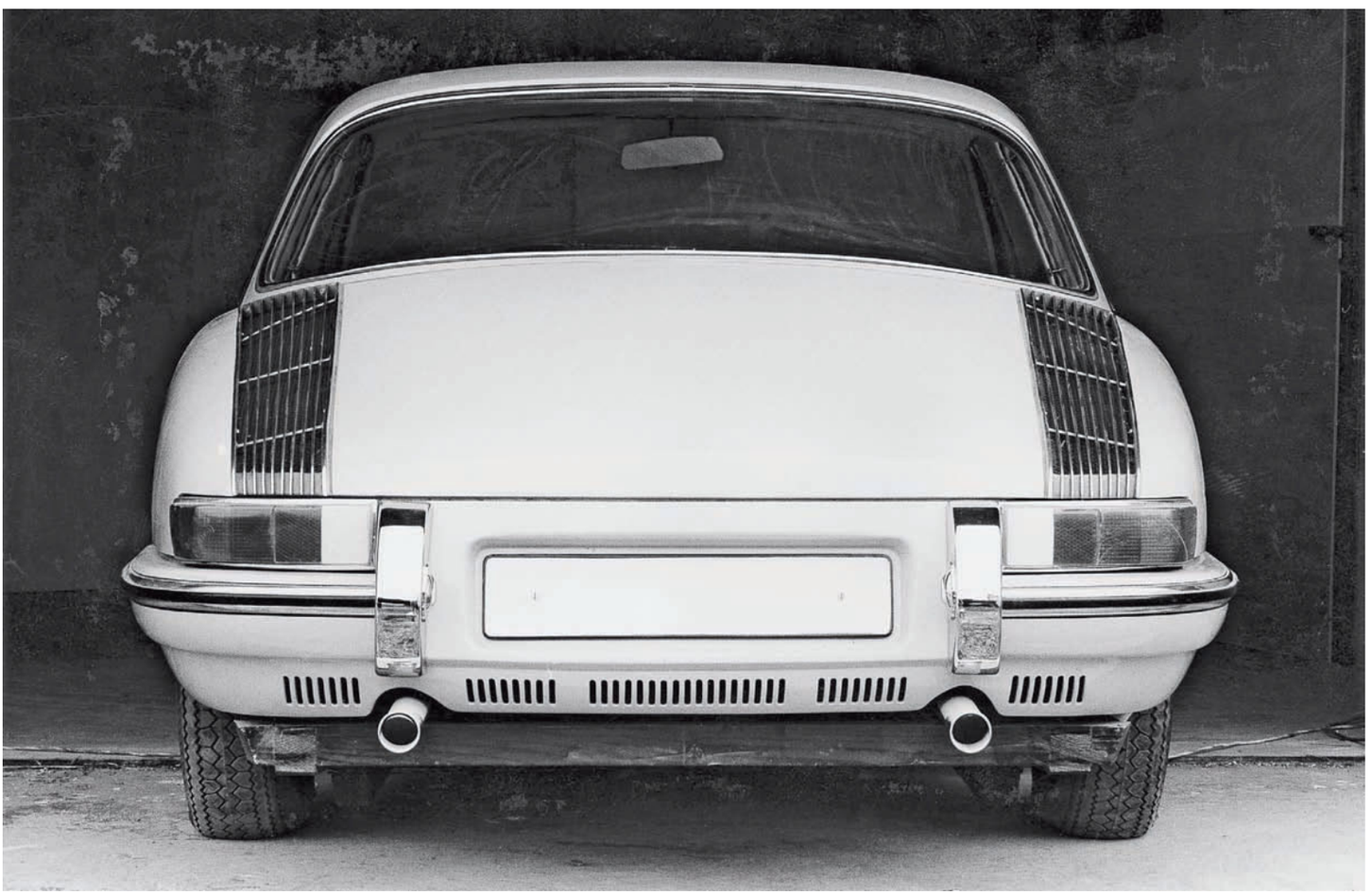


It was very nearly there. By late 1961 there remained only subtle details and gentle nudges to lines and forms to finish the car. *Porsche Archiv*

The back end of the F. A. Porsche team 754 T7 had a bit further to go to reach the configuration that went into production. Air intake and cooling came through the side of the rear quarter panels, which proved insufficient. *Porsche Archiv*

Erwin Komenda's 754 T9 appeared in January 1962. This was one of three variations his design team produced. *Porsche Archiv*

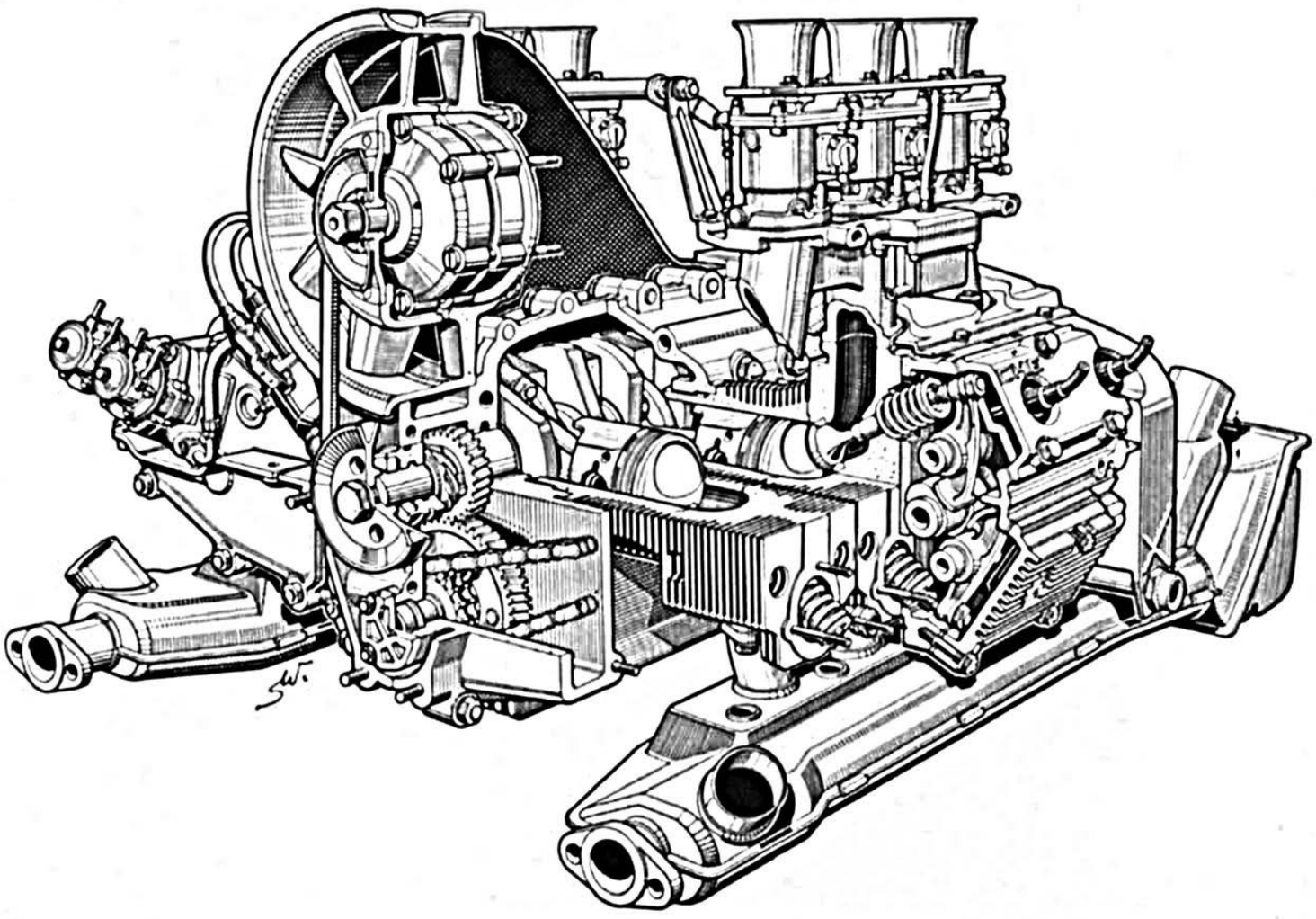
Engine ventilation became an issue that plagued the design staff and engineers as the car closed in on its debut. This was the back end of one of Komenda's team T9 proposals. *Porsche Archiv*



About this time, Ferry replaced von Rücker as chief engineer with Hans Tomala, already involved with the new car, but now given engineering development along with his other responsibilities of design and manufacturing. Ferry had good reason; he had driven the T7 body with the twin-fan 745 engine for several months before, and as Aichele put it, he "banned the design of other new pushrod engines once and for all."

That meant only overhead cams would do. And this required pulling racing engine designer Hans Mezger into production work. The rapidly escalating costs of the new Porsche's development convinced Ferry that continuing in Formula One (especially after so little success) was not a prudent investment. He canceled the 804 program for 1963. His competition engine designers suddenly were available, a decision that made sense because there was never a doubt that the company and its customers would race the new production car.

Mezger knew the performance capabilities that dual overhead camshafts provided from his work on the 771 and 804 racing engines. He never considered anything else for the new production powerplant. He also understood that gear-driven overhead cams were fine for racing where costs, intricacy, and noise were barely considered. Those were drawbacks for a road car, however. Mezger and fellow engineer Horst Marchart (who went on to head engineering research and development) developed a chain-driven overhead cam configuration that worked because of a hydraulic tensioner Marchart invented.



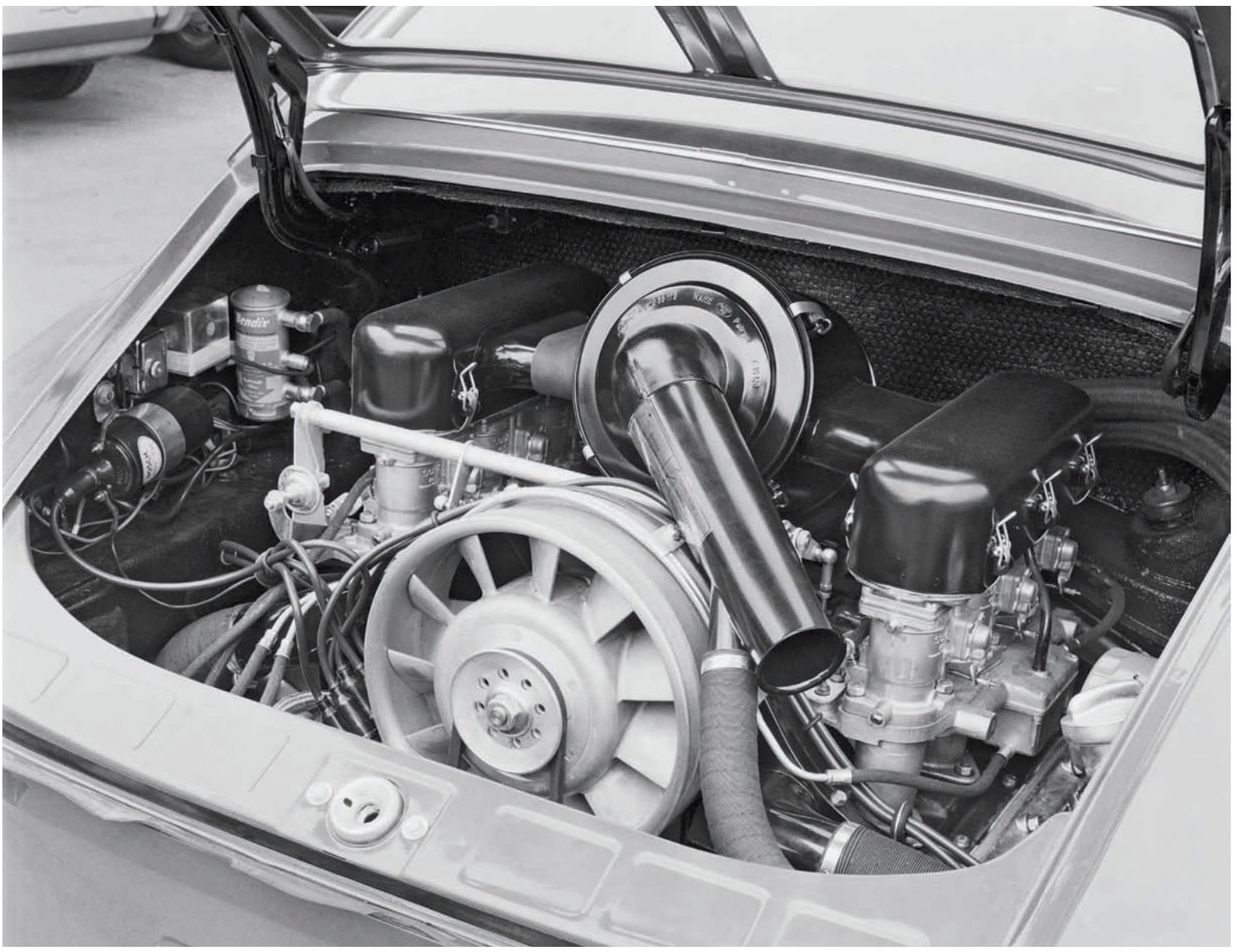
The 1,991cc Typ 901 engine incorporated chain-operated overhead camshafts and one intake and exhaust valve per cylinder. The opposed six-cylinder engine developed 130 DIN (148 SAE) horsepower at 6,100 rpm. *Porsche Archiv*

An engine's ability to rotate fast relied on crankshaft stability. The 745 had four crankshaft main bearings, which seemed a logical configuration. But Mezger and Marchart wanted one on either side of each connecting rod. As the design progressed, this new engine carried the Typ 821 designation. At first they thought seven bearings would anchor the rapidly turning crank; however, they concluded by June 1, 1963, that they needed eight. In Karl Rabe's record books, this engine went in as the Typ 901/1. Extreme testing showed problems with oil transfer to outer cylinder banks in hard cornering, presenting another serious drawback for racing applications.

By this time, Ferry Porsche's nephew, Ferdinand Piëch, had joined the company fresh from engineering school at the Swiss Technical Institute in Zurich. Like his cousin F. A. Porsche, Piëch had spent weeks before and after school sessions in the design department; by April 1963, he was a full-time Porsche engineer. Combining the lessons learned from his grandfather Ferdinand Porsche and those he absorbed in Zurich, he pushed for the highest-quality materials from suppliers and matching work from his colleagues. As he was a Porsche family member, despite the protests of his uncle's cost-conscious purchasing department, Piëch's preferences generally prevailed. Ferry followed his recommendation to adopt dry-sump lubrication for the new engine.

This system required a separate tank, lines, and pumps, but it ensured even oil distribution throughout the engine range and at any cornering force. In addition, the dry-sump system eliminated the need for a deep oil pan, lowering the engine in the chassis to improve handling. Still, with its vertical 11-vane cooling fan and downdraft carburetors above the engine, it sat too tall for some purposes.

The configuration of the 901 engine with its large central 11-blade fan and its centrally mounted air-intake filter left engine compartment room at a premium. While Hans Mezger's engine offered abundant capabilities for growth and for racing, its height made convertible-top storage impossible. *Porsche Archiv*



The Typ 901 designation—for the new eight-bearing four-cam engine *and* the complete car—first appeared in Porsche's internal documents on January 9, 1963. The engine developed 130 net horsepower using DIN (Deutsches Institut für Normung) standards and 148 gross, according to SAE (Society of Automotive Engineers) calculations. Adding the dry sump did not necessitate a major Typ number change. By October 30, according to Aichele, engineers inside the company knew that Typ 901 engines "intended for production will be numbered sequentially beginning with the number 900 001." That memo stated that engineering had reserved the first 100 engines for its own testing purposes. As Aichele learned, "The 901 prototypes were based on so-called replacement bodies, with chassis numbers beginning with the number thirteen. The first 901 development car," he reported, "carried chassis number 13 321. Engineering numbered these forerunners sequentially only up to the tenth car. The eleventh, numbered 13 352, fell out of the sequence. The twelfth test car, numbered 300 001, bore the first production serial number."

Activity in Zuffenhausen was frenetic. Helmut Rombold's rack-and-pinion steering system went onto the new car. ATE disc brakes, introduced on the contemporary 356C and SC models, came over as well. New independent front and rear suspensions improved handling and provided greater space within the 901 body. The nomenclature emerged from a worldwide parts-distribution and sales pact between Volkswagen and Porsche. The only available sequence of numbers that was large enough to handle a new Porsche model began with 900.

Porsche's neighbor Reutter, having helped in development of the new 2+2, balked at the expense of producing new tooling to manufacture the body panels and constructing new facilities to assemble the cars. Company founder Wilhelm Reutter had died in 1939 and his son Albert, who ran it after that, died in wartime bombing in Stuttgart. Walter Beierbach had managed the company successfully, but, when the family faced the financial commitment to produce Porsche's new car, they chose instead to put the company up for sale. Ferry had no choice; Reutter had helped develop the new car and they knew too much about Porsche's business. He invested six million Deutschmarks (DM)—nearly $1.5 million at the time, more than $11.4 million today—to acquire Reutter Karosserie.

The new Porsche improved on the 356 in many ways. Fritz Plaschka's "big line" roof provided 58 percent greater window glass area. The wheelbase, stretched only 100 millimeters (3.9 inches) from the 356's 2,100 millimeters, and better but more-compact suspensions provided nearly twice the interior and front luggage capacity. Ferry's aerodynamicist Josef Mickl reduced the coefficient of drag from 0.398 for 356 models to 0.38 for the new car. Running prototypes finally appeared on the roads around Zuffenhausen in March and April 1963. Ferry's investment in the new car was approaching 21 million DM (more than $5.25 million at the time and nearly $40 million in today's dollars), including the Reutter acquisition. It presented a staggering risk.

Ferry debuted the 901 at the IAA international automobile exhibition in Frankfurt in September 1963. The car provoked enormous interest.

The IAA opened in Frankfurt on Friday, September 13, 1963. Journalists got in as early as Tuesday evening, the 10th, and briefings introduced new cars to writers and photographers through Thursday. Auto show records reveal that 21 manufacturers debuted models during the 1963 exhibition. Mercedes-Benz showed the closest competitor to Porsche's new car with its 230SL. Further out the engineering spectrum, both Rover Cars of Britain and NSU of Neckarsulm introduced startling new powerplants: Rover showed off a gasoline turbine and NSU displayed its first production Wankel rotary-engine models.

Autos alternated with trucks at Frankfurt, the commercial vehicles filling the hall in even-numbered years while the odds went to automakers. In hall 1A, at stand 27, Porsche had rented 211 square meters, about 2,265 square feet out of the entire show's 800,000 square feet. Surrounded by an Emailblau 356C cabriolet, a Togobraun SC coupe, and a Signalrot Carrera 2 coupe, the company introduced the 901, displaying its fifth prototype, No. 13 325, in a special blue paint. It was reported to be Ferdinand Piëch's test car. Attendance records indicate that more than 800,000 visitors wandered the Frankfurt show halls over the next ten days. Porsche sales director for Germany, Harald Wagner, knew that delivery of the first production model was a year away. He encouraged his staff to make that delay clear. Despite this and its respectable price of 23,900 Deutschmarks ($6,020 at the time; about $45,000 with inflation at the end of 2012), and the fact that no drivable

VON HANSTEIN'S ADVENTUROUS PROMOTION

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INHALT

27. JULI 1963
40. JAHRGANG
15

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Das Titelbild
Den Kadett auf Dauertest-Pfaden fotografierte Julius Weitmann (siehe Seite 14).

ABENTEUERLICH

kostümiert wurde dieses Auto, was aber wohl kaum jemanden daran hindern kann, seine Identität zu erraten: es ist der neue Sechszylinder-Sportwagen von Porsche. „Unecht" ist zweifellos die hintere Haube mit Hecklassen; auch die geschlitzten Blenden in den Seitenfenstern und die Mittelstrebe im Heckfenster dürften an der Serienausführung kaum zu finden sein. Der vordere Kühlluft-Eintritt ist ebenfalls Attrappe, denn zur Wasserkühlung hat man sich bei Porsche ebensowenig durchgerungen wie zum Frontmotor. Getreu der Tradition des Hauses stellte man sich schwierige Konstruktionsaufgaben: der luftgekühlte Sechszylinder-Boxermotor hat auf jeder Seite eine obenliegende Nockenwelle, die mit Ketten angetrieben wird. Zu erwarten sind 130 bis 140 PS, mit denen das sehr strömungsgünstig gebaute Fahrzeug über 200 km/h schnell sein wird. Mit dem Produktionsbeginn ist in diesem Jahr nicht mehr zu rechnen, aber bestimmt wird der Wagen in Frankfurt gezeigt.
FOTO: BLUMENTRITT

»

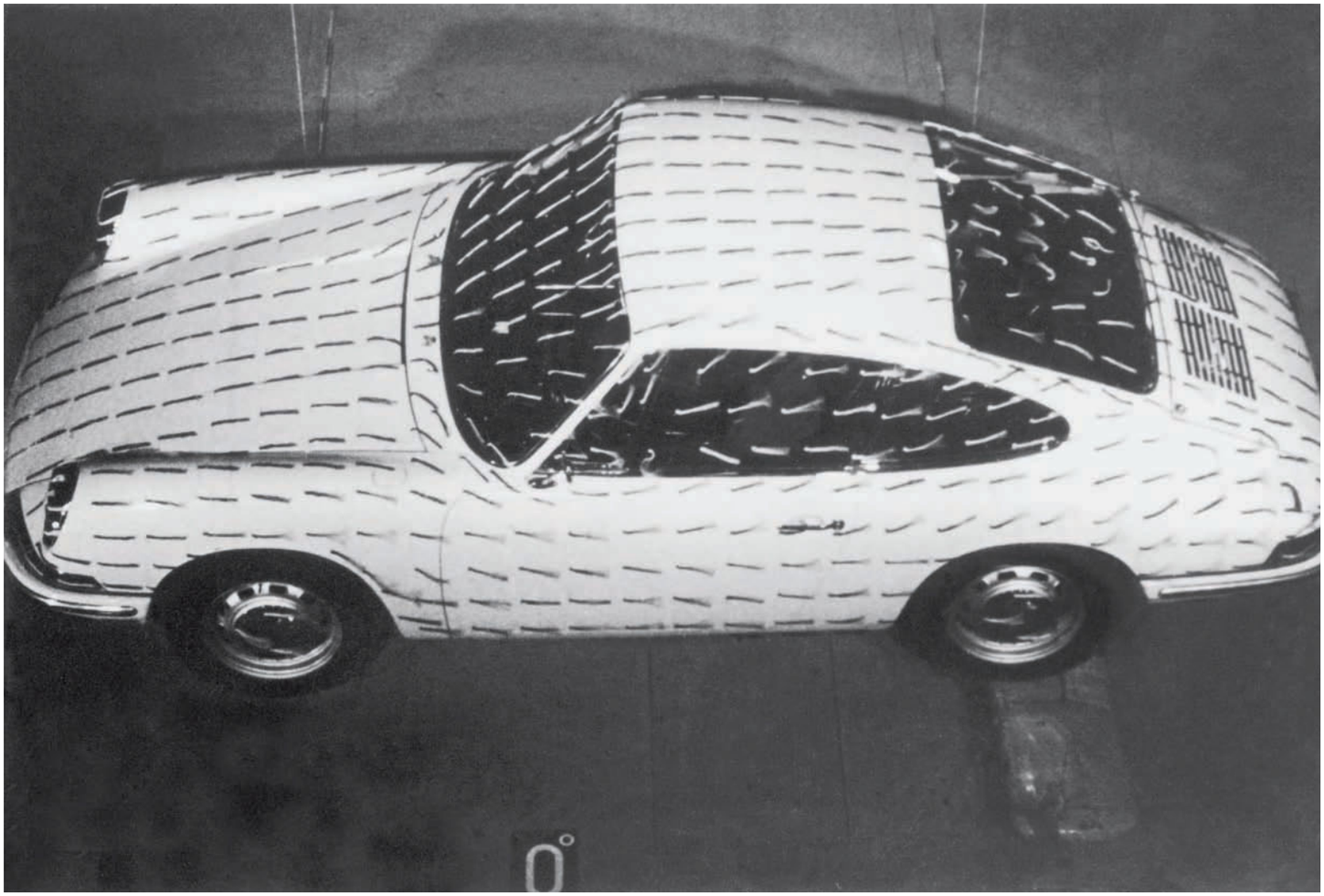
Its contents page headlines often were as exciting as anything else inside *Auto Motor und Sport*. The July 27, 1963, issue taunted its readers with the word "Adventurous," and photos of the camouflaged and winged 901 prototype nicknamed *der Fledermaus*, the bat. *Porsche Archiv*

It hadn't hurt Porsche's cause at all that the company's charming and shrewd press and racing director Huschke von Hanstein had stirred the waters in advance of the introduction of the 901.

Von Hanstein was a regular reader of *Auto Motor und Sport*, the Stuttgart-published enthusiast magazine circulated throughout Germany. Early in 1963, he saw photos published on the contents page that showed a new Mercedes-Benz 600 Series model testing on public roads. It generated a great deal of attention.

Helmuth Bott's engineers had created camouflaged versions of the 901 for nighttime testing, and Von Hanstein and Bott arranged for one car—nicknamed *der Fledermaus* (the bat) because of its two finlike wings on the rear deck—to be captured on film by a friendly photographer. Porsche Archiv director Dieter Landenberger explained that Von Hanstein himself delivered the prints to the magazine, along with the kind of information about the prototype that no spy photographer could know.

Alongside the headline *Abenteuerlich*, the German word for adventurous, or even bizarre, a series of photos credited to Blumentritt in the July 27, 1963, issue whetted the appetites of Germany's enthusiasts.



models existed for road tests, Porsche banked some sales deposits for the new car. (The price fluctuated between Frankfurt and the end of the year as specifications and standard equipment evolved.) This called for 7,000 DM ($1,755) up front, and it came with a promise that Mr. Wagner's staff would send a letter notifying the buyer when they could pick up their new car. At the same time, nearly 400 loyalists placed orders for 356 models.

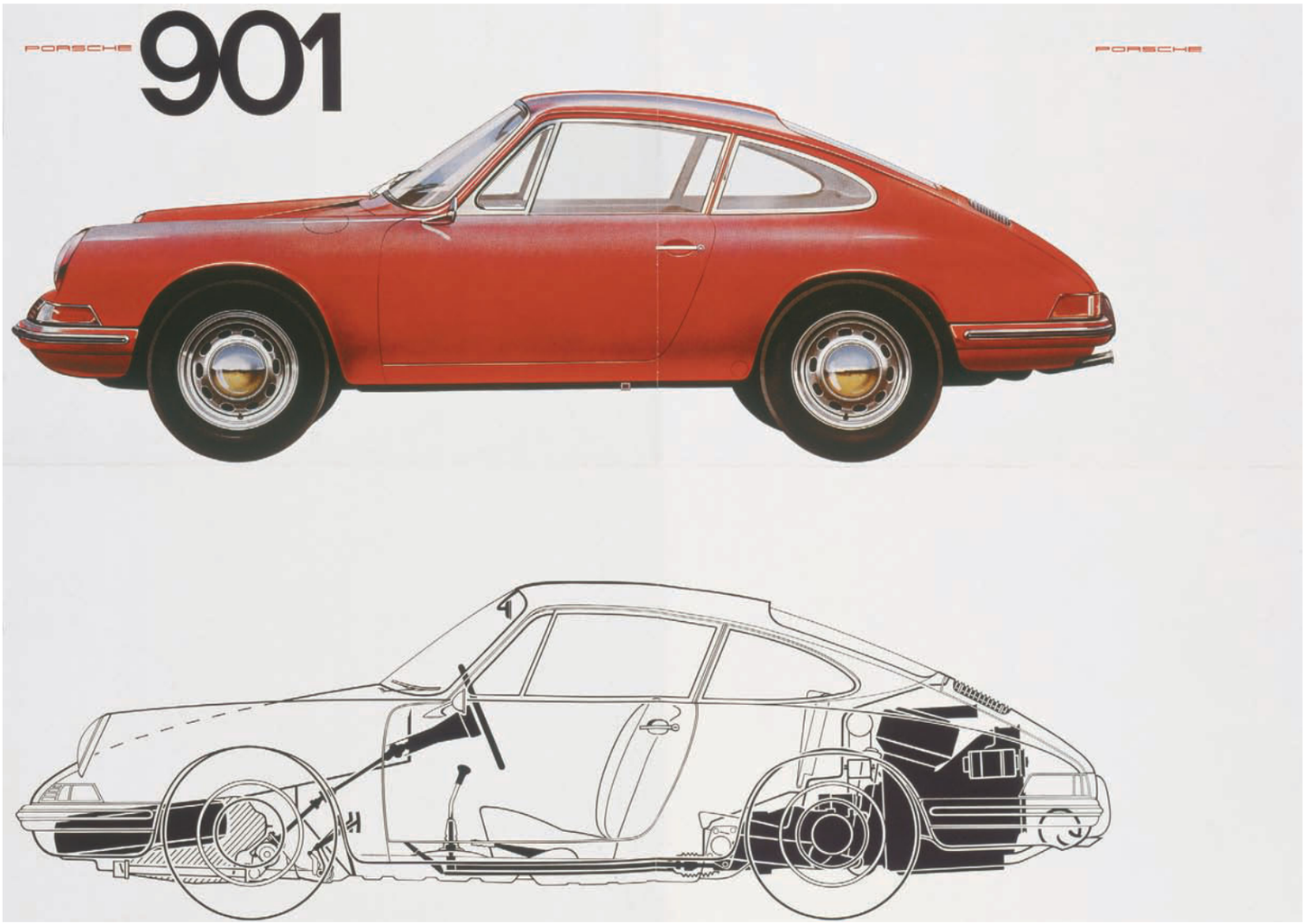
While only Helmuth Bott's test drivers had accumulated any time in the new cars, the enthusiast magazines praised the 901 based on its appearance and specifications. Buoyed by positive feedback, Ferry prepared for the Paris Auto Salon, from October 1 through 11, a month later. He felt some relief at last. He still had millions of Deutschmarks to earn back, but internal battles over body style and the questions of usable engines were settled. Conflicts seemed a thing of the past. The French were loyal customers. He anticipated a good reception. There, visitors and journalists loved the car. However, the reaction from a fellow manufacturer was decidedly less warm.

Automobiles Peugeot had registered with the French office of copyrights and patents the right to designate their models with a three-digit number that placed a zero in the middle. The first such use came with their Model 201 in 1929. By 1963, the sequence had gone as far as 403, 404, and 601. During the Paris show, Peugeot notified Porsche that it could not call the new car a 901 in France. Huschke von Hanstein, still in Paris, sent an urgent note to Ferry on October 10.

France was a good market for Porsche cars. Ferry felt there was little use in reminding Peugeot that his 804 Formula One car had won at Reims the year before. In a rush of memos between Ferry, von Hanstein, and Wolfgang Raether, they contemplated renaming the car the 901 G.T. That idea died when it became clear there was no room to insert the two letters into materials ready for printing in German and French. On the other hand, with the three-digit Typ number appearing throughout any text material, changing the middle was relatively easy prior to mass printing.

»

The 901 was well formed by the time it reached the Stuttgart University wind tunnel in March 1964. This was hardly its first trip to the tunnel, and by this time, one or another of the 901 prototypes had been on display at the six most important auto shows in Europe. *Porsche Archiv*



The 901 sales brochure was obsolete within days of the Paris Auto Salon because French carmaker Peugeot protested the designation. The color and black-and-white publication became a collector's item when Porsche renamed the car the 911.
Porsche Archiv

On receiving Peugeot's letter, Ferry halted production of brochures *and* the cars. Rather than antagonize an entire nation, he made his decision on October 13 to renumber the car as the 911 for all its markets effective November 10. Porsche had begun 901 manufacture on September 14, interrupted it on October 10 as they dealt with Peugeot and awaited their response, and then resumed around November 9. By this time, barely a dozen cars were complete. One went to Franz Ploch and Werner Trenkler for a cabriolet experiment and then on to Karmann; two cars—300014 and 300016—went to Paris distributor SonAuto for the Paris show, one for display and the other for demonstration, departing Zuffenhausen three days before the show opened. Porsche shipped another to Japan (300022) for an exhibition and still another to California (300012) for an automobile display near San Francisco. Perhaps only one or two cars slipped out to early customers in late September. The rest of them simply got rebadged as 911 models.

The process to create the new Porsche had taken up more than a fifth of Ferry Porsche's life. He turned 55 on September 9, five days before 901 production commenced. During that time, he directed his company through three evolutions in his 356 series, and he had worked with outsiders successfully—Drauz, Karmann, D'Ieteren Frères—and others less so. His racing programs evolved from the 550 Spyder through the 718 open and closed cars, and in and out of Formula One. It's likely that Ferry truly believed his statement about the "shoemaker, stick to your last." It held true for racing; while the Abarth GTLs were not perfect cars, they won races, and their successors, the 2000 Carrera GS Dreikantscheibers and the conquering 904s, proved that Porsche is *the* road-racing company.

It was a highly eventful period of time, including the costly and unexpected acquisition of a neighbor he had hoped would simply remain a partner. The roots of the first 356s clearly were engineering and technology derived from the Volkswagen. Through their own era, they evolved into vehicles purely Porsche. The 911, and its entry-level sibling, the four-cylinder 912, drew not only a line in the sand, but also etched a demarcation point in automotive history books.

These cars began as Porsches, supervised in design, engineering, and manufacturing by F. Porsche and F. Porsche Jr. In some ways, it scarcely matters who drew what line on what date. A former Porsche stylist who now heads another automaker's advanced design explained it recently: great design is accomplished as much with adjectives and metaphors as it is pushing a pencil. It requires good taste and good judgment. It has a final editor who has the executive authority to say, "See! That's it."

The company delivered the first 901s on October 27, 1964. No one alive at the time imagined what was to become of the cars and their work.

Six months after the Frankfurt debut, Porsche showed a Quick Blue–painted 911 prototype, chassis 13 326, along with a bright red 904 at the Geneva, Switzerland, auto show. Porsche shared show space with Volkswagen. *Porsche Archiv*

"It was my father's wish that I get to know the car body division and simply gather knowledge 'from scratch' with the people there and work together with them. I knew Mr. Komenda and Mr. Reimspiess from my childhood, dating back to Gmünd and the old Stuttgart days before the war."

— F. A. Porsche

This was perhaps the most highly visible of all the early 911s as sales director Dieter Lenz took the car on a 50,000-kilometer sales tour around Europe. This fifth-built prototype ended its life when Porsche engineers dropped it from a crane to test its front-end crash strength. *Porsche Archiv*

Porsche designer Hans Ploch and styling engineer Werner Trenkler developed two cabriolet prototypes in mid-1964. This car, 13 360, also saw duty as one of the Targa prototypes. *Randy Leffingwell*

CHAPTER TWO

EVOLUTION VERSION 1.0


PORSCHE

Throughout the ascent of design Typ numbers from 695 to 754 to 901, Ferry remained committed to offering an open version of the new Porsche. F. A., his designers, modelers, and engineers had submitted three scale drawings and a model to Ferry, who followed up this review with a letter he wrote to Karmann in mid-October 1962. Karmann assembled the 356C and SC cabriolets and was the natural one to field this inquiry. Ferry asked the manufacturer to evaluate the concepts, which included a cabriolet system similar to the 356 configuration with a padded top, a clear plastic window removable by zipper, and a boot that hid the roof and stored it as low as possible in the car body. The second option was a collapsible top that required unsnapping the cloth material for stowage beneath the boot. The third version described a main top bow housed inside a rollover bar with removable top and rear panels. F. A. also had proposed a rigid but removable steel roof.

Still other concepts followed, including one that described a collapsible and/or a removable rollover bar. Perspectives differed on the look of the roof and the profile of the car, top up or down. F. A. told Aichele that he preferred that "the open car should have a distinct feeling in the roof line, to underscore the Roadster feeling." He offered a drawing in early December 1963 that showed this idea. It was not as severe as the "stepped roof" variations Erwin Komenda had made five years earlier, but it showed a definite, gentle break in the roofline behind the rear window.

The roadster concept, however, brought up problems with the entire idea of an open car. As Eugen Kolb pointed out, "No one considered the cabriolet during design of the coupe. It was talked about but forgotten when the other discussions were going on." Whether a rollover bar collapsed or a soft top folded into the rear of the car, there was no place to put it. One version completely sacrificed the rear seats for the top, its bows, and the rollover bar storage. There were other considerations. Although that recent evolution from an engine with two smaller cooling fans mounted over each cylinder bank to the Typ 901/1 with its single larger one certainly had improved engine performance, smoothness, and reliability, it had yielded one unanticipated consequence. Where Komenda's 356B Hardtop Coupe had increased interior room for the 356, the B Roadster's alternate bodyline reduced the space even when the top was raised. Lowered, it proved impossible to store any 911 top proposal because of the taller engine and the chassis parts.

"Drawing the cabriolet, the system to open the roof, the kinematics, was not right," Kolb explained. "The system for the 356 was completely developed, but nothing could be taken from it for the 901. If you had copied the 356 roof system, it would have been too high at the rear, like a Volkswagen, not like a Porsche." Kinematics studies the mechanics of the motion of a body or bodies—in this case, the cloth top and support bows of a convertible roof—without considering its own mass or forces acting upon it. Most crucially, the estimated costs of designing, developing, and making stamping molds for new sheet metal for this 911 roadster body killed any chance.

"Drawing the cabriolet, the system to open the roof, the kinematics, was not right. The system for the 356 was completely developed, but nothing could be taken from it for the 901."

— Eugen Kolb

«

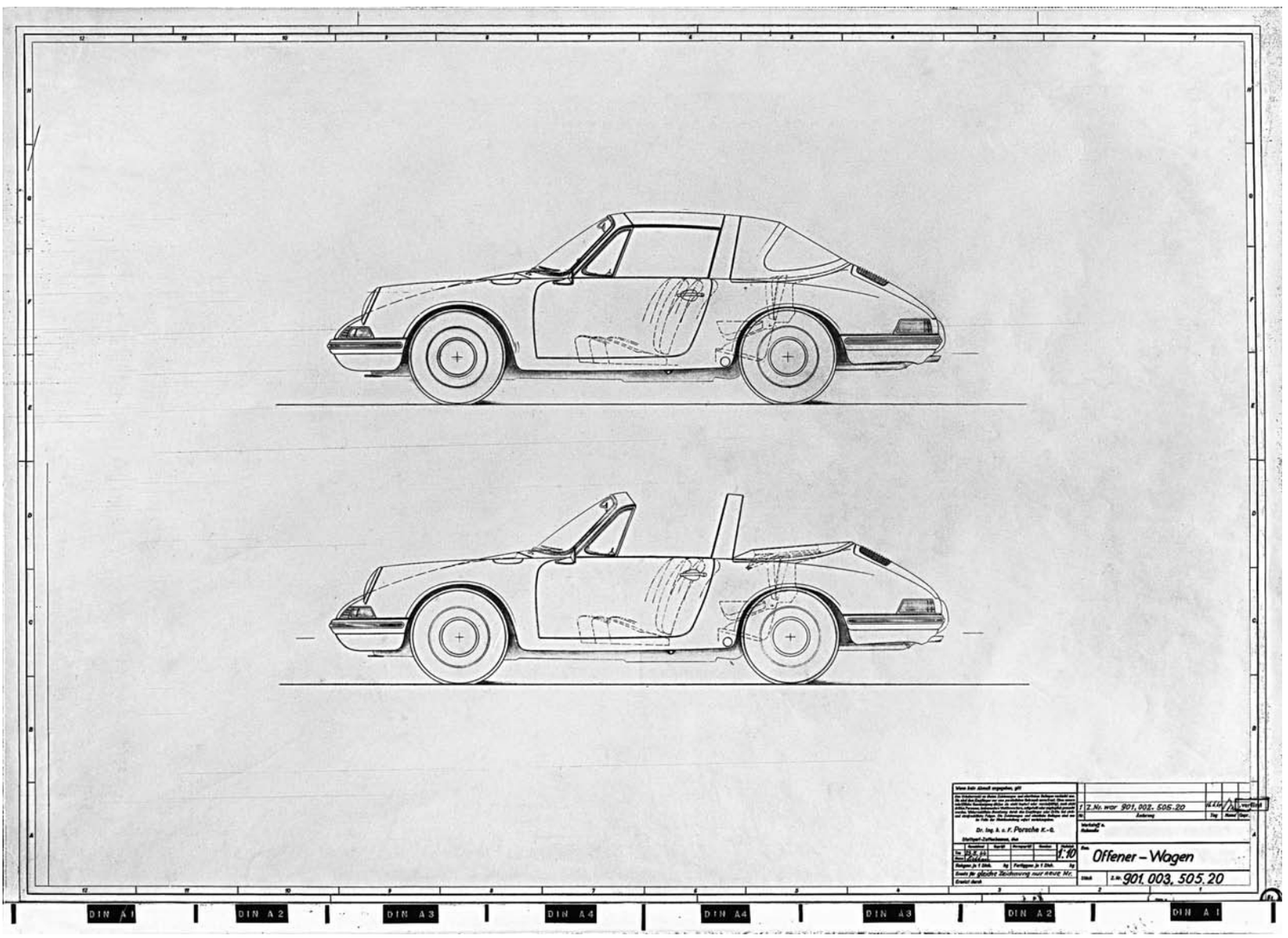
Careful inspection showed structural changes where the prototype Targa bar was fitted to and removed from this car in May 1964. Experimenting with the open 911 revealed no place to store the hood or its bows, and the chassis was not stiff enough to support an open car. *Randy Leffingwell*

After the September IAA debut, however, pressure increased. Sales boss Harald Wagner reported that many visitors asked about an open version. Over the next months, development continued on more concepts until early June 1964, when a prototype "open car" emerged from the shops. Gerhard Schröder remembered that Franz Ploch and engineer Werner Trenkler had gotten a car to work on. They also had done cabriolet development for the 356 models.

By June 12, he and engineer Werner Trenkler had completed their first mockup, and Ferry had it photographed that day. Barely two weeks later, on the 24th, a group convened to review the car. Ferry Porsche, F. A., Hans Tomala, Hans Beierbach (now running Reutter for Porsche), Erwin Komenda (whom Ferry had put in charge of completing the 901/911 technical drawings), Fritz Plaschka, and Harald Wagner (Ferry's sales chief) examined the car. Trenkler and Schröder were missing from the review. This was a case, Schröder explained, where those asking the questions asked the wrong people. Had he and Trenkler been present, he said, the story might have a different ending.

Wagner argued vigorously for the fully open car, expecting it to sell at least as well as 356 cabriolets had done. Ferry listened as Beierbach and Komenda stressed the extensive work and the expenses Porsche might incur stiffening the chassis and revising the rear body panels to accommodate the soft top and its supporting bows. Ferry concluded that it was too costly, deciding instead to approve the roll-bar variation. However, it, too, needed some changes.

"There were so many obstacles," Kolb continued. "Of course, the car lost much of its stiffness. The cabriolet proved the 901 chassis was not strong enough." One further consideration affected Ferry's reluctant decision to let the cabriolet slip away: By this time, automobile safety advocate

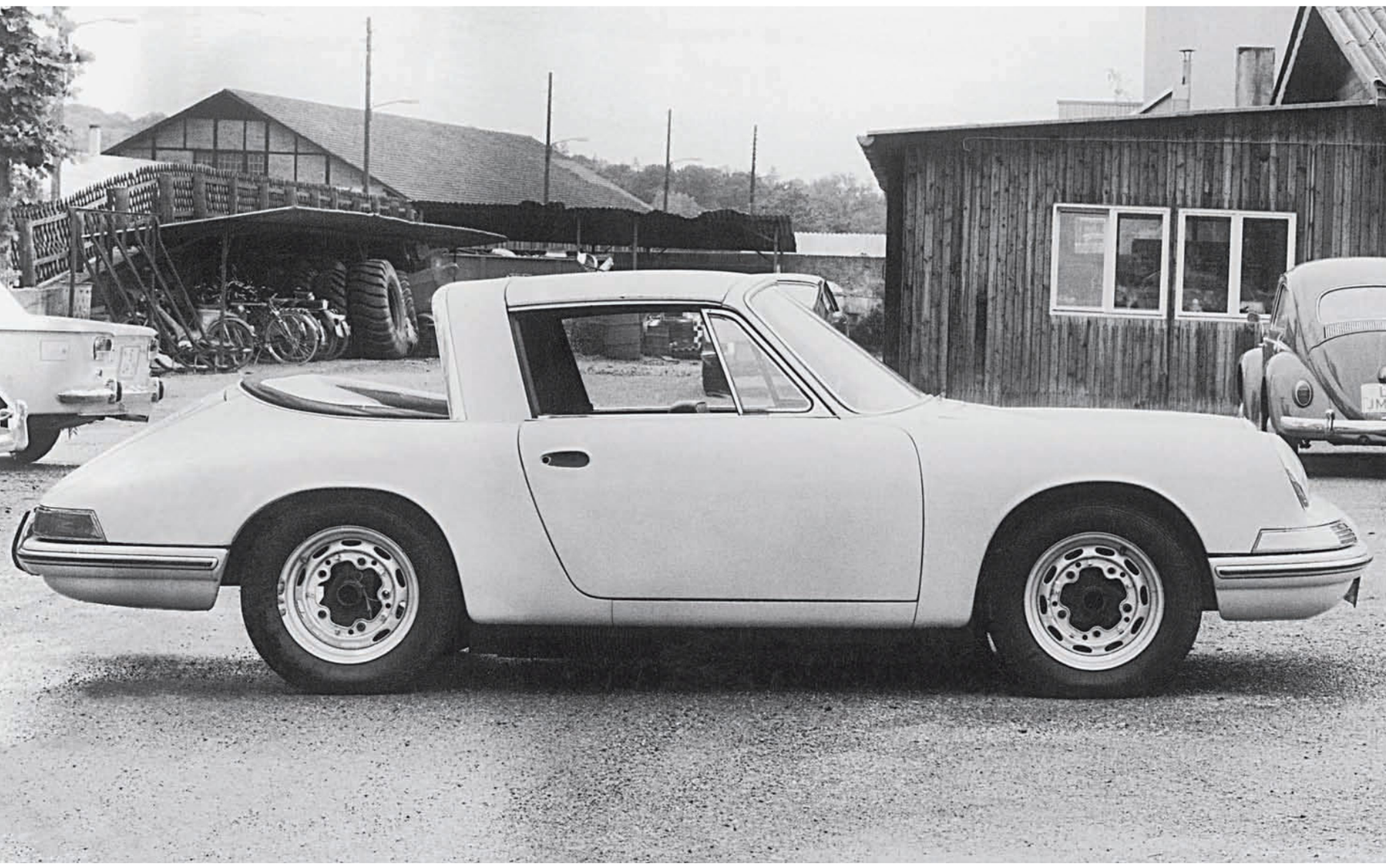


Called the Offener-Wagen, this drawing, completed May 23, 1964, showed Porsche's thinking about its open 911. Barely two weeks later, Ploch and Trenkler had a full-size prototype to demonstrate. *Porsche Archiv*

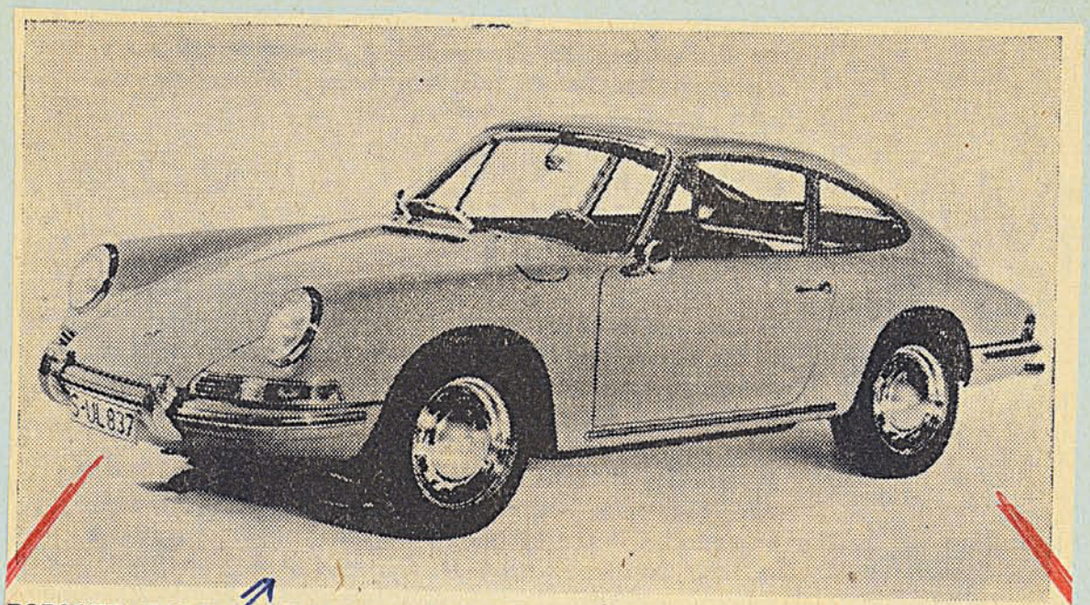
Ralph Nader in the United States had drawn a growing audience to his objections to vehicle design and engineering. Inside Porsche, engineers, designers, and marketing staff worried that legislators in its largest market might outlaw convertibles altogether.

Soon after this, Ferry asked Karmann in Osnabrück, who did not respond to his first inquiry, to work further on an open 901. Porsche shipped them the Ploch/Trenkler prototype, 13 360. When that car returned to Zuffenhausen on September 10, 1964, it entered the system with a Cardex that showed the date, its number, and its specification as a Typ 011/KW, Cabriolet, a designation that modern-day engineers suggest may have been intended to disguise its real purpose. A few days later, Porsche started 901 production, on September 14, beginning with serial number 300 007 (oddly, Porsche did not assemble number 001 until the 17th).

With production startup problems occupying his time and energy, it wasn't until late in January that Helmuth Bott took a long evaluation test drive in 13 360. He paid particular attention to chassis stiffness (which, after Karmann's work, he found no worse than the 356 cabriolets he had driven), and to the soft rear window flapping and fluttering. A few days later, testing the car with the removable roof panel in place, the wind noise was so great he could converse with a fellow engineer only by shouting. There was work to do.



Chassis 13 360 appeared with a mockup rollover bar and removable roof panel on June 12, 1964. At this point concepts for the rollover bar remained in body color. *Porsche Archiv*



PORSCHE TARGA heißt das jüngste Modell aus Zuffenhausen, das der Öffentlichkeit erstmals auf der IAA in Frankfurt vorgestellt wird. Bei diesem Typ ist der Sicherheitsbügel zum erstenmal in der Welt in die Serienproduktion aufgenommen. Der Bügel aus Nirosta-Stahl stellt vor allem bei Überrollunfällen einen besonderen Schutz dar. — Der Porsche Targa wird im Frühjahr 1966 zur Auslieferung kommen. Der Preis, so gibt das Werk an, dürfte etwa 1500 DM über dem der Coupé-Ausführungen liegen.

Heidelberger Tageblatt 8.9.65

Avec la suppression des modèles « 356-C », Porsche ne possède plus de cabriolets. Verra-t-on à Francfort une carrosserie de Porsche 911-912 décapotable ? C'est peu probable, mais la demande, pourtant, est forte.

L'Automobile 9/65

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The September 1965 issue of *L'Automobile* published this single photo with a caption that read, "With the end of the 356C models, Porsche had no cabriolets. Will we see at Frankfurt a Porsche 911–912 convertible? It's unlikely but the demand, however, is strong." *Porsche Archiv*

"There were so many obstacles. Of course, the car lost much of its stiffness. The cabriolet proved the 901 chassis was not strong enough."
—Eugen Kolb

65 25

PREMIER SALON AUTO DE LA SAISON :

Celui de Francfort, nous promet plusieurs grandes «premières» allemandes

2

La Nouvelle Revue, Lausanne 7.8.65

Premier Salon de l'Auto de la saison 1965-1966, celui de Francfort est toujours attendu avec impatience car il donne en quelque sorte le ton à la nouvelle mode automobile. Son autre pôle d'intérêt, c'est qu'il nous réserve toujours de grandes « premières » mondiales, surtout du côté des constructeurs allemands.

A quelques semaines de son ouverture, prévue pour le 16 septembre, quelques indiscrétions ont filtré sur des nouveautés assez sensationnelles dont on n'est pourtant pas certain qu'elles apparaissent à Francfort déjà. En tous cas, ces renseignements sont sérieux et ces modèles sortiront tôt ou tard des usines allemandes.

En cessant la production de ses modèles « 356-C », Porsche n'a plus de cabriolets pour satisfaire les nombreuses demandes de ses clients. Voilà pourquoi on attend à Francfort la sortie d'une décapotables dérivée des « 911 » et « 912 » (photo No 2).

Porsche 911 als Cabrio

Die neuen Porsche-Modelle 911 und 912 werden zur Frankfurter Autoausstellung im September in einer Cabriolet-Ausführung erwartet. Für diese Modelle besteht großes Interesse, da die bisherigen Porsche-Cabrios nur noch in sehr kleinen Stückzahlen für den USA-Export geliefert werden. Die Preise sollen um etwa 1 000 DM über den Coupé-Preisen liegen.

Hornburger Oberobl. Braunschweig S. 23.8.65 Die Glocke v. 3.65

Porsche

Mit seinen beiden Modellen 912 und 911 bietet Porsche den Freunden seines Hauses zwei hochmoderne und leistungsstarke Sport-Tourenwagen. Wenn man als Zuffenhausen etwas Neues erwarten will, dann wird sich das nicht um neue Konstruktionen handeln. Eher ist anzunehmen, daß man bis zur IAA soweit ist, sowohl den 912 als auch den 911 als Cabriolet zu liefern, bedeutet doch der Umbau einer Coupé-Karosserie in einen offenen Wagen nicht gerade geringe Probleme, wenn man der hohen Leistung und dem Stil der Verarbeitung treu bleiben will, die sich nun einmal mit der Marke des Hauses verbinden.

Bad Kraftfahrzeugmarkt 1965

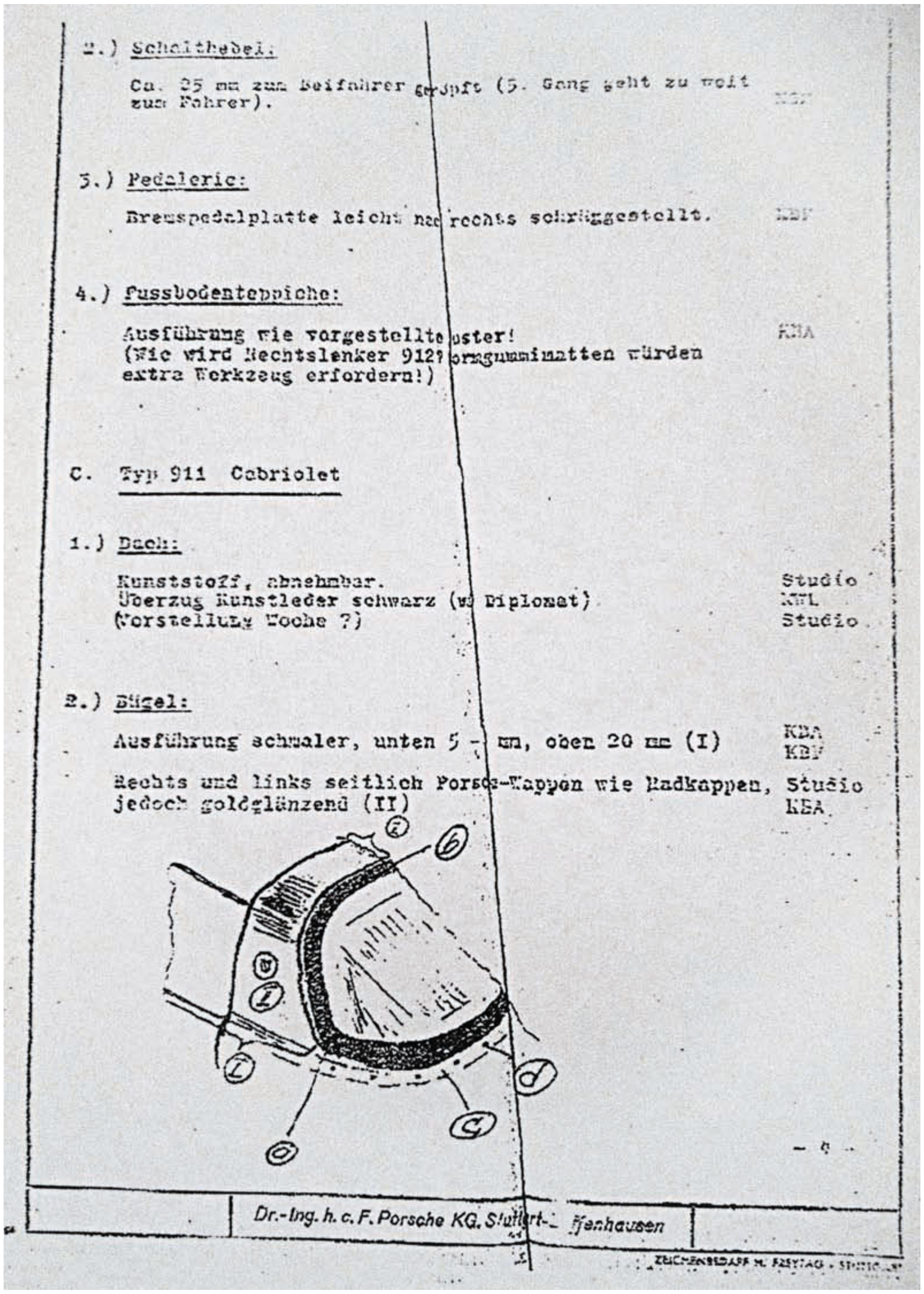
»

The August 7, 1965, issue of *La Nouvelle Revue*, from Lausanne, Switzerland, published this photo and brief story:

First auto show of the season 1965–1966, that of Frankfurt, is always awaited with impatience because it gives a sort of tone to the new style automobile. Its other interesting focus is that it reserves for us always the big world premiers, above all those of German constructors.

Several weeks before its opening, previewed for the 16th of September, several indiscretions have filtered out about novelties so sensational that one is not however certain to see these at Frankfurt already. In any case, this information is serious and these models come out early or late from their German factories.

In ceasing production of the 356C models, Porsche has no more cabriolets to satisfy the numerous demands of its clients. That is why one waits at Frankfurt for the debut of convertibles derived from the 911 and the 912."
Porsche Archiv



2.) Schalthebel:

Ca. 25 mm zum Beifahrer gekröpft (5. Gang geht zu weit zum Fahrer).

3.) Pedalerie:

Bremspedalplatte leicht nach rechts schräggestellt. KBF

4.) Fussbodenteppiche:

Ausführung wie vorgestellte Muster! KBA
(Wie wird Rechtslenker 912? Gummimatten würden extra Werkzeug erfordern!)

C. Typ 911 Cabriolet

1.) Dach:

Kunststoff, abnehmbar. Studio
Überzug Kunstleder schwarz (wie Diplomat) KWL
(Vorstellung Woche 7) Studio

2.) Bügel:

Ausführung schmaler, unten 5 mm, oben 20 mm (I) KBA KBF

Rechts und links seitlich Porsche-Wappen wie Radkappen, jedoch goldglänzend (II) Studio KBA

– 6 –

Dr.-Ing. h. c. F. Porsche KG. Stuttgart-Zuffenhausen

«

From this *Aktennotiz* from February 1, 1965, it is clear that Porsche's decision for the Typ 911 Cabriolet open car was the Targa with a zipper-removable rear window, a rollover bar covered in stainless steel and fitted with a Porsche badge, and a removable roof panel over the driver's head. *Porsche Archiv*

Trenkler and Schröder addressed each item on Bott's list, and listened as others, Rolf Hannes of the testing department and design boss F. A. Porsche, added input. Hannes pointed out wind draft problems, and F. A. objected to the way the rubber-coated cloth ballooned up at high speed. For Schröder, this was a personal challenge; he had devised the panels, struts, and supports that kept that from happening with the 356 cloth tops. However, because this "targa" top panel had to collapse for storage, there was little he could do until the later rigid version appeared.

On February 1, 1965, the car emerged as the subject of a joint memo to two dozen managers, engineers, and designers discussing a 912 for testing, a right-hand-drive 911 prototype, and the Cabrio, 13 360. A drawing at the bottom of the second page suggested that decisions had been made.

This combination of crucial considerations killed the Cabrio and brought about its alternate, a model that marketing and sales named the Targa. Helmuth Bott and his staff had identified specific locations on the 901 unibody that required reinforcement for a cabriolet. They added bracing ahead of and behind the doors, and through the rocker panels. A rollover bar, judiciously disguised, restored a great deal of the rigidity and stiffness to the car. The question was where it was to be located, and what it was to look like.

"I discussed with Mr. Schröder how we make this bow. It must be metal that will not rust. And we have to make the bow stiffer. I kept trying to consider the safety, to make it strong like the metal on the side of a road. He said 'No, not yet. First we make it look right, and then we can make it strong enough.'

— Eugen Kolb

"I discussed with Mr. Schröder how we make this bow," Kolb recalled. "It must be metal that will not rust. And we have to make the bow stiffer. I kept trying to consider the safety, to make it strong like the metal on the side of a road. He said 'No, not yet. First we make it look right, and then we can make it strong enough.'

"One day a coupe appeared in the studio."

Kolb and Schröder gathered up some transparent materials and laid them over the top of the car. They roughed in some lines in pencil. Because they were hard to see, Kolb retrieved some black tape from the studio and remade the lines. "And then we began to move lines back and forth to define the bar. Butzi thought it was ugly. We changed the shape, some, just a little, Butzi said okay, and then I started to make the drawings. And the idea of using stainless steel came from Butzi, right at the very beginning," Kolb said.

"It was Mr. Bott," he continued, "who insisted on the removable soft rear window. He wanted as much as possible to enhance the open car feeling. Then of course," he went on, "the discussions came about what to call it and how to market it. Was it Porsche's 'open car?' Feelings about the American market prevailed. We promoted it as our coupe with a safety item, as 'Porsche's Safety Car.'"

As Ferry had done with the 901, he debuted the Targa nearly two years in advance of first deliveries, at the IAA show in Frankfurt in September 1965. Barely a month earlier, on August 11, Porsche had registered the patent for the Targa, No. 1455743, listing designer Gerhard Schröder and engineer Werner Trenkler as its inventors. (Registering this patent was one of Erwin Komenda's last tasks within Porsche. He had worked with—or for—one Porsche or another for more than 35 years. Colleagues from that time suggest that he changed when Ferry Porsche pushed aside his ideas for the next Porsche. His rebelliousness toward Ferry simply may have been his assessment that no other designer could measure up to his own ideas or to those of Ferry's father, no matter what their family name was. For several years he had suffered from lung cancer even as he continued working. He left the company in late 1965 and he died on August 23, 1966. He was 62.)

Just in advance of the September show, Porsche issued a press release announcing the new model and its name. September proved to be another decisive month for Porsche. The Targa debut was a tremendous success with crowds as excited as they had been two years earlier seeing the New Porsche. Clever and creative marketing promoted the new car as four-in-one: With its roof and rear window removed, this was the Targa Spyder; it was the Bel-Air with its rear window zipped in place but the top open. Reversing that order, with top on but rear window collapsed, earned the vehicle the name Targa Voyage, and completing the lineup, with all panels in place, marketing called the car the Targa hardtop. Ferry, his direction set, discontinued production of the 1600cc S engine as well as the S and SC model cars. Porsche cabriolet manufacture ceased as well, except for a limited run in 1965 for the Dutch highway police.

Within days of the end of the IAA, Bott took a Targa prototype to Wolfsburg's test track for endurance testing. He learned the car needed further reinforcement at the rear doorsills and along the heater tubes. An even more demanding durability test took place in Zuffenhausen on November 10. Bott and Werner Trenkler supervised a drop test on the Targa, inverting a car, hanging it by a crane, and releasing it from two meters above the pavement. If Porsche was going to promote the car as a safety vehicle with rollover protection, Bott wanted to be certain it could handle more than a mere rollover. It didn't.

Trenkler reworked the roll bar, its mounts, and the surrounding structure, as well as the windshield frame, and in early January 1966, Bott returned to Wolfsburg with the improved prototype where drivers ran it longer and harder over the endurance test without any failure. One year later, on January 23, 1967, Porsche began production of the Targa as a 911 and 912 model.

THE ITALIAN ROADSTER EXPERIMENT

With no knowledge that the Targa was coming, and with no production Cabrio on the price list, California Porsche distributor Johnny von Neumann took matters into his own hands. He had done that before, teaming up with Max Hoffmann to conceive and promote to Ferry Porsche the sales potential for a Typ 540 Speedster to follow on the heels of the America Roadster in the early 1950s. This time, he bypassed Hoffmann and Porsche altogether, taking his idea to Italy to Nuccio Bertone, who, over the next nine months, designed and fabricated a roadster body on a 911 chassis. Von Neumann funded the work himself, hoping to license the design to Porsche. He was a racer and a consummate salesman, but he was not an engineer, and the project stumbled over obstacles he had not foreseen. He was unaware of how much structural stiffness the 911 chassis lost without its steel roof. What's more, Bertone's design, while stylish and appealing, was more Bertone than Porsche. Finally, when von Neumann offered the car to Porsche, Ferry declined it, expressing his concern that the Porsche name had come to represent quality he was not sure could be matched everywhere. The Abarth experience had made Porsche cautious.

Ferry's engineers hardly remained idle during these years. As the 356 series had swelled with the addition of Super variants, so the 911 followed suit, introducing the more potent 911S in 1967. This engine developed 160 horsepower at 7,200 rpm out of its 1,991cc displacement. Engine designer Hans Mezger brought new technology to the engine, surrounding the cast-iron cylinder liners with a finned jacket of aluminum to promote better heat transfer to cool the engine.

The S was super in many other ways, with its five-speed manual transmission as standard equipment, as well as front and rear anti-sway bars and Koni shock absorbers at all four corners. Porsche introduced ventilated disc brakes and new five-spoke forged aluminum wheels from Fuchs.

The other significant 911 variant was the four-cylinder 912 model. Introduced in April 1965, Porsche adapted the powerplant from the 356SC in the car, developing 95 horsepower at 5,800 rpm from the 1600cc pushrod engine. It was a shrewd product on Porsche's part. Priced some 5,500 DM (roughly $1,375 at the time), less than the 911, it only slightly reduced standard equipment and trim levels. Its body, brakes, wheels, and suspension were nearly the same, and many drivers were quick to point out the four-cylinder car's better handling with its lighter engine at the rear. While the 912s came standard with a four-speed transmission, the extra cost five-speed was a popular option because it improved performance and fuel economy. Ironically, because it was such a frequent choice, at the same time Porsche introduced the 911S with a five-speed in 1967, it made the transmission standard as well in the 912.

> "It was Mr. Bott who insisted on the removable soft rear window. He wanted as much as possible to enhance the open car feeling. Then of course," he went on, "the discussions came about what to call it and how to market it. Was it Porsche's 'open car?' Feelings about the American market prevailed. We promoted it as our coupe with a safety item, as 'Porsche's Safety Car.'"
>
> — Eugen Kolb

Throughout this time and for decades before, Porsche's engineering staff had served under contract as Volkswagen's research and development division. One of Ferry's key motivations for acquiring the land and building the facilities at Weissach was to better serve VW as well as other clients who came in search of Porsche's expertise. Being a shrewd businessman, Ferry organized Weissach so that VW's annual contract met its operating overhead. Any other revenue was profit. With this kind of freedom, Weissach became a think tank and brainstorming center as well.

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The April 7, 1966, issue of *Motor Italia* devoted a full page to the Bertone Porsche 911, writing, “At Geneva, on the large stand of Bertone . . . A spider of the Porsche 911, destined to be marketed in the U.S.A.” The caption called attention to the retractable headlight covers. *Porsche Archiv*

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In *Touring Bern*, from March 15, 1966, a photo showed the Bertone roadster with a caption declaring it was “a limited series of this new body style, destined exclusively for the American market.” While the *Kölnische Rundschau* wrote on April 16, 1966: “The Italian bodymaker Bertone showed this elegant body for the Porsche 911. The rear end is very powerful.” *Porsche Archiv*

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At the Turin Motor Show in November 1967, Porsche displayed a 912 Targa, a 911S coupe in the center, and a 911 coupe at the bottom of the photo. Porsche had used this largest Italian motor show for the world debut of its Cisitalia Grand Prix car in 1949. *Porsche Archiv*

Ferry's competition division had been campaigning mid-engine racers for more than a decade. He watched as racing competitors and road car manufacturers embraced the configuration, and, with plans to discontinue the 912 a few years ahead, he needed an attractive, interesting entry-level model. With memories of the costs of designing, developing, testing, and launching a new model still fresh in his mind, he wanted a collaborator.

VW chairman Heinrich "Heinz" Nordhoff had been a strong supporter since late 1948, when he signed VW's postwar agreement with Porsche for design and engineering work. By 1966, the Beetle was long in the tooth and his Karmann Ghia coupes and convertibles had gone into redesigned second-generation models that garnered less enthusiasm. The 411, an updated, redesigned three-box-style rear-engined air-cooled sedan progressed toward launch as a 1969 model. But something sporty might enhance VW's image, replacing the Karmann Ghia and possibly bringing new customers into Porsche. Together, the two companies devised the mid-engine Typ 914, using a 1.7-liter flat four for the Volkswagen version and the 110 horsepower two-liter flat six from the new T (for Touring) model. While many designers have been given credit for its appearance, it was Heinrich Klie who created the radically non-Porsche forms, shapes, styles, and lines of the identical twin VW and Porsche products, these being a dramatically lower and seemingly elongated rendition of the three-box 411, while working in F. A. Porsche's basement design studio.

Harald Wagner and his marketing and sales staff welcomed the proliferation of models, and for 1968, he and his team were happier still. Porsche continued the 912 four-cylinder models in coupe and Targa variations, as well as the 911S. It added the entry-level 911T, whose flat six developed 110 horsepower at 5,800 rpm. For European markets, the base 911 became the 911L, for Luxus, or luxury. However, for the United States, Porsche had not yet met emissions standards with its S model, and the L was as good as it got, supplemented by T and 912 versions.

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For a single year, Porsche manufactured this two-liter 911L. It was the company's highest line offering in the United States in 1968. *Porsche Archiv*

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This 1967 base 911 model probably was one of very few ever used to tow a caravan mobile home. The fender mirrors were likely aftermarket accessories. *Porsche Archiv*

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In the Zuffenhausen new-car delivery parking lot, this sunlit 1968 911L interior made it clear why Targa models appealed to many customers who relished open-air motoring. Porsche assembled only 444 of the L Targas. *Porsche Archiv*

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The new 911E was an elegant ride to an evening of opera or fine dining and dancing. Porsche introduced the fuel-injected E model and manufactured 1968 coupes and 858 Targas in 1969. *Porsche Archiv*


D-JD 699

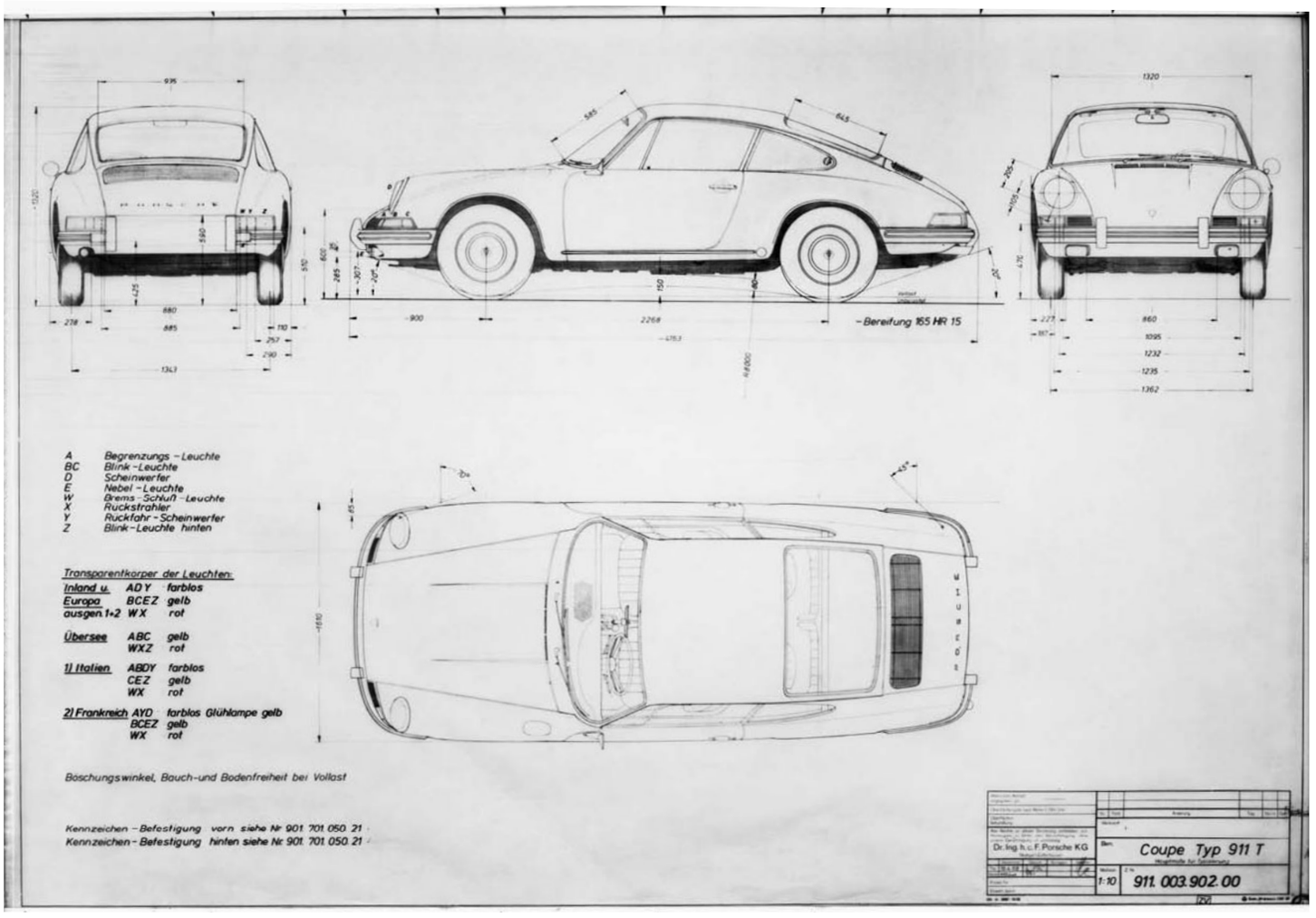
Visually the cars evolved in understated ways. On the instrument panel, new gauges put white letters and numbers on black surfaces surrounded by black trim rings. Windshield wipers went matte black and Porsche engineers reconfigured their operation so the sweeping motion rose up from in front of the driver, arcing to the right on start-up.

Ferry had kept his engineers busy for the past several years on a semiautomatic gearbox project he imagined had great appeal to his U.S. customers. He introduced the Sport-o-Matic transmission and was surprised to find that more European customers than Americans chose the optional four-speed torque-converter system. There was no clutch pedal for the driver and an engine vacuum-operated servo actuated the clutch at the transmission housing.

Model year 1969 brought significant changes to 911 engines (and signaled the end of the 912 series). A mid-level 911 arrived to replace the 911L. The new 911E (for *einspritzung*, or injection), and the 911S engines now used a Bosch/Porsche mechanical fuel injection system. Fuel injection had appeared on Porsche's 906 race cars in 1967 to mitigate the fuel feed problems that drivers experienced in extremely hard cornering. But translating racing's needs for full-throttle/hard braking to the wider varieties of driving conditions on public roads was not easy.

Engineer Rolf Sprenger, who later went on to establish and operate Porsche's *Sonderwunsch*, or Special Wishes, customer service department, started his career as a research engineer in fuel systems with Bosch. One of his earliest assignments at Porsche was adapting fuel injection to series cars.

"For a racing car," Sprenger explained, "where you mainly drive at high revs, you don't ask for fuel consumption, not in those times. But on the production car, you have to be very lean, you have to have a good consumption, and you have to have a good output. So, we made a very sensible fuel pump, a very accurate pump.



The German government required carefully measured drawings of each new car model from every manufacturer. The new 2,268-millimeter wheelbase was the significant difference for the 1969 models in this 911T document finished on April 16, 1969. *Porsche Archiv*

Model year 1968 was the last for the 1,991cc Typ 901/02 engine. In the S, engineers pulled 160 horsepower out of it at 6,600 rpm using two of the three-barrel Weber 40 IDS carburetors. *Dieter Landenberger/Porsche Archiv*

"The racing pump was a six-cylinder pump in those days, but it was in-line. Our first tests we did with the pump like this, but then we turned to what we called the double row pump, which had three plungers on each side and a smaller housing.

"We did really a great deal of research on fuel injection on air-cooled engines. Mercedes and others already had fuel injection systems in production cars, like the 220 and 300. They had mainly two-plunger pumps and they converted those to six or eight cylinders. We had plungers for each cylinder. But we had no water-cooled engines, which keeps heat better. Especially when you move over a hill and pull back the throttle. On zero load, as we call it, with the air-cooled engine, it didn't keep warmth so much. So the engine was a little bit colder down in the valley, and when you accelerated, you found you had insufficient fuel.

"And also the barometric pressure! For heights, the elevation. If you are in a higher region, you had not enough air so you needed less fuel in order to have the right mixture. And this was another difficult thing to work out. We had to find a system that, in high altitudes, the output was less than at lower levels.

"In those days we didn't have the electronic pump. There was some development, but the electronic pump that Volkswagen was developing came a couple of years later. In those days, my colleagues in Bosch did some research, but that was never accepted for production. So we had to live with the mechanical one." Porsche's first series prototypes ran with fuel injection in late summer to autumn 1967. There were discoveries, surprises, and more work.

"Well, they worked, but. . . . there was a lot of backfiring. When we pulled back the [linkage] lever on zero load, we found out that it backfired. We learned to stop fuel delivery completely," Sprenger said. "We thought we should deliver a small amount, but that was wrong. So we had to cut fuel delivery completely.

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For 1970, 911E models such as this one, as well as T and S models, ran with a new 2,195cc engine. This E version developed 155 horsepower at 6,200 rpm. *Porsche Archiv*

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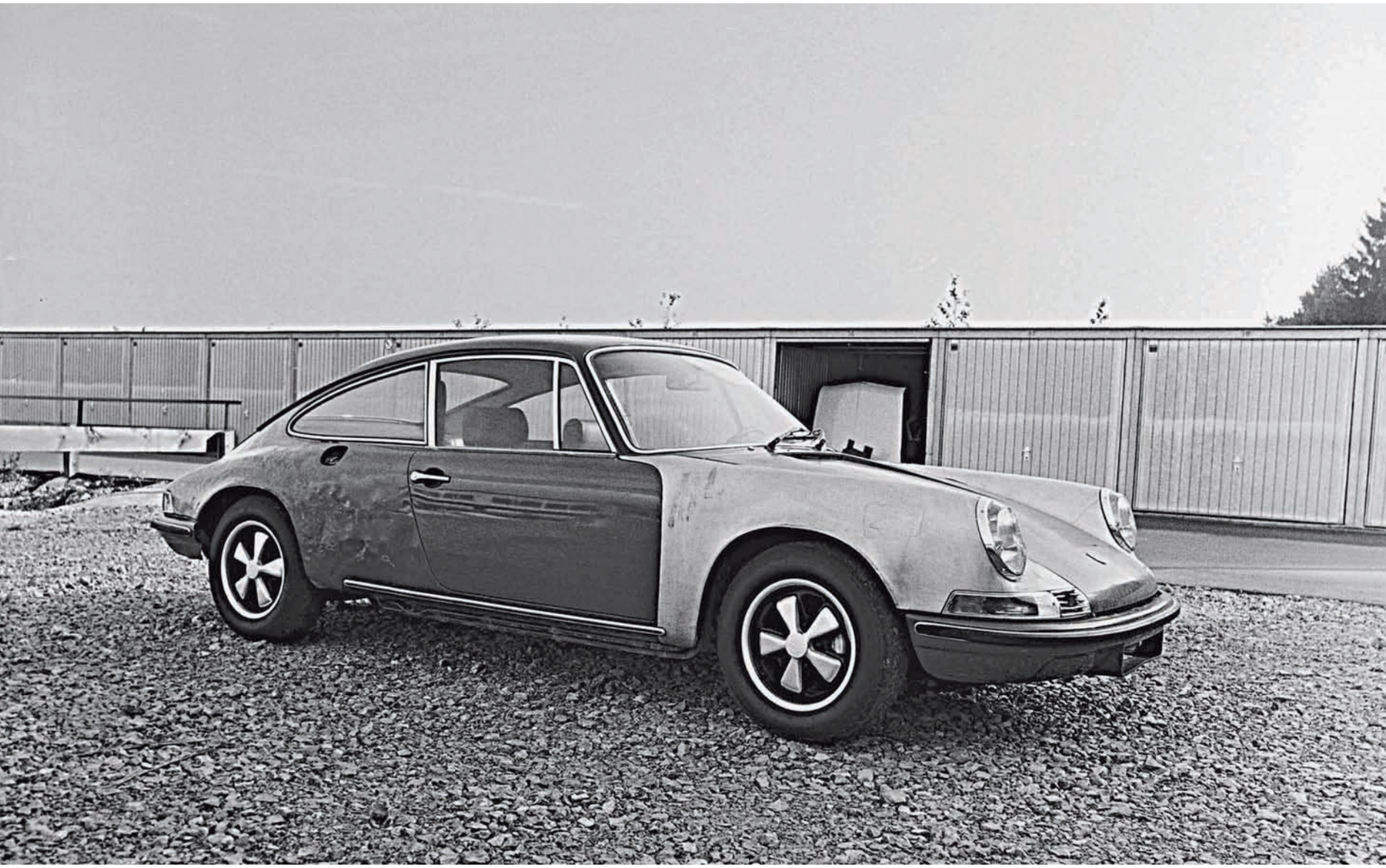
The four-seater idea continued to fascinate Porsche, and in October 1969, Pininfarina delivered its concept of a new four-seater 911. Assembled on chassis 320020, it used an S engine developing 180 horsepower. *Porsche Archiv*



Following the Pininfarina four-seater concept, F. A. Porsche's design staff created their own in 1970. Among other things this body tested was a passenger side location for the oil reservoir and its filler cap for production in 1972. *Porsche Archiv*

"And then it was very difficult to find just the right place to place the injector nozzle to get the maximum output. With fuel injecting the old Mercedes racing engine, it was the so-called direct injection. They pushed the mixture into the combustion chamber. We tried this, but we thought this might be too expensive because you have special nozzles because of the heat! So we said, okay, we spray in the inlet manifold. But then we had the problem to find out where is the right place. What is the right nozzle? What is the right angle for the nozzle? It was a lot of research!"

Dialing in all the variables not only eliminated cornering fuel cutout and improved fuel efficiency, but it also added 10 horsepower to the injected engines for model year 1969. The 911E arrived with 140 horsepower at 6,500 rpm, and the S owners got 170 at 6,800 rpm. Along with the mechanical injection came capacitive-discharge ignition systems, both devices that cleaned up emissions as well. The L designation disappeared for 1969 from European and U.S. models, and American buyers once again found S versions available.

Another significant change occurred on the 1969 models. To improve handling, Porsche engineering lengthened the wheelbase 57 millimeters, about 2.24 inches, from 2,211 millimeters to 2,268. E and S models rode on new wider wheels that had grown from 4.5Jx15 on the 901 and early 911s, to 5.5J for 1968, to 6Jx15 for 1969. This required a slight flare on front and rear quarter panels to accommodate the wider wheels and tires.

At the Coliseum in New York City, Porsche showed not only its 1971 production car lineup, but it also displayed the 1970 Le Mans–winning 917 K. The New York show ran April 3–11. *Porsche Archiv*

As if Ferry's engineers had not been busy enough, one further development reached the 911 marketplace at this time. In an effort to further improve ride and handling, Porsche introduced a hydro-pneumatic strut front suspension system. While it was standard on the E, it was available as an option on the T and S models. The system automatically compensated for changes in front loads from fuel use and luggage placement.

The four-passenger 911 concept briefly returned from the dead in 1969 and then again in 1970 with two proposals that proved that certain proportions are, if not inviolate, at least not elastic. F. A. Porsche contracted with Pininfarina in Italy who developed the B17 prototype, a car that the Porsche Museum displays on its main floor. Pininfarina added 192 millimeters, 7.6 inches, to the wheelbase behind the B-pillar, allocating the extra space to slightly longer seats and foot room for adults. But all this additional steel and glass pushed the car's weight up to 2,497 pounds. In Pininfarina's hands, Fritz Plaschka's big line roof slope rose and swelled awkwardly.

A year later, F. A.'s staff took a try at it with the 911C/20. Pushing the wheelbase out 347 millimeters, 13.7 inches, turned the coupe into a two-door stretched limousine with an overall length of 4,510 millimeters, or 177.6 inches, 14 inches longer than the 911. Visually the car was more successful than Pininfarina's; both Plaschka's and Schröder's input and F. A.'s sense of proportion were evident. However, with no changes to the front suspension or steering geometry, its maneuverability suffered.

For the regular series models for 1970, production engine chief Paul Hensler enlarged displacement on the 911 engines, increasing bore from 80 to 84 millimeters to bring the engines to 2,195cc. To control weight, Porsche cast the engine cases in magnesium and used forged steel crankshafts, forged aluminum pistons, and Biral cylinders. Horsepower rose to 180 for the S model, 155 for the E, and 125 for the T. At the same time, overall weights of the cars dropped by 132 pounds. As Tobias Aichele reported, “At Porsche, lightweight design was an obsession of the new chief of development, Ferdinand Piëch.” Porsche discontinued the 912 model and introduced the mid-engine 914.

The 1971 model year saw only minor technical modifications to the cars, occurring in ignition and fuel injection systems to meet evolving emissions restrictions. Bigger changes happened for economic reasons, as Porsche and Germany monitored the value of the DM compared to the dollar, going from 3.92 DM in 1969, to 3.65 in 1970, to 3.48 in 1971. Porsche prices rose in the United States because dollars bought fewer Deutschmarks. A recession in America made things worse. As the staff watched the 150,000th Porsche leave the factory, a 911S going to its new American owner (himself a seven-time Porsche buyer), Ferry cut production and then shortened the workweek. Annual production fell to 11,715 cars, the lowest level in five years.

> “For a racing car where you mainly drive at high revs, you don’t ask for fuel consumption, not in those times. But on the production car, you have to be very lean, you have to have a good consumption, and you have to have a good output. So, we made a very sensible fuel pump, a very accurate pump.”
>
> — Rolf Sprenger

That was the public news. Inside Werk I, another problem loomed. As Ferry’s children and those of his sister Louise Piëch finished their educations, they expected a job in the family business. Among those already inside the company, issues arose that challenged the direction the products were going. One such eruption occurred between development chief Ferdinand Piëch, Louise’s son, and Ferry’s son Hans-Peter, who had headed production since 1965. Piëch believed 911 production engines needed dual-overhead camshaft configurations while Hans-Peter felt the single-cam system was fine, despite board approval authorizing the change.

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The only model missing from this 1972 lineup was a T. Models posed beside a new 2.4-liter S, with an E Targa in the foreground and a 914-6 in the rear. *Porsche Archiv*

Porsche put prototypes such as this 1970 T through 8,000 kilometers of testing over these roads at Weissach. Test drivers ran 24 hours a day until they reached the distance requirement. *Porsche Archiv*

This was one of dozens of disagreements that steadily altered the relationships between family members and the company. Ferry was 61 and not yet ready to step away from all that he had built. To better manage the rivalries, he called a family meeting in the fall of 1970 at the family farm in Zell am See, Austria. An outside consulting firm orchestrated the agenda. The result was startling: all the family members vacated their jobs inside Porsche Zuffenhausen and at the Piëch family holding, Porsche Salzburg, for the good of the companies, opening their jobs to trained, professional outsiders. Officially, the new rule stated that Porsche shareholders should not work in company management. Only Ferry remained at his post as chairman of the advisory board. Within a year, all of them were out or nearly so. F. A. Porsche left almost immediately to establish an independent industrial design firm, Porsche Design. Ferdinand Piëch transferred laterally at Weissach and directed Porsche's engineering work for outside clients. Now the company needed managers.

THE FUHRMANN ERA

In the testing department, mechanics fitted cars with fresh tires and attended to other needs. The cluster of 1970 cars included T, E, and S models with manual and Sportomatic transmissions. *Porsche Archiv*

Ernst Fuhrmann returned to Porsche in September 1971. The 911 production for 1972 model year already was underway. New engines powered the cars with 2,341cc displacement that came about by lengthening stroke from 66 millimeters to 70.4 through a new crankshaft. Hensler's engineers essentially were forced into this change in order to meet anticipated emissions regulations, the introduction of lead-free fuels, and the need for cars for the American market to run on regular octane gasoline. Even with these modifications, horsepower output rose, taking the T up to 130, the E to 165, and the S to 190. The new engine configuration also increased torque, an important benefit for drivers who spent more time in cities than on open autobahns.

Ferdinand Piëch had wanted for some time to reposition the oil sump reservoir from its location behind the passenger-side rear wheel to a spot ahead of it to better balance the car and neutralize handling. For 1972 he succeeded, and an exterior oil-filler cover just behind the passenger door made this difference apparent. But concerns over side-impact safety made this a single-year feature, and post-1972 production returned the reservoir to its original position.

Ernst Fuhrmann found he had plenty to do. One of the new cars for which he previewed designs was a joint project with VW to replace the aging Beetle. This car used a variation of the low-profile underseat engine to maximize space inside the compact sedan. Piëch and Bott, and stylists from Tony Lapine's design studio (another new arrival, from Opel at Russelsheim), had created a handsome innovative low-engine concept to replace the 911. However, instead of VW's flat four,

FINDING SOMETHING TO DO

Ernst Fuhrmann had left Porsche in 1956 after Ferry hired and then promoted Klaus von Rücker into the job Fuhrmann believed he deserved. He went almost immediately to Friedrich Goetze AG in Burscheid bei Köln in northwestern Germany, one of Europe's best known manufacturers of piston rings.

"Oh, let's see," Fuhrmann reminisced in late 1991. A short, slender man, he was soft-spoken in interviews. "I was a young man and very eager. Dr. Porsche hired Mr. Rücker and set him in front of me. I told them 'You don't need him because I am still here.' This was a very normal situation. Two people would like to have the same position, so one must leave."

But at Goetze, his youthful eagerness tripped him up. "I was very successful with the other company. But there are two reasons to fire a manager: one reason is he is not successful. Another reason is if he is too successful," he said.

"I was successful. The office manager thought that I did anything I wanted and that I didn't care about him. That was true," he added with a short, sharp laugh. "Therefore I had to leave." It was the summer of 1971. Fuhrmann, who was 52, and his wife Elfrieda went home to Teufenbach, Austria, where he took an unplanned vacation.

"I was here for six weeks without a job. It was pretty nice." He laughed again. "And one day the telephone rang. Mr. Bott and Mr. Piëch called to ask if they could pay a visit. They came, asked me if I'd like to come to Porsche. They showed me the designs for the new cars. I had nothing else to do. . . ."

On Weissach's open road jump test, a driver challenged the car's functions, strength, and durability. Weissach engineers often reported that visitors from other carmakers watched these tests, shook their heads, and said, "No wonder!" *Porsche Archiv*

this sports car used an opposed six-cylinder engine for power. Plans called for an entry-level 912 replacement using a tuned version of the VW flat four. Piëch stepped further and conceived a double flat six, either as a pair of stacked sixes, or an opposed 12-cylinder, as an exclusive ultra high-performance variation. A Volkswagen sports car was on the drawing boards as well.

"The salespeople wanted a new car," Fuhrmann explained. But then VW's board fired its general manager, Kurt Lotz, and the new chairman, Rudolf Leiding, reviewed all upcoming projects. "Then in the VW Werk, the decision was made *not* to build the Porsche car," he continued. "So we had no successor for its 911. Porsche had an agreement with the VW Werk, so that the whole costs of the development center were taken from VW fees. Weissach was their development center. So it meant Weissach cost nothing to us. VW Werk helped to give Weissach enough [research and development] orders, so it was a 'must' for the work of the engineers there. And all this was canceled. So I had no work for Weissach. And I had no successor for the 911."

Fuhrmann, even at Goetze, had watched the winds of automotive politics blowing across the Atlantic Ocean. Ralph Nader's vendetta against GM for penny-pinching Corvair's engineering development had blurred the lines between fault and fiction, with the rear-engine, air-cooled design shouldering the blame. Did such concerns make Porsche the next target in Nader's sights?

> "I was very successful with [Friedrich Goetze AG]. But there are two reasons to fire a manager: one reason is he is not successful. Another reason is if he is too successful."
>
> — Ernst Furmann

One year remained on the existing contract with VW Werk. The 911 was scheduled to disappear at 1973 or perhaps 1974, when strict new emissions and safety standards went into effect in the United States. That paralleled the eight- or nine-year lifespan that other manufacturers maintained for their models. This left Fuhrmann little time to fully develop and introduce a replacement from scratch. Rudolf Leiding threw Weissach a bone, asking them to develop an economical front-engine water-cooled coupe. The idea paralleled one Fuhrmann had conceived for a luxury version with a Porsche badge. Either or both could succeed the 911.

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Following hours of work in the wind tunnel, aerodynamics engineer Tilman Brodbeck devised the lower lip, or chin spoiler, introduced on 1972 models. This channeled air around the front of the car and nearly eliminated front-end lift. *Porsche Archiv*

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The 1971 Targa 2.2-liter T provided the perfect backseat playground for children and pets. T engines developed 125 horsepower at 5,800 rpm. *Porsche Archiv*


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New work assignments energized Weissach. A project EA425 for Volkswagen entered Karl Rabe's registry, and it appeared in a second column as Typ 924, an entry-level sports car Porsche could badge as its own as it had done with the 914 and 914/6 models. A luxury GT car, the Typ 928, was another automobile that Fuhrmann had in mind, and he meant it to remain purely Porsche. But with years of development ahead of the new cars, Fuhrmann reconciled his need to keep the 911 alive. A Sunday afternoon race at nearby Hockenheim provided a shot of adrenaline to the rear-engine model.

"I was just standing in the pits," Fuhrmann said. "I watched many 911s, and the Fords and the BMWs were passing them. Even our fastest 911, I think, was lapped by a Ford and then a BMW." The sight of a compact Ford and then a BMW two-door sedan passing a 911 stunned Fuhrmann, and he searched for his staff at the track to get an explanation. He found Wolfgang Berger, who worked for racing engineer Norbert Singer. Berger explained that the other cars he had seen were pure racers disguised as production cars by clever factory operations from Ford in Cologne and BMW in Munich. Modified suspensions, bodies, and larger-than-life tires and wheels had improved their handling. "Your analysis is interesting," Fuhrmann told the younger man. "Think about it and then tell me what you will do."

Berger reported to Singer and the 911's gentle slide into oblivion picked up a renewed inertia of motion. Within days Singer called another young engineer, Tillman Brodbeck, into his office. Brodbeck was Porsche's first hire as an aerodynamics graduate. Singer sent him, a couple of mechanics, a designer from Lapine's staff, and a car into the VW wind tunnel where Brodbeck devised a small lip for the front valence of the car below the bumper, and, on later visits, the *burzel*, the ducktail spoiler that revolutionized the car's handling, changed its appearance, and influenced car designers, engineers, and marketing and sales staffs everywhere. Peter Falk's test department ran countless laps to determine its best placement and height.

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As of July 14, 1972, the date of this drawing, the Carrera graphics on this new car still referred to it as the 911 SC. This was the finished drawing for export purposes. *Porsche Archiv*

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Not long after Brodbeck and his colleagues tamed the front end of the 911, they returned to the wind tunnel to address rear lift. Tape strips (and instrument readings) revealed smooth airflow over the rear that lifted the car. *Porsche Archiv*

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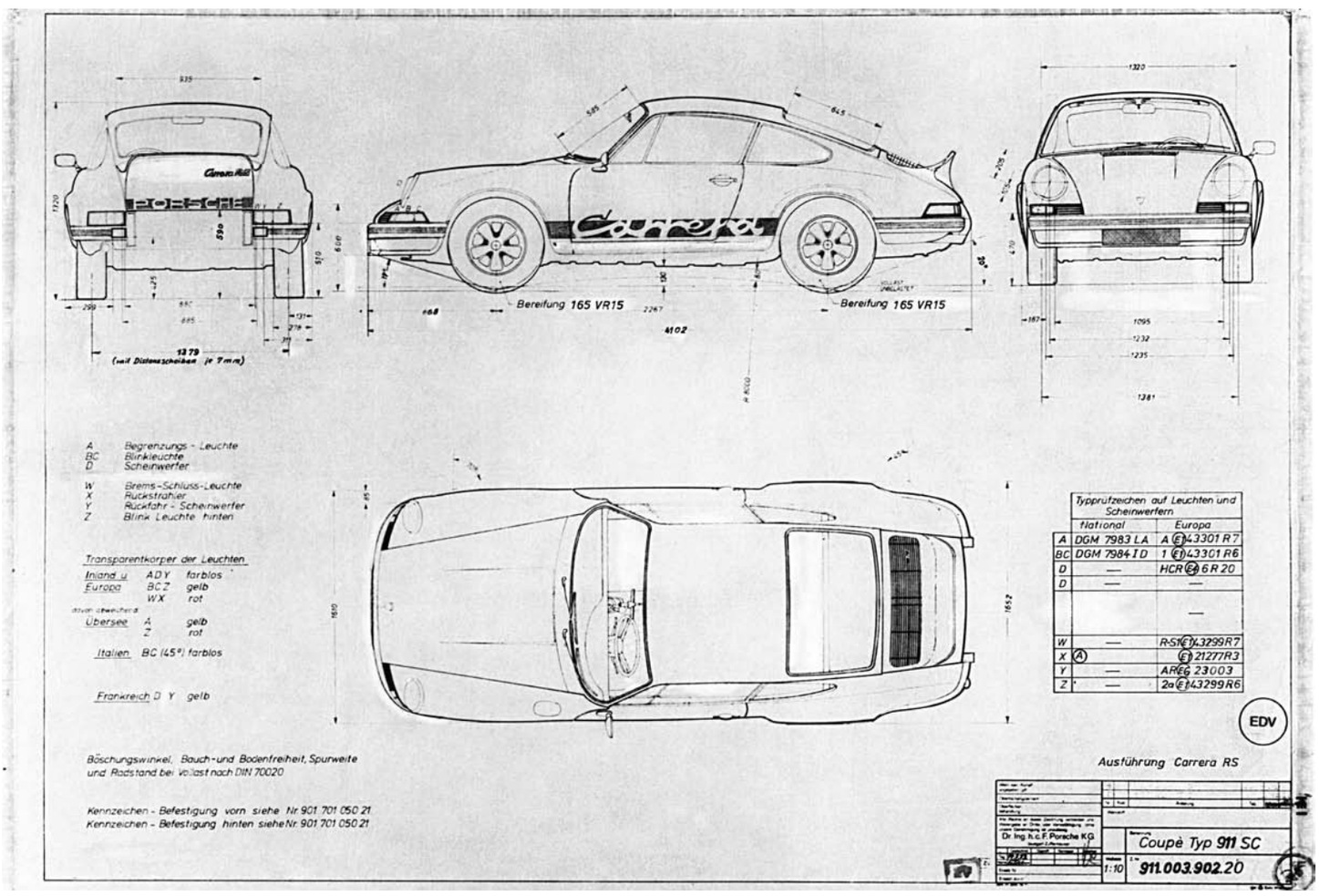
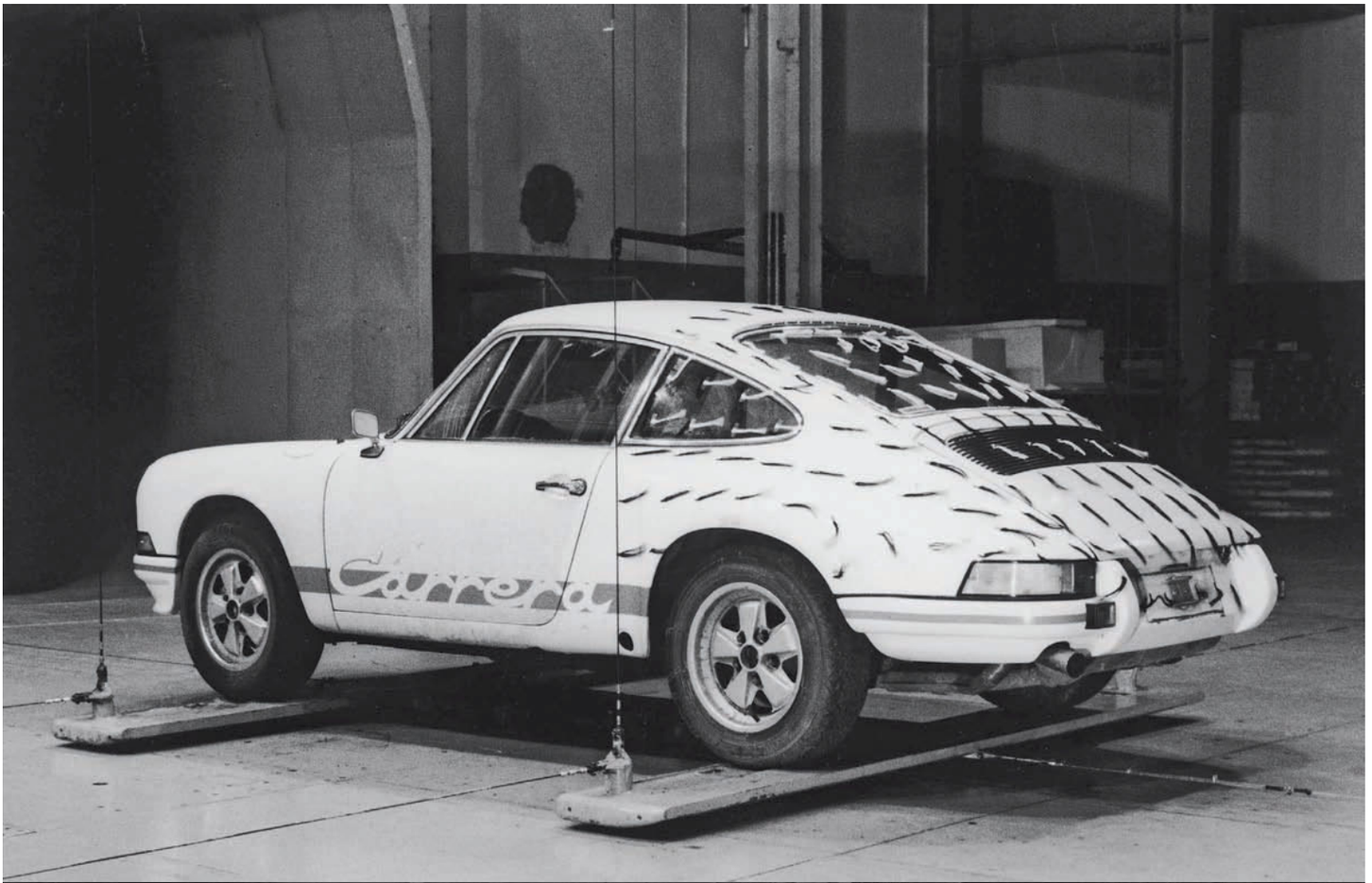
The wind tunnel team tried many variations before concluding that this shape and size offered great improvement and the fewest compromises. Styling chief Tony Lapine later trimmed it to improve its proportions. *Porsche Archiv*

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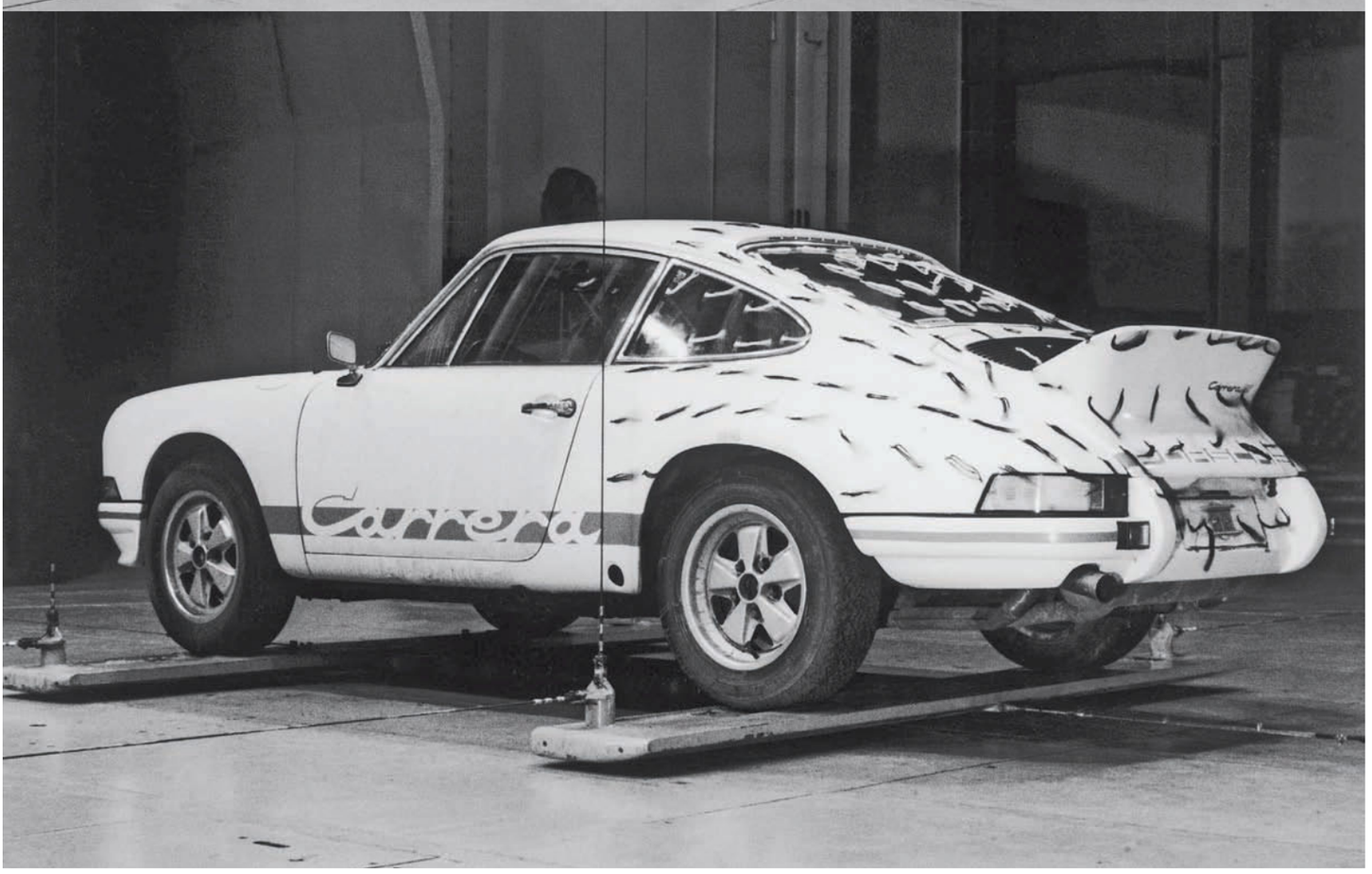
Carrera

Once the testers finished, the ducktail went back to Lapine's studios to ready it for production. It led to a moment reminiscent of the studio modifications that occurred between Erwin Komenda and F. A. Porsche. Lapine himself made designs of the entire car. When his styling department presented the first actual vehicle—it was just before the production start—Falk was startled.

"The burzel is too low! Why is it lower than we tested it?"

"Because it looks better," Lapine told him. Decades later, Falk related that Lapine had cut 10 or 20 centimeters off the height because he thought it had better proportions. It went into production shorter than what Falk and his drivers had wanted.

The lip, or "chin spoiler," appeared on 1972 model-year regular production 911s. Almost immediately even average drivers on American interstates and European autobahns felt the stability improve in the car. But neither Fuhrmann nor Berger was done.

Late in 1972, another level of 911 performance and options arrived. Originally (and internally) known as the 911SC, marketing needed something more dynamic and more appealing, and they proposed resurrecting the name Carrera from earlier high-performance 356 models. Tillman Brodbeck's startling ducktail debuted on the 911 Carrera. The rest of the car's designation revealed more of its secrets: RS 2.7., a Rennsport-inspired vehicle with a 2.7-liter engine.

This prototype still showed short bumper guards, and the Carrera RS logo was in the center of the ducktail. On production cars, the guards grew longer, and the Typ moved down and to the far right. *Porsche Archiv*

Real-world driving tests around Weissach confirmed what wind tunnel work had suggested to improve road holding and decrease front and rear lift. For 1974, Carrera models used the flat whale-tail rear wing. *Porsche Archiv*

The new model entered the market with the purpose of meeting homologation requirements as a production race car. As such, it took some inspiration from the ultra-limited run of 911R models that Ferdinand Piëch developed in 1967. That series of four prototypes and 20 production cars emerged mainly to determine what the competition limits were from an automobile derived from series production roots.

Those 20 production R models remained prototype-category competitors all their lives and accomplished impressive results, but the point of these new RS models was to take back Hockenheim and every other racetrack from those modified Fords and BMWs. Regulations from the Fédération International de l'Automobile (FIA), racing's international directorship, called for a minimum run of 500 identical cars to qualify for Group 4 Special Grand Touring Car category. For these models, the so-called lightweights, everything nonessential to competition fell from the car, stripping its weight to just 1,984 pounds. Marketing and sales, who had talked Piëch and others out of more than the 20 series 911R models, believed it was impossible for Porsche to sell anywhere near 500 of these spare uncompromising automobiles. To appease them, Bott, Singer, and Berger devised a touring version of the car, fitted with an interior more like the best-equipped S models. These came in at 2,370 pounds.

To power the vehicle, Hans Mezger's engineers developed a new 2,687cc flat six by enlarging bore from 84 millimeters to 90 millimeters. This engine introduced aluminum alloy cylinders with Nikasil liners, a nickel/silicon coating that promoted better cooling and less wear. With Bosch's K-Jetronic (the K for *kontinuierlich*, or continuous) electronic fuel injection and ignition management system in use, the engine developed 210 DIN horsepower. Because Mezger conceived the engine for competition, Porsche did not attempt to configure it to meet U.S. emissions standards, rendering the car unobtainable in the States for many years unless it came to race.

Word spread that this car was limited in production and something special from Porsche. The mandatory 500 lightweights (designated M471) nearly flew out of Zuffenhausen. (Porsche had sold those first 500 even before they unveiled the car at the October 1972 Paris Auto Salon.) Sales personnel were stunned, and by the time they finished counting their receipts, 1,580 of the RS Carrera models sold in 1973. This gave it FIA eligibility for the far less challenging Series Production Grand Touring Car Group 3 (for which the requirement was 1,000 units), where the Carreras triumphed. The cars sold for 36,000 DM ($13,585 at the time), some 5,000 DM ($1,887) more than the 2.4-liter 911S. The lightweight versions used plastic and/or thinner metal body panels and narrower gauge window glass. One of its most distinctive features was its bold graphic on the sides, the word "Carrera" in script, in a color matching its five-spoke Fuchs wheels.

As RS Carrera historians Thomas Gruber and Georg Konradsheim reported in their meticulously researched book, *RS Carrera*, Porsche took no chances with the homologation. Zuffenhausen assembled not just the first 500, but the first 1,000 cars as their most stark RSH or Rennsport homologation versions, mounted on narrow wheels, with no ducktail. Mechanics drove the cars off the assembly line directly to Stuttgart's official weigh station. After certification, they returned the cars to Zuffenhausen for completion as the customer ordered it. The lightweights had only a driver's sun visor, no glove box cover, cardboard door panels with straps operating the latches, and no insulation or sound-deadening material. Customers with no intention ever of racing the cars snapped them up, teaching Porsche marketing and sales a lesson: if we build it, they will come.

For those who were unable or unwilling to get a 1973 RS, Porsche carried over the S, E, and T models with their 2.4-liter engines introduced the year before. In the middle of the model year, Porsche introduced the Bosch injection system to T models for American delivery in order to meet coming emissions standards.

This front deck lid graphic, known as safety stripes, was optional on domestic and export 911s for 1974 models. *Porsche Archiv*

THE SECOND GENERATION: THE G MODEL

What emerged from Zuffenhausen and Weissach for the 1974 model year was, in some ways, a car the company never intended to make. Strict new regulations from American legislators dictated everything from bumper height to headrests integrated into seats for rear-end collision whiplash restraint; from automatic seatbelts to heavier padding on instrument panels, switches, and the steering wheel hub; from mandatory use of regular-grade unleaded gasoline to the addition of air-cleaning-but-performance-robbing belt-driven devices to the engine. Porsche had to redesign and reconfigure a car they expected instead to discontinue. This was the birth of the well-regarded G Series.

Bumpers had perhaps the biggest potential to destroy those hard-fought shapes of the 911. American safety regulations required that those at the front of the car had to withstand a five-mile-per-hour impact with a fixed barrier and show no damage. Styling chief Tony Lapine, who had brought with him Wolfgang Möbius, Dick Soderberg, and chief modeler Peter Reisinger when he joined Porsche from Opel, set them and a variety of chassis engineers to solve the problem. Möbius' bumpers, with the accordion-like rubber interfaces to the body, met the requirements and retained the car's balanced proportions. Historian Karl Ludvigsen wrote, "After the G-Series cars had been on the market for about a year, they looked so right and were so familiar to the eye that they tended to make earlier Porsches look excessively light and fragile by comparison."

Porsche offered the 150-horsepower base 911, the 175-horsepower 911S, and the 210-horsepower Carrera. Carrera buyers in the United States got the S engine in their cars. Displacement was the same—2.7 liters with Bosch electronic fuel injection on the base and S models (and U.S. Carrera), and mechanical injection feeding the European Carrera.

Porsche had made history on the world's endurance racetracks with its effective 917 series of coupes with their opposed 12-cylinder engines. Those cars, however, had strict regulations for engine displacement and other specifications. Elsewhere in Europe, the InterSerie and, across the Atlantic in the United States, the Canadian-American Challenge were racing series that enforced no limits on engine sizes and encouraged unlimited development. Porsche's response to interest from a couple of its drivers was to turbocharge the flat 12 and mount it in an open Spyder body. In its wildest trim, this technology yielded as much as 1,400 horsepower, more than doubling the normally aspirated output. The InterSerie and Can-Am turbo technology seemed like a fantasy for road cars until Porsche delivered it with a leather interior and electric window lifts.

The 911 model range for 1974 included the base 911, shown here, as well as the S and the Carrera coupe, all using the 2.7-liter engine. They marked the birth of the successful and long-lived G Series. *Porsche Archiv*

“All my life, all my automobile life,” Ernst Fuhrmann recalled, “I was of the opinion that racing must have a connection to the normal automobile. And we were very successful with the InterSerie in turbocharged cars. And when this race car came, it was noiseless. And the next version was better. So we were far ahead. I said to my people, why don’t we put this success into our car?

“They said, ‘Oh, this was tried already.’

“But not in a car that was done right.

“‘And it was refused by management in that time! ‘It was impossible,’ they said. ‘There’s not enough room.’ This was my contribution: I looked in the engine and said, ‘There must be room!’”

Porsche engineers always looked for ways to increase engine output from an air-cooled flat-six cylinder engine that already was approaching some limits. Engineering protests prior to Fuhrmann’s assignment were nothing compared to the problems they encountered as they struggled to make the systems work.

“Herr Binder was the head of engine design department,” Herbert Ampferer recalled. “He came to me and said, ‘You, young guy, you are young, inexperienced. I need a layout designer for the new turbo engine.’” Ampferer was a young guy with a mechanical engineering degree from Steyr in Austria, concentrating mostly on engines. His first job at Porsche put him to work on the EA266 mid-engine project for VW. “It was horribly complicated, drives running around the corners, bent drives. Unbelievably complicated,” he said.

Turbo technology in those days, 1970 and 1971, while he and racing colleague Valentin Schäffer worked on road and competition adaptations within Porsche, came mostly from commercial truck applications. These were unsophisticated systems, as can be expected from needs that weren’t centered on any kind of responsiveness.

A German named Michael May was turbocharging Ford Capris. The car suffered lengthy turbo lag—the response time from throttle pedal input to engine reaction. Porsche acquired one to give the engineers a sense of the state of the art. Ampferer recalled one drive where by the time the turbo input reached the engine, he was headed at a huge concrete wall: “I made it. Nothing happened. So I had a good test on the lack of response of the turbos.”

With that experience in hand, he questioned Binder about the considerations he had to design into Porsche’s turbo car. “Tell me, sir, do we need air conditioning for that car?” Ampferer asked. “‘No, we don’t need it,’ he said. Do we need a rear wiper for that car? ‘No, we don’t need it. This is only 200 cars or something. Forget it!’”

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The sometimes tail-happy Model 930 Turbo appeared as a 1975 model in Europe. Its three-liter engine developed 260 horsepower, an enjoyable challenge on a large flat lot in snow. *Porsche Archiv*

“Then sales and marketing announced that they could sell many more than only 200. And they needed air conditioning. So we started from scratch, completely. It was a case of not knowing what market was in front of us for this new car.”

They experimented with prototypes. One used a 2.7-liter block. In 1969, Valentin Schäffer had mounted turbos on two-liter 901 engines. One turbo stuck out of the rear deck lid of a 911 coupe, while another, even though it protruded from the engine compartment of a 914-6, suffered critical cooling problems. To Binder and Ampferer, the three-liter engine developed from the 2.7 for the racing Carrera RS 3.0 seemed a good place to start.

“I was involved with the 930,” Ampferer explained, using its internal Typ number, “but once you have designed the components needed for the prototypes, you are a little bit out of the business. Product procurement starts. Product components come in house. They get assembled, and the first tests bring the first calls. ‘We have a problem there, we have a problem here.’ And you redesign it, and it goes again. You are involved in that process just from time to time. You have time to start it along with another project.”

For Ampferer, that other project was the front-engine water-cooled Typ 924, the final joint development with Volkswagen under the old contract. Both projects moved through their various phases, the 930 Turbo appearing in the spring of 1975 in Europe. Its 2,994cc engine incorporated a 95-millimeter bore within the aluminum alloy crankcase. With normally aspirated compression at just 6.5:1, when the Kühnle, Kopp & Kausch (KKK) turbocharger spooled up to its 90,000-rpm operating speed, it boosted air into the cylinders at 0.8 bar, 11.3 pounds per square inch (psi). As a result the engine developed 260 horsepower at 5,500 rpm, making the coupe with its prominent rear wing into the fastest German production car of its time. Acceleration from 0 to 100 kilometers per hour took 5.5 seconds, and the car reached a top speed of 155 miles per hour.

Ferry Porsche sent the first production 930 Turbo model, completed in late 1974, to his sister as a gift. Louise Piëch was a talented painter, and so she could see the world clearly, the factory assembled her car with an untinted windscreen. *Porsche Archiv*

"All my life, all my automobile life, I was of the opinion that racing must have a connection to the normal automobile. And we were very successful with the InterSerie in turbocharged cars. And when this race car came, it was noiseless. And the next version was better. So we were far ahead. I said to my people, why don't we put this success into our car? They said, 'Oh, this was tried already.'"

— Ernst Fuhrmann

Weissach widened the 1975 Turbo's rear track from standard 52.8 inches to 59.5 inches. This greatly improved handling and road holding. *Porsche Archiv*

Porsche widened the bodywork by about five inches to accommodate much wider wheels and tires. For brakes, the engineers incorporated ventilated aluminum rotors with dual-piston calipers in front and ventilated cast iron rotors in back. Spacers widened front track by 0.83 inch and 1.1 inches in the rear. Not only were Ampferer's dreaded air conditioning and rear wiper standard equipment, but sales and marketing also wanted full-leather upholstery, a four-speaker stereo system, electric window lifts, and automatic heat control. Porsche debuted the car at the 1973 Frankfurt show and deliveries began early in 1975.

Despite the Turbo's distinctive rear wing—some called it outrageous at the time—trim on all the 1975 models was otherwise subdued. Headlamp bezels and exterior mirrors matched the body color, and on the Targa, the bar went flat black. In addition to the high-performance Turbo, the company offered base 911, 911S, and 911 Carrera models as well as a special 25th anniversary edition that they painted silver with blue/black leatherette inside to commemorate a quarter century of manufacturing automobiles in Zuffenhausen. Carrera and Turbo coupes ran on Fuchs wheels, while base and S models introduced cast-aluminum wheels from ATS that quickly earned the nickname "cookie cutters."

For 1976, Porsche shuffled its model lineup, dropping one version, resurrecting another, and introducing a third. The base 911 carried over, but now it ran with 2.7 liters tuned to produce 165 horsepower. The 911S disappeared while the Carrera adopted the same 3.0-liter block that powered the Turbo. In its normally aspirated configuration, it provided buyers with 200 horsepower. Both 2.7- and 3.0-liter engines got new cooling fans, not quite one inch smaller in diameter, and with five blades instead of 11, but that turned faster. For a single year, the company reintroduced the 912 strictly for the American market. Full compliance with emissions and safety regulations for the new 924 was a year away. Porsche launched the new coupe in late 1975 as a 1976 model in Europe. In the interim, the 912E used the 2.0-liter flat four of the recently discontinued 914/4. The fuel-injected engine produced 86 horsepower. Porsche manufactured 2,099 for the States in coupe and Targa versions.

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Berlin Philharmonic Orchestra conductor and music director Herbert von Karajan was a regular Zuffenhausen visitor and a good customer. Porsche created this custom-painted Martini Turbo for him in 1975. *Porsche Archiv*

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The 1977 model year 911 lineup posed on a Weissach test track curve for a photo. From left, a Turbo 3.0 coupe, a 911S Targa, a Carrera 3.0 coupe, and a base 2.7 coupe. *Porsche Archiv*

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The 3.0 Carrera, left, delivered 200 horsepower at 6,000 rpm, while the base 911 provided buyers 165 horsepower at 5,800. Coupes and Targa 911s sold in nearly equal numbers while 3.0 coupes outsold Targas two to one. *Porsche Archiv*

Weissach engineers added thermal reactors, a kind of first-generation catalytic converter, and secondary air injectors to the engines of its 1977 model year cars destined for Japan, Canada, and the United States. Vacuum brake boosters appeared on Carrera 3.0 and Turbo models as well as base 911s fitted with the Sportomatic transmission. While the Carrera shifted to ATS wheels as standard equipment, the Turbo became Porsche's first model to run on 16-inch wheels and tires. Ahead of the rear wheels on the wider body, Porsche added a matte black material to protect the paintwork from rock chips. Inside all the cars, buyers were pleased to find two new air vents in the center of the instrument panel and rotary knobs set into the door panels that locked and unlocked the doors, eliminating the pop-up buttons that a skillful thief could open with a coat hangar.

The 1978 Turbo 3.3 developed 300 horsepower at 5,500 rpm. Porsche introduced black matting on the leading edge of the rear fender flares to protect paint from rock chips. *Porsche Archiv*

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Porsche originally created the designation SC, or Super Carrera, for what became the RS Carrera in 1973. The name reappeared on the 911 series beginning in 1978. *Porsche Archiv*

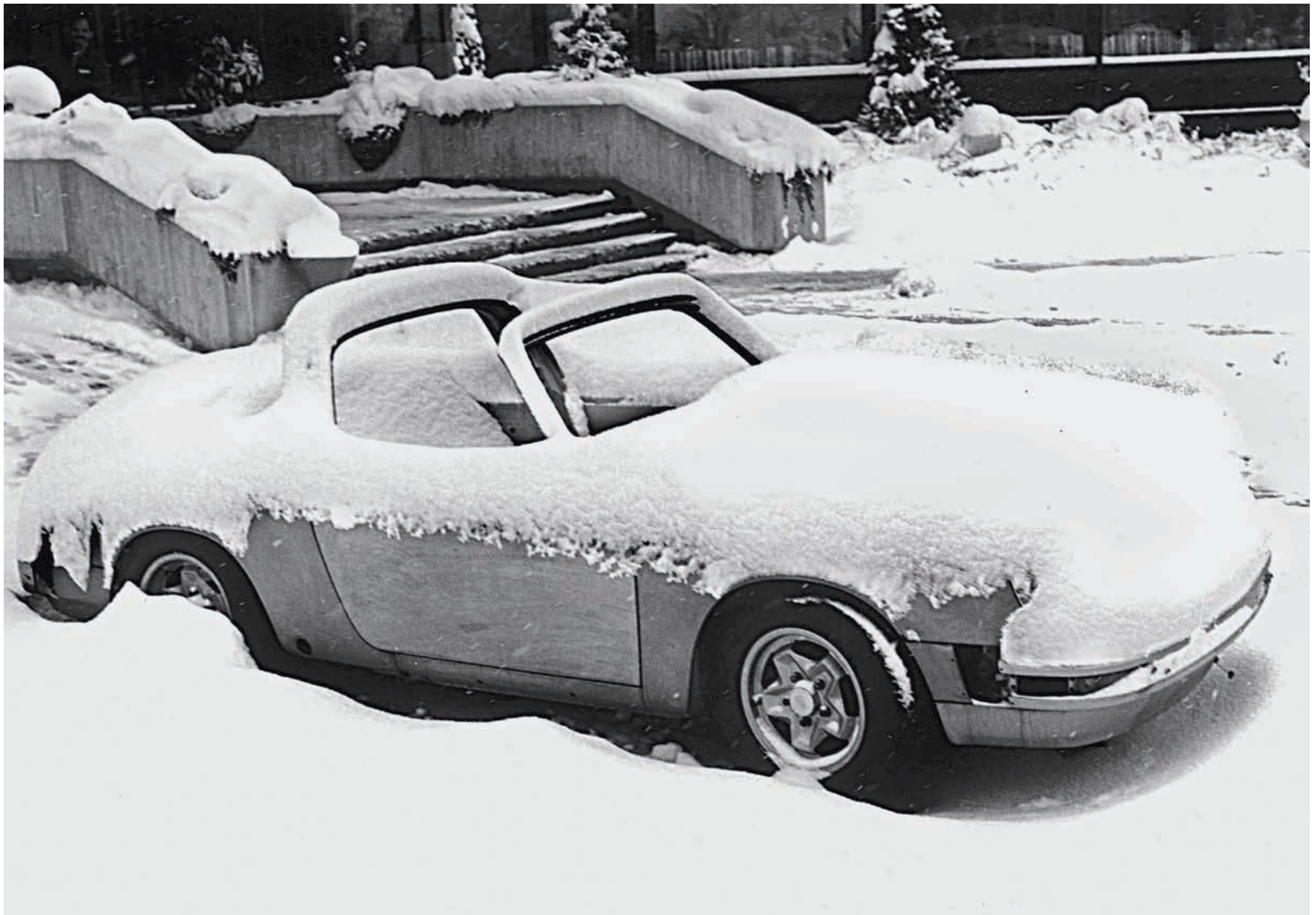
Porsche's model lineup raised eyebrows in 1978 with the addition of its startling new 928. Outside observers saw a product range leaning toward front engines and water-cooling. The 911 became the new SC model, but in some eyes this was just the next Porsche where the 924 and 928 were the new ones, illustrating the company's direction.

Only two variations of the 911 remained, the SC, standing for Super Carrera, and the Turbo, each with newer, larger displacement engines. The SC took over and improved the 3.0-liter version from the previous Carrera, while the Turbo grew to 3.3 liters. The base 911 and Carrera were discontinued. In its earliest iterations, trim on the SC returned to bright work, with door handles, window frames, and headlight frames all chrome plated. Fifteen-inch ATS aluminum wheels came standard while 16-inch Fuchs were optional.

For the SC, Weissach reworked its three-liter engine to provide drivers with greater torque at nearly all engine speeds. As a result—and combined with the effects of mandatory use of regular-octane gasoline—the engine developed 180 horsepower, down 20 from the previous Carrera even as urban drivability improved. Cooling duties called for reinstating the 11-blade fan, but it retained the smaller diameter.

For the new Turbo, engineers increased bore to 97 millimeters and stroke to 74.4 millimeters with a new crankshaft. With compression set at 7.0:1, horsepower output rose to 300, though emissions requirements and the need to operate on unleaded fuel in Japan, the United States, and Canada reduced engine output for those countries to 265. Still, it remained Porsche's most potent offering compared to the 125-horsepower 924 and the newly introduced 240-horsepower 928. Wisely, Porsche's product planners and marketing and sales staffs still believed that nothing should eclipse the output of the Turbo as company flagship.

After three years of chrome, Porsche returned to body colors on the headlight surrounds, while door handles and window frames went flat black for 1979. The compromises in engine timing that had given the 1978 SC good performance at the expense of fuel economy were adjusted for 1979. Horsepower remained unchanged at 200 for the SC, 265 for U.S., Canadian, and Japanese Turbo models, and 300 for rest-of-the-world buyers. Production for the year was 9,475 coupes, Targas, and Turbos. The car was safe for another year.



PLENTY TO DO NOW

But the addition of two new cars provoked comment. Throughout 1977 and 1978, Fuhrmann, as not only chief of engineering but company spokesman, answered or avoided questions about this apparent evolution. In early 1978, with 928 models on the road, he quantified the future of the 911. At that time, Porsche manufactured around 45 of the 911s each day. The inquisitors, of course, did not have Fuhrmann's understanding of engineering, of the challenges to cleaning the emissions from air-cooled engines, of reinforcing the 911 platform to withstand even more demanding impact tests. By 1978, the 911 was close to the same age—13 years at that point—at which Ferry launched the 356 replacement. And how were Fuhrmann's engineers and designers expected to make something this old seem fresh and new?

"The car was still selling," he explained in 1991. "We still made money from this car. So I set a low limit at which we no longer make money. I told journalists if we ever go below 25 cars, some number each day, 6,000 a year, we stop."

In some sense, though, Fuhrmann already had stopped. He had halted any further engineering, other than what the United States required to continue shipping cars there. Sales in America still accounted for half of 911 production, so, depending on exchange rates, half or more of Porsche's profits came from American customers. Fuhrmann couldn't ignore them; he only hoped to entice them into 924s and 928s.

To inhibit body corrosion, Porsche began zinc galvanizing its car bodies in 1975 for the 1976 model year. To demonstrate its effectiveness, Weissach engineers parked an unpainted but galvanized body outside the engineering center for decades. *Porsche Archiv*

Loyalist groups developed in Zuffenhausen and Weissach. The 911 faithful became outspoken that engineering development and design updates were perpetually shelved. While design chief Tony Lapine drove a new 928, Wolfgang Möbius stayed with his 911 as his company car. Modest engineering changes gave the SC engine an eight-horsepower increase for rest-of-world models, and the Turbo fitted a new exhaust with twin pipes. U.S.-destined cars received catalytic converters and oxygen sensors that sapped away the eight-horsepower gain, and adding insult to injury, new speedometers read only to 85 miles per hour as the States enforced the widely ignored 55 mile-per-hour national limit. Porsche stopped distributing Turbos to Japanese, Canadian, and U.S. buyers.

The 1982 SC coupe presented customers with the ninth version of the G model, its three-liter engine developing 204 horsepower at 5,900 rpm. Few outside the company knew this was meant to be the 911's last year. *Porsche Archiv*

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For engineers at Weissach, writers at magazines, and Turbo owners everywhere, this was inspiring performance. Three hundred horsepower launched the 2,860-pound car from 0 to 100 kilometers per hour in 5.4 seconds. *Porsche Archiv*

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These U.S. specification models for 1980 had taller ride height regulations than those for Europe. American buyers not only had to accept 188 horsepower engines, but also speedometers that read to just 85 miles per hour. *Porsche Archiv*

Production of all 911s hit 9,943 for 1980, a figure slightly more comfortably above Fuhrmann's death sentence. However, budgets for engineering and design and advertising and promotion had to be split in three portions, and to many inside the company and outside, it seemed as if the boss had said one thing but intended something else.

During an interview in 1991, Fuhrmann admitted that he had enemies and he felt sure he made some of them himself. People judged him harshly for assuming Ferry Porsche's role as company spokesman. Those who knew Ferry well spoke of an introverted and circumspect man who shunned the limelight. With his own traits in mind, Ferry had moved his office from the upper floor of Werk I to another building several miles away in Ludwigsburg. People wondered if he went in order to give Fuhrmann room to manage or because he felt pushed out.

Ferry's decisiveness as a leader was beyond dispute. He brought the 356 and the 911 into production. He launched and supported racing programs that made the 550 and the 718, the 904, and half a decade of his nephew Ferdinand Piëch's race cars into regional, then national, and then international champions, and they became the stuff of legends and articles. He controlled and directed his fractious family in the pivotal meeting in 1970 that removed them—and his probable successors—from jobs within the company. He was 61 at that time, and by age 70 in 1979, he had been an exile from his own company for perhaps six years.

Fuhrmann in 1991 told a story about visiting Detroit to drum up engineering business for Weissach after VW's contract with them ended. He met with Lee Iacocca at Ford Motor Company who was interested in what Porsche might bring to Ford. By the time Fuhrmann got back to Stuttgart, Iacocca had been fired. What Fuhrmann did not add in his recounting of the Detroit tale was that Henry Ford had come to resent the fact that while his name was on the building and most of the cars that left it, when Ford Motor Company spoke, it was Lee they heard, not Henry. What Fuhrmann knew, however, was that Ferry was the opposite of bombastic, outspoken Henry.

A decade younger than Ferry, Fuhrmann looked forward to his 60th birthday coming up in 1979. Sales of his 924 and 928 were growing. By 1980, the 911 was heading to its 15th anniversary. He was convinced that the company needed a new car.

"Work was a little slow," he explained. "At that time we should have begun a new program." He went to Ferry to explain that he didn't want to work until the end of his life, that a new car took seven or eight years to reach the market, and he wanted to stop at 65. He told Ferry he was prepared to leave the day Porsche had a new man who could launch a new program.

Ferry got busy. Through headhunters he approached Bob Lutz who ran Ford of Europe for several years. Ford shipped more of its Fiesta compacts to the United States than Porsche had produced in all three models during 1979. Ferry had labor problems and disappointing sales. He was unable to articulate the future he saw for his company. Lutz, one of twelve candidates for the job, stepped away. But, true to his word, Fuhrmann went home to Austria before year-end.

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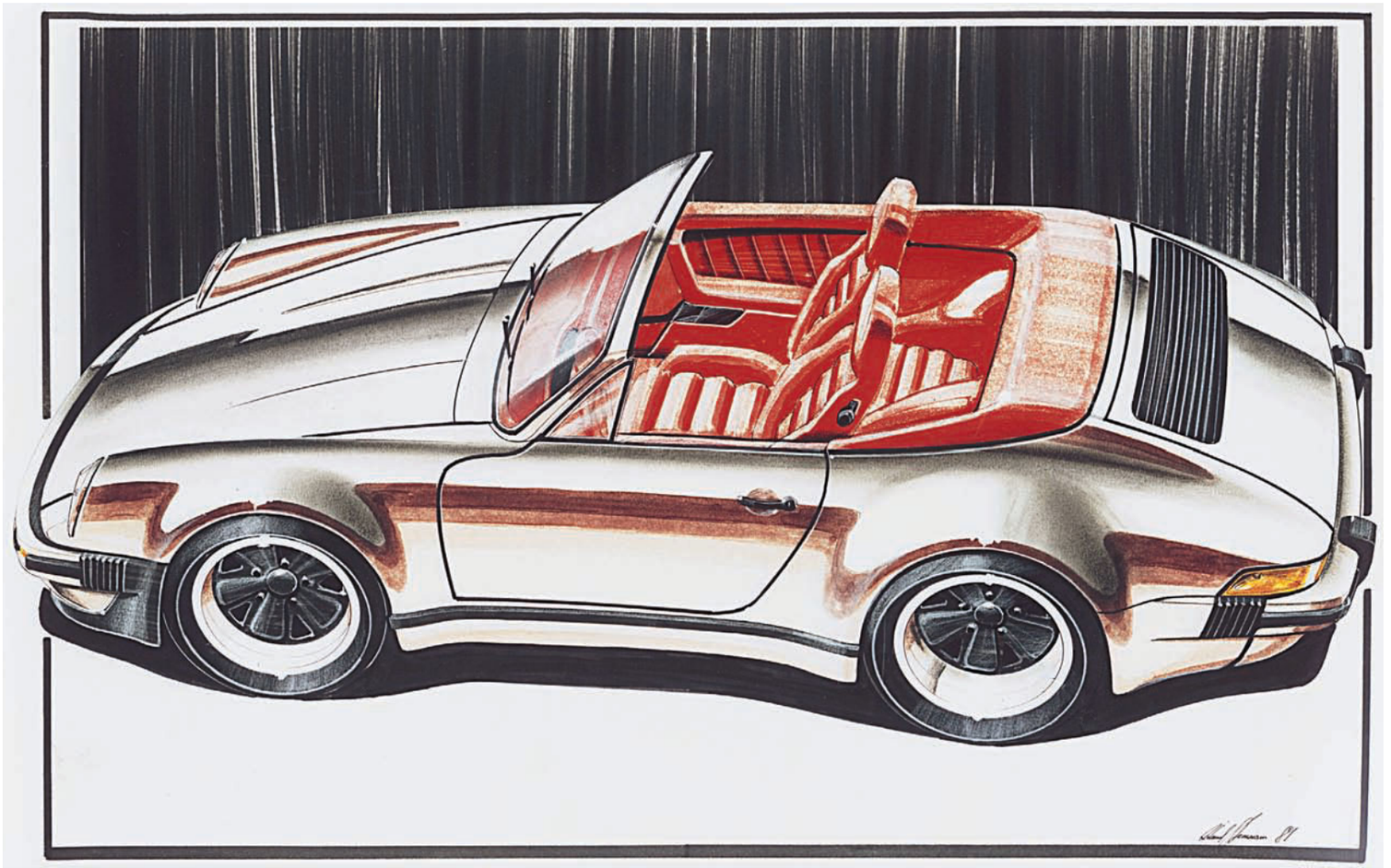
This was one of the first of the Flachtbau turbos, of which Sonderwunsch manufactured just seven or eight. These early versions appeared through 1982, when two round headlights replaced the four rectangular lamps. *Porsche Archiv*



THE PETER SCHUTZ ERA

Porsche stylist Roland Stemmann began working on 911 cabriolet concepts soon after Peter Schutz and Helmuth Bott launched the project. This combination of white body with red interior carried through to at least one celebrity owner. *Porsche Archiv*

By April 1980, Ferry had a much better grasp on things. At a reception on the terrace of his family home in the hills above downtown Stuttgart, he nailed it while speaking to another of his candidates: "We have people who know how to design automobiles, how to build them, to sell them and service them. Our problem is that we are not making any money."

Ferry was speaking to Peter Schutz, a German-born, American-educated mechanical engineer with direct experience in sales. Schutz knew how to make money. At Caterpillar and at Cummins, he had made them money and he improved relations with labor at Cummins to such an extent that the Teamsters Union asked him to deliver their national convention keynote address.

"When we look for the reasons for our poor earnings," Ferry continued, "we've got manufacturing and sales and engineering all working against each other. We are looking for someone who can get this whole organization unified and working together."

Schutz knew how to do all that. When he left Cummins, he moved to Germany to manage Klöckner-Humboldt-Deutz (KHD), the heavy diesel engine manufacturer. He improved working conditions through employee empowerment, which increased productivity and raised company profit.

Schutz took the job that Ferry offered, and he spent several months learning about the company and its products before he arrived with his wife Sheila in January 1981. Dealers everywhere told him that Porsche's cars were too expensive and they had quality control issues. He heard morale was low in Zuffenhausen and Weissach because Porsche was discontinuing the 911 and moving toward more 924- and 928-type automobiles. Peter figured there was more to this story.

From dealers, owners, and service people, he learned that the hydraulic camshaft drive chain tensioners routinely failed in the 911s. This was a source of quality complaints. In his first meeting with production engineers, he asked if they had a cure for this problem.

“Oh yes, but the car is going out of production,” they told him. “And the repair kits have become a profit source for the company.” Schutz heard this cynical view and worried that savvy customers attached it to every Porsche product, wondering if compromising engineering somehow made the company more money. But his biggest problem was with the engineers’ first sentence. Ferry’s finance people had shown him that the 911 remained Porsche’s most profitable automobile. Thousands of drivers seemed to love the cars.

That evening he called on Helmuth Bott, the director of engineering, at his office in Weissach. On the wall, Bott had a large bar graph that traced out production spans and life expectancies of Porsche’s products. The 928 ran out five years. Around that time the 924 became the 944 and that ran out another five years.

Perhaps this was an early form of just-in-time delivery as painted 930 Turbo bodies waited outside the factory. These cars were queued up for engine-and-chassis marriage and for interior completion. *Porsche Archiv*

"The 911," Schutz recalled in an interview in 2012, "stopped in mid-1981. There was just a short bar and then it stopped. That was only months away. I thought about everything I had heard. I walked to Mr. Bott's desk, picked up an indelible marker, and I ran the line off the end of the graph, kept going on the wall to the corner, around the corner, and onto the next wall.

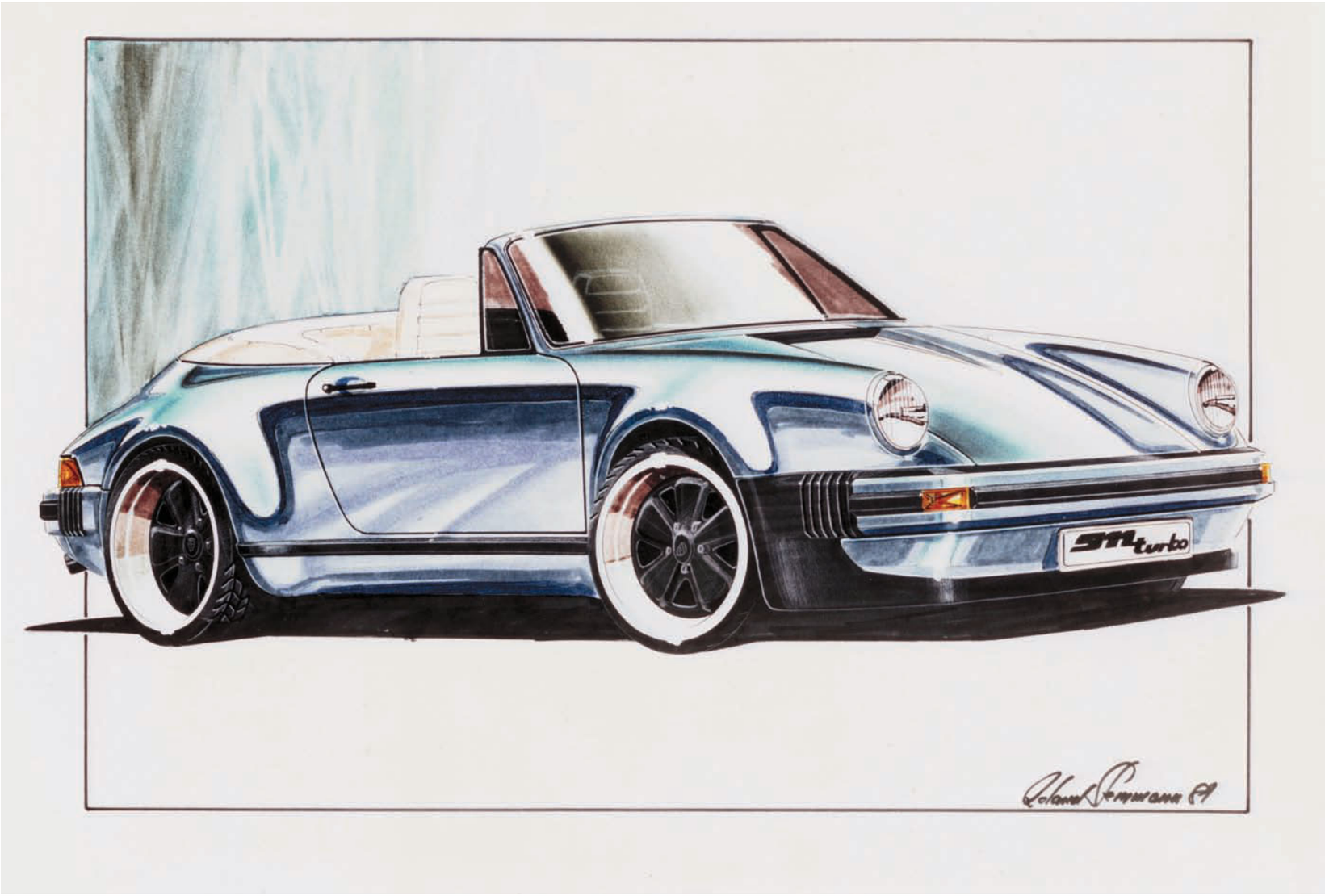
"'You can do this, Herr Schutz?'

"'I can do this, Herr Bott.'"

For both men the question became how to let the automotive world know. Like all his engineers, Bott had drawers filled with proposals, ideas, drawings, and notes he could not show Fuhrmann. For the former boss, the growing threat of U.S. regulations dictated the end of the 911. No more of Porsche's money, or his staff's time, could go into this anachronism.

Bott felt differently and he had put in the time: an open 911? All wheel drive? His predecessor, Ferdinand Piëch, had pushed Audi's engineers to create the Quattro with prototypes appearing in 1978. For 1980, Audi introduced production cars. Bott led Schutz downstairs to a garage where he had hidden something he called his Speedster. Two years earlier, Fuhrmann had threatened to terminate him if he put any more time into it. Schutz was learning that under Fuhrmann, no one worked on 911 models unless it was critical.

And so Porsche's current production 911s had received just minor running changes. Engineers were allowed to replace the rubber-centered clutches—with their rapid failure rate—with units that used steel springs. Countless owners had complained about air boxes destroyed by engine backfires on cold starts. Bosch and Porsche reprogrammed the K-Jetronic's mixture. The slow-selling Sportomatic dropped from options lists during the 1980 model year. But these were Band-Aids. Nothing in the pipeline or on the horizon gave anyone outside Porsche an indication of what Peter Schutz had done to Helmuth Bott's wall. Something far more dramatic was essential for that purpose.



Another Stemmann sketch identified the concept as the 911 Turbo. The wide-body approach served well for auto show introductions. *Porsche Archiv*

The 1981 Frankfurt IAA Cabrio studie used Porsche's 3.3-liter turbo engine. At Frankfurt, Porsche displayed the car on mirrors to show off its high-tech all-wheel drivetrain. *Porsche Archiv*

Dramatic debuted at the 1981 Frankfurt IAA. This always had functioned as Porsche's home show, where it revealed its greatest treasures. Schutz had blessed this project early in March. On April 15, the two men saw a white prototype with a red leather interior. The next day, Bott drove it, enjoying the wind in his hair, and 18 days after that the supervisory board approved development toward production. Porsche was going to produce a 911 cabriolet.

"It was an interesting new challenge," Eugen Kolb said of the cabriolet development process. "When Schutz saw the first prototype, he said, 'Okay, let's go to series production!' And the date was clear when Schutz wanted it. So everyone suddenly was very much awake with this information—engineering, design, purchasing, sales, everyone woke up when they heard.

"Schutz saw the prototype and expected they could make it in this way very soon. It just was not possible. He did not understand how much work was needed."

The show car, almost cobbled together on a hastily fabricated all-wheel-drive Turbo 3.3 platform, was the sensation of the show. Visitors knew Porsche, however, and they understood that what they saw, what some were ready to order on the spot, still was 18 months or two years away. For some of Schutz's staff, that much time would have been a generous gift.

"The next *studie* of the convertible was presented in the Geneva auto show," Hans-Peter Bäuerle explained. That show took place March 4–14, 1982. "It had to be designed very quickly. They made it. Put it in the display, everybody was enthusiastic. Schutz said, 'Build it. Put it into production.' And the guys who had to build it said, 'Oh, my God!' And even so, they expected to have five more years to develop it."

Following the Frankfurt IAA introduction, Porsche had 911 SC Cabriolets available for delivery as 1983 models in late 1982. Weissach invested huge effort into stiffening the chassis for the open car. *Porsche Archiv*

But Peter Schutz was not a five-year man.

Bäuerle was a graduate in mechanical engineering from Stuttgart. Much of his studies concentrated on sheet metal forming, production engineering, and machine tools. His particular interest was aluminum. Hired in 1978, he first attended to some body manufacturing problems and producing an all-aluminum 928 prototype. Startled by this possibility, the steel industry paid attention and they began producing high-strength steels about this time. Weissach's engineers were divided in two groups, those who designed and those who tested. Hans-Peter was a tester.

"I knew that between the 356 and the 911, there was no convertible. Because everyone knew it was not possible to make a convertible out of the 911. Only the Targa." His assignment from Helmuth Bott was "to find a way to make a convertible out of the 911 that *must* work."

In the beginning of the 1980s, Bäuerle had developed methods to measure the stiffness of car bodies. Until this time, Porsche only had done the so-called one wheel drop test. "With a car secured on a test bench on one stand at each corner, engineers lowered one. They measured the twist or torsion on the body and judged it: it's good, it's not good. It was not extremely precise," Bäuerle said. With Bäuerle's direction, Porsche began to install equipment to measure the whole body.

"The 911 stopped in mid-1981. There was just a short bar and then it stopped. That was only months away. I thought about everything I had heard. I walked to Mr. Bott's desk, picked up an indelible marker, and I ran the line off the end of the graph, kept going on the wall to the corner, around the corner, and onto the next wall."

— Peter Schutz

"So we took a 911 Targa and cut away the rollover bar. From a body in white, we removed the bar, welded the axles stiff, mounted it without any rubber into the body, and put it on a rigid bench. Then we glued and screwed some measuring arms—about ten of them—all along the body. We used mechanical gauges—this was before electronics.

"It took about half a day or so to measure the bending of the car. That was first," Bäuerle said. "We measured that by putting weights at the middle of the car, under the seat area. You get a curve that brings down the middle and brings up the ends. And you can calculate the bending stiffness of the body."

To improve the numbers, they removed the testing equipment and welded stiffening material into the rocker panel and measured it again. There were no computer aided design (CAD) or calculating systems yet. The engineers did work by hand and eye and experience and slide rules, and they figured out where to reinforce the body to increase stiffness.

"Our goal was to get at least 60 to 70 percent of the stiffness of the coupe. We already had that base number for the closed car. And for example, if you take a coupe and you cut away the roof, you are at only 10 percent of the stiffness. So absolutely not drivable. Impossible to drive the car," Bäuerle said. Shocking as this sounds, this was not unlike the results for any coupe on the market at this time if engineers removed the steel roof without adding any further reinforcement. Very few manufacturers had bothered to quantify it by this time.

The engineers performed torsion tests as well, setting the car on the stand, dropping one wheel, and applying a winch pulling at a prescribed force. They watched the front and the rear of the car twist and calculated the difference from level ride with gauges that gave results in Newton-meters per one degree.

"We did this with the Targa. We found that if you cut away the bar, the torsional stiffness is 20 percent. And that is absolutely not sufficient. And maybe that is why they stopped any convertible development before this time. Because it couldn't work.

"We reinforced behind the front wheel, the rocker panel, and also in the area where you put your feet. We combined the front sheet metal with the rocker panel so you have a good flow. And when we had a certain level, I went to Mr. Bott.

"I told him we had 60 percent. He said we have to test it."

Bott told Bäuerle to take ten Targas out of the production line and find the worst one—these were handmade cars with human assemblers at the dawn of the age of high-strength and ultra-high-strength steel.

“We selected a car, the worst of them. Actually it belonged to a guy at Weissach,” Bäuerle said. “Nobody liked him much. He had special ordered it. Gold metallic. Yellow leather interior. And we took it. He was furious. ‘I will go to Mr. Bott!’

“‘Okay. You go to Mr. Bott.’ This was safe because I knew Mr. Bott supported our project. We cut off its roll bar. Very rough. It was brutal. We welded the reinforcements in place, and then we painted it black because all prototypes were black. And we ran it on the Weissach endurance road.

“The bottom limit to get a car freed for manufacture was that it must run 8,000 kilometers around the clock with no problem. Which is about the equivalent of 180,000 kilometers on a normal road, driven hard by a professional. So it’s a rough test.

“And we had a big surprise. We did not expect this. After a thousand kilometers, the engine fell out. Big problem. Broke the mounts from vibration. And we didn’t know why because our prototype had good torsional stiffness, even better than the Targa.”

This development led to Porsche’s first dynamic stiffness testing system. A fellow engineer suspended the body on elastic straps and attached a vibrator to it. As they varied the vibration frequency, they forced the car to its own vibration frequency, called its resonance frequency. They learned that the body-in-white convertible oscillated at a lower frequency than the Targa. They added parts to the body to test the effect each had in altering that frequency.

Celebrities, especially musicians, have owned Porsches and, because of their celebrity, have gotten special options. Violinist Anne-Sophie Mutter ordered this 1983 SC Cabriolet with red leather interior and a red leather convertible boot. *Dieter Landenberger/ Porsche Archiv*

"It took about half a day or so to measure the bending of the car. That was first. We measured that by putting weights at the middle of the car, under the seat area.

— Hans-Peter Bäuerle

To fit a collapsible top into the 911 body, engineers Eugen Kolb and Gerhard Schröder moved the rear seatbacks forward nearly four inches. A complex structure of bows and straps restrained the top from tenting up while driving at high speeds. *Porsche Archiv*

"And when we put in the engine and the gearbox, we found that as the body rotated left-right-left, the engine and gearbox rotated right-left-right. And what was clear was that it came to a resonance catastrophe," Bäuerle said.

"We had with us a good design engineer in our chassis department and he did something that is now in all convertibles if you open the engine compartment and look inside. The normal 911 is mounted with a *schwert* on the backside; we call it a sword. The convertible has a lever with a gas spring, like a shock absorber, mounted at the body and connected to the engine. It serves as a torsion damper and eliminates the engine working against the body. So we put that in and we had no problems at all with the 8,000 kilometers."

But that was only one of the big challenges facing the convertible crew. They still needed a top.

"Eugen Kolb was the one who made the top," Bäuerle explained. "He was actually the one with the idea to make a top that does not deform so much in the wind as other convertibles. When you drive fast, other convertible tops blow up like a tent over you." The cobbled-together top for the show car was meant only for slow maneuvering on and off exhibition floors.

"The levers you need for the kinematic," Kolb explained, "are new, different, compared to the 356. The 356 you have, it is like an umbrella. For the 911, to stow the top behind the seats, you need a kinematic [mechanism] that makes it close and fold and everything. And they had only bent tubes in this Geneva show study. They had nothing proper for a convertible roof.

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The first step was to release latches from each side of the windshield and then to unzip the rear window. From that point, lowering the top was an easy operation that anyone could do single-handedly. *Porsche Archiv*

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The top remained a manual operation until 1987. The wide front bow, to which factory assemblers glued the cloth top, was one secret to its stability at high speed. *Porsche Archiv*

“We had to go to chassis engineers to find out from them who to contact in metal suppliers to select the material for lightweight bows. We didn’t know any of this. They told us since we had such a hurry that we should hire another 20 men to file off the sharp edges of the bows for each car if we hoped to meet Mr. Schutz’s deadline.

“Cracks are a critical concern in cast parts. In a sharp line, there may occur cracks. In a forged part with rounder edges, they last longer. The main bow was die cast, but the main levers were forged aluminum. Schröder developed the front bow and this was an aluminum extrusion profile. That was critical for keeping the line of the top,” he explained. “The front bow is connected to the main bow by a lever and it is attached to the cloth. The main bow is very wide, maybe 20 centimeters, like the Targa, and there the cloth is glued in place. In addition, there are ropes, straps, from the front bow to the rear, connected to the cloth and to strong springs to hold down the cloth.

“For Bott it was important to be able to open the rear window without taking down the roof. Like the idea of the first Targa, for the open feel, but also, if you have scratches on it, you can change it without having to replace the entire roof. Schröder made a prototype with electric window lifts and that was the basis for how we could do the Cabrio electric roof.”

From Schutz’s discovery of Bott’s Speedster to the Frankfurt debut on September 4 was barely seven months. Six months later, on March 4 when the Geneva Salon de l’Auto opened, engineers were, as Kolb put it, awake to Schutz’s goals. The 18 months from project approval in April 1981 to the Cabrio introduction in late 1982 was considerably less time than the engineers routinely needed. However, both Schutz and Bott had guessed right in their assessment that an open 911 added sales: Porsche assembled 4,096 of the new open cars in its first year, increasing total 911 production by nearly 50 percent.

It had taken reorganization and a massive commitment. Bott assigned 911-development responsibility to Friedrich Bezner, and Schutz and the supervisory board devoted the largest portion of the year’s development funding to the 911.

Despite introduction of the 1983 Cabrio, the Turbo remained a steady seller through its entire life as a G model. Specifications barely changed as engineers, with other assignments from Bott and Schutz, worked on the all-wheel-drive Turbo known as the 959. *Porsche Archiv*

THE DEPARTMENT FOR THOSE WISHING FOR SPECIAL CARS

For 1983, engineer Rolf Sprenger's special wishes *Sonderwunsch* program introduced the first of his department's special options, the slant nose, or *flachtbau* front end for 930 Turbo models. Earliest versions went only to the company's best customers starting in 1979. These had four rectangular headlights fitted in pairs below the front bumper. A second version incorporated two larger round headlights on either side of a low-mounted oil cooler. This raised eyebrows at the U.S. Department of Transportation (USDOT), which worried about oil spills in front-end collisions. The third version, with flip-up headlights adapted from the new 944, satisfied all nations for impact safety and lens height.

"There are some people who do not like this conversion so much," Sprenger allowed several years ago. "And others are very much enthusiastic about it. It is a matter of, how do you say, personal tastes? We also very much wanted to change the real spoiler at that time. Because we thought for the whole car it would be nice to have a different rear spoiler. But there was no technical adjustment for the thermodynamic. The Weissach people couldn't give us another rear spoiler. We had very many more ideas how to change the car in the back."

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As chief executive of Techniques Avant-Guard (TAG), Mansour Ojjeh, right, collaborated with Porsche on engine development and other technologies for the McLaren F1 team partnership. Here with Manfred Jantke (Porsche press director), Ojjeh inspected a 935 that Sonderwunsch developed for road use for him. *Porsche Archiv*

Sonderwunsch also offered modifications to improve not only the Turbo's "show," but also its go, with a performance option that fitted a larger turbocharger, an increased-flow intercooler, and a four-pipe exhaust system. This took output to 330 horsepower and launched the car from 0 to 100 kilometers per hour in 5.2 seconds. With its slightly more aero-efficient front end, the performance option slant nose topped out at 171 miles per hour.

Despite the glitz and excitement of the new open 911, Porsche had plenty to offer with the rest of its 1982 and 1983 SC and Turbo lineups. A year before the Cabrio appeared, the company offered a 50th anniversary 911, commemorating Porsche Engineering's birth in 1931. Only 200 examples emerged from Zuffenhausen assembly, each finished in Meteor Metallic with burgundy leather and cloth interiors. For those wishing for a slightly bolder presence that also included the beneficial effects of its aerodynamics improvements, Porsche offered SC buyers the option of adding the Turbo front spoiler and rear wing.

THE RETURN OF FERRY PORSCHE

During this time, Peter Schutz not only waged a battle to reestablish the 911 as Porsche's most important model, but he also worked to reestablish Ferry as Porsche's most important asset. When Schutz reached Zuffenhausen in January 1981, he saw accountants working in a large room across the hall from his own office. He knew Ferry had taken a small workspace at Ludwigsburg, and he moved out the accountants and had the area remodeled into a comfortable glass case–lined office for Ferry.

"I moved Ferry in there," Schutz explained in 2012, "and every morning, shortly after nine o'clock when he got there, I'd walk across the hall and have coffee with him." It became a routine that allowed the newcomer to learn the history from the man who had made much of it. "He didn't like talking about the past," Schutz continued. "He was much more excited about the future." For Ferry and for Porsche, there appeared to be a future.

During this period the exchange rate between the U.S. dollar and the German Deutschmark worked in Porsche's favor. Through 1982 and 1983, one dollar purchased 2.26 and then 2.43 DM, where in 1980, it had skidded down to 1.82, an exchange that made Porsche cars more expensive in their largest market across the Atlantic.

The company introduced the Carrera 3.2 Series for 1984. These improved G Series models fitted the Turbo's longer crankshaft stroke—74.4 millimeters—while carrying over the SC engine bore of 95 millimeters. The result was displacement of 3,164cc. Bosch mated its latest L-Jetronic system with its new digital motor electronics (DME) Motronics 2 engine management hardware to increase performance and fuel economy while cutting exhaust emissions. To resolve another Schutz—and older owner—frustration, both the 3.2 normally aspirated Carrera engine and the 3.3 Turbo received new oil-fed camshaft drive-chain tensioners.

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Raw turbo bodies moved along the assembly line in 1984. Between model year 1978 and the end of the G Series in 1988, Zuffenhausen assembled nearly 15,000 Turbos. *Porsche Archiv*

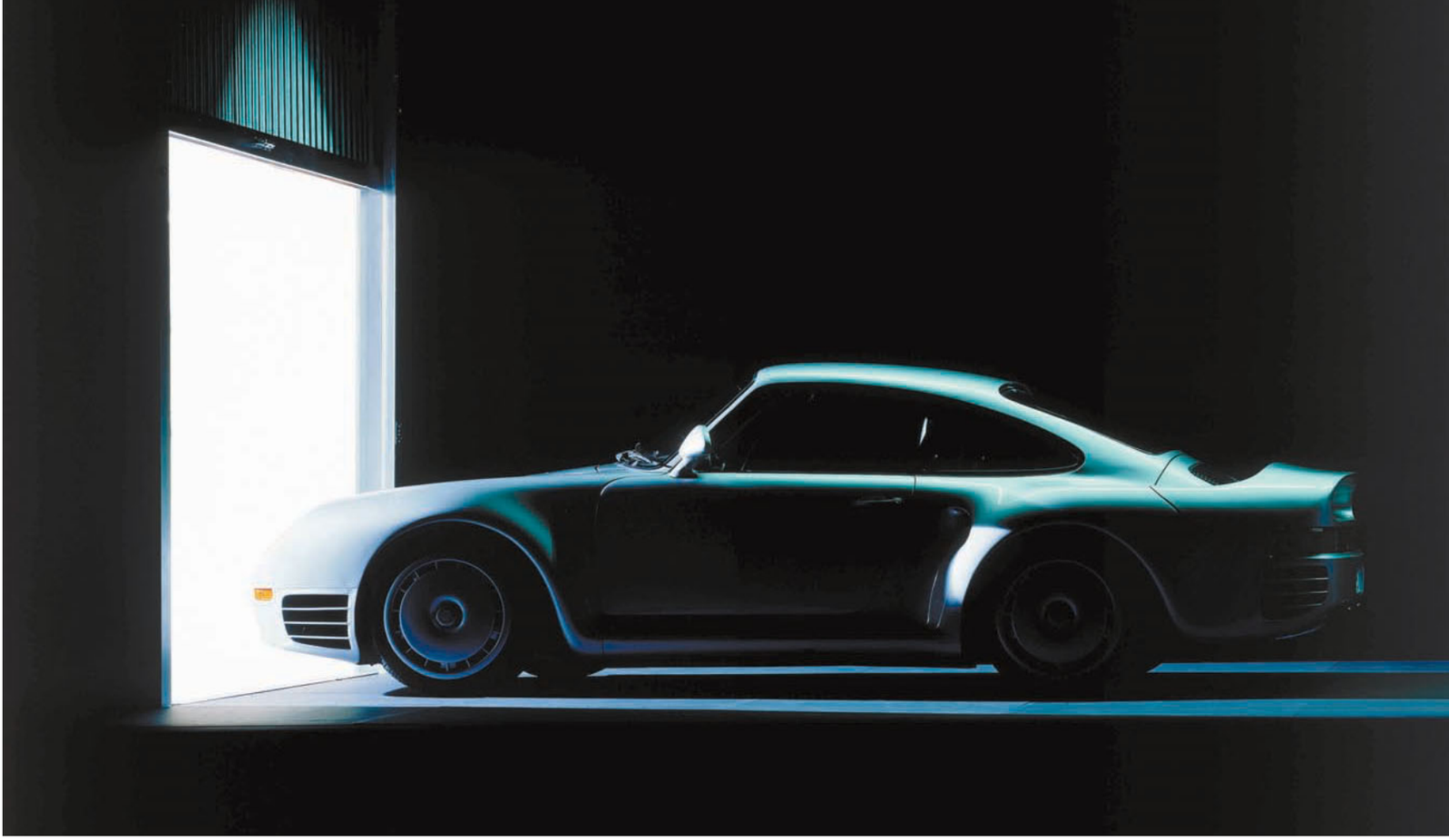
The Turbo remained unobtainable for U.S. customers while the rest of the world enjoyed its power and exclusivity. A “gray market,” so nicknamed for creative interpretation of the spaces between the black-and-white rules for U.S. importation, had blossomed soon after the Turbo disappeared from American dealerships. A number of independent mechanics and body shops collaborated to import non-U.S. specification cars from Europe. The shops had to accomplish a considerable amount of work on each vehicle to meet USDOT and Environmental Protection Agency (EPA) regulations. Some cars worked well; others did not. The marketplace fed an appetite but *caveat emptor*—buyer beware—was the best advice of the day.

Encouraged by Peter Schutz’s embrace of his visions for the 911, Helmuth Bott launched a more ambitious program. His goal was to take the four-wheel-drive system he’d mounted beneath the Frankfurt and Geneva concept cabriolets and put it on the road for Porsche customers.

Since the beginning as a car company, Porsche had proved and promoted its products through competition. Nothing forced engineering solutions more effectively than a new race next weekend. Newspaper and magazine stories about racing victories appeared after each event, generating the additional benefit of no-extra-cost publicity. Ferdinand Piëch embraced competition during his days at Porsche and even more effectively as developer and champion of the all-wheel-drive Quattro rally and road cars. For Bott, this was essential technology for the 911.

Bott had joined Porsche back in 1952. His earliest assignments were to solve problems with the new synchromesh transmissions, and then he went on to improve road holding for the 356A models. Handling and traction became a lifelong study and fascination for him. Testing one afternoon with factory race driver Richard von Frankenberg, they compared driving styles;

Porsche made use of Volkswagen’s “tank” proving ground while developing its Typ 953 all-wheel-drive prototypes. Engineer Roland Kussmaul and a team of specialists spent weeks at the Ehra-Lessien test facilities through 1983. *Porsche Archiv*



The Frankfurt IAA show *Gruppe B* prototype looked startling in any light. Its performance capabilities matched, if not exceeded, its futuristic appearance. *Porsche Archiv*

von Frankenberg preferred cars with oversteer and he worked the steering wheel, "sawing" it back and forth as he flung the car around corners. Bott preferred near-neutral handling. They had a course set on Malmsheim airfield in the early days before Weissach, and von Frankenberg bet Bott ten bottles of wine that his sawing technique was faster around the track.

"I passed him two times in 15 laps," Bott explained in 1992. "He was very upset. I suggested he take the other car, that we trade. So he learned. Because if you have too much oversteer, your front wheels really are not working. And you get much better cornering forces if you take the forces with all four tires. As much more as you are able to distribute your power onto four wheels, the faster you can go through the corner." Throughout his career, Bott said, his goal was that any Porsche "should have road holding so that everybody can go fast in it."

He continued. "I'm a *machinenbauer*, an engineer who makes machines. And you know the engineers who build machines are sometimes fighting against the electricians, against the engineers from other faculties. However, when I first saw what you could do with electronics on the engine management, I was so impressed. It thought this was a revolution for the whole car. For everything."

Electronics enabled Bott and a phalanx of engineers and development drivers to create the all-wheel-drive Porsche, the 953 for off-road racing, and later the 959 for the paved roads. These vehicles gave new meaning to the objective of distributing power and cornering forces onto all four wheels. Bott's engineer Manfred Bantle managed the staff that investigated every technology available at the time, from tires to engine fuel delivery to prototype gearboxes. Bott wasn't trying to see 20 or 30 years ahead to some far-off far-out technology. He knew his engineers' capabilities. When Bott targeted a point 10 years out, they frequently had reached it in two.

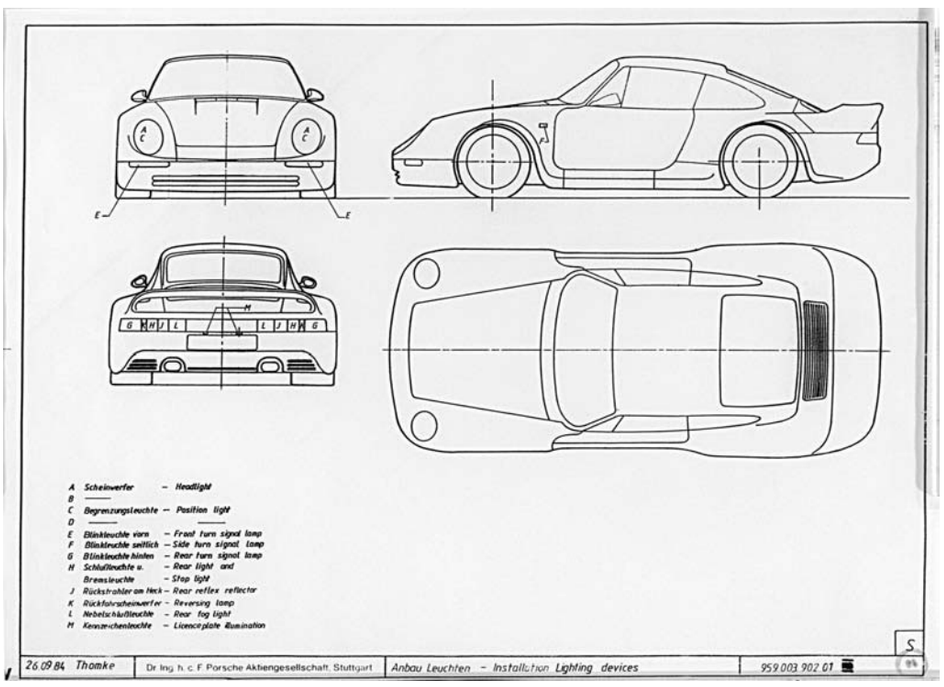
He envisioned racing an all-wheel-drive 911 in the African desert—a competition not unlike the earlier Can-Am and InterSerie with few limits and limitless opportunities for learning. He planned to assemble a production run of 200 vehicles to legalize it for this competition. He understood Porsche's customer base and remembered that sales of the 1973 Carrera RS had tripled what the company needed for homologation. If Zuffenhausen could assemble 200 of these four-wheel-drive cars, they also could make many more from what they learned if the demand surged.

From the styling department, staff designer Dick Soderberg got the assignment to create Bott's 911 for ten years down the road. He hoped the company would allow a new roof—one of the most costly features on any automobile—sharing a conviction with Bott and Bantle that the 959 should emerge without spoilers and wings. Without that investment, though, a rear wing was an aerodynamic necessity, especially for a car with the speed potential the engineers envisioned. In the end, the integrated rear wing that Soderberg devised with aerodynamicist Herman Wurst, what Wurst called the bread basket handle, created a design language that other car stylists adopted, and it tweaked the over-roof airflow to hug the car body. A long slender black lip, added onto the rear deck lid just before production started, fine tuned the aerodynamics and yielded a low coefficient of drag of 0.32 in contrast to the production Carrera coupe at 0.39.

Porsche steadfastly supported the Frankfurt IAA show and once again chose the event to unveil its pearlescent-white painted show car in September 1983, identified as *Gruppe B*. The company promised production for 1984/1985. However, with all the complex systems, and the new technologies and materials incorporated into the car, that target slipped again and again.

The engine and drivetrain for this new car proved to be an engineering tour de force, partially because Bantle and Bott were aware of expectations. As historian Karl Ludvigsen reported, Bantle wrote a memo acknowledging that the technological community in Germany would accept only "typically Porsche perfection of the four-wheel drive technology." In 1978, racing engineers, faced with the need for more horsepower, developed water-cooled cylinder heads for some of the 935 race cars derived from the road-going 930 Turbos. This system allowed them to fit four valves per cylinder under those dual overhead camshafts; this provided "breathing" capability that was impossible in air-cooled engines. For the 959, dual turbochargers developed progressive boost that delivered 450 horsepower at 6,500 rpm from the 2,849cc flat six. Bore and stroke measured 95 millimeters by 65 millimeters.

Exchange rates between the U.S. dollar and the Deutschmark continued to make U.S. sales valuable, and, for Porsche's board, such continued investment seemed reasonable. The average rate through 1984 was 2.85 to the dollar and through 1985 it averaged 2.94. A $48,000 Turbo sent home 60 percent more marks than that sum provided in 1980. Company profits for 1985 were 30 percent higher than in 1984. Porsche's sales in the United States consumed nearly two-thirds of 1985 total production of 54,458 cars. Schutz approved the 959 launch at the September 1985



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Engineers diagrammed the lighting devices for the 959, completing the drawing on September 26, 1984. With its dual-language legend, it clearly was intended for export purposes. *Porsche Archiv*

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The life of a development engineer included winter-testing the ABS system—in this case, on this second 959 prototype. Dieter Röscheisen worked this car in Arien Plog, Sweden, in December 1984.
Porsche Archiv

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No sooner had Porsche introduced the new Cabriolet when the manufacturer put a new 3,164cc engine behind it one year later for 1984. As a 3.2 Carrera, the Cabrio enjoyed 207 horsepower at 5,900 rpm.
Randy Leffingwell

IAA show. The company promised deliveries of two versions, a Sport and a Comfort model, in August 1986. It set the price at 420,000 DM, about $143,000 at the time. Porsche demanded 50,000 DM deposits (almost $17,000). Some 250 potential buyers opened their checkbooks; the oversubscription allowed that some customers might step away. From many viewpoints, Peter Schutz looked like a savior.

Through all this 959 development, the company made small, steady changes to the Carrera 3.2 and Turbo 3.3 models. Profits not only had encouraged the showpiece 959, but also allowed further development of the 911, an evolution necessary because of continued safety and emissions regulations updates from a number of governments.

> "I moved Ferry in [the office across the hall from mine], and every morning, shortly after nine o'clock when he got there, I'd walk across the hall and have coffee with him."
>
> — Peter Schutz

"With the G model, every year we made new things on the car," Bernd Kahnau explained. Kahnau grew up inside Porsche. His father, head of 356 production, drove him and his mother home in his 356 from the hospital after his birth. "We did gear switches, every year new things. New clock. Vents, mirrors, seats, tires, steering wheels. But the G model was not possible to make ABS, not possible to make airbags." Those innovations and requirements dictated a new structure. Lessons, developments, technologies, and features spilled over from the 959 to this new vehicle, soon known as the 964.

From 1987 through 1989, Porsche offered the Carrera Clubsport. Zuffenhausen assembled just 189 of these coupes (plus one Targa) during the three-year run. *Porsche Archiv*

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The Turbo Look Carrera Cabriolet benefited not only from structural enhancements to stiffen the Cabrio body, but also those necessary to accommodate the performance capabilities of the Turbo. This owner opted as well for an uncommon Flachtbau (slant-nose) treatment. *Porsche Archiv*

Through 1984, 1985, and 1986, the Carrera provided buyers a 231-horsepower engine (at 5,900 rpm) for everyone but U.S. and Japanese buyers, whose nations had the strictest emissions limits. Those two got along with 207 horsepower. Five-speed gearboxes in the normally aspirated cars made good use of the power and torque available. The company offered Coupe, Targa, and Cabriolet bodies in standard narrow body configurations, and buyers could option the cars with the front spoiler and rear wing of the Turbos, or they could order the wide body Turbo Look for the coupes. Because of the longer suspension arms and the greater torsional loads on the Turbo Look bodies, those structures received extra reinforcement from Weissach, similar to the Cabriolets.

For 1985, the Turbo Look spread to Targa and Cabriolet models. Side impact door beams of high-strength steel, new this year, obstructed the intrusion of vehicles into the passenger compartment in broadside accidents. The list of small changes year after year kept specifications writers and advertising copy creators busy counting words as they filled pages with what was “New New New.”

The Turbo returned to U.S. markets for model year 1986. Weissach engineers had tamed its emissions using new ignition and fuel mixture controls, an oxygen sensor, secondary air injection, and a three-way catalytic converter. The engine delivered 282 horsepower for U.S. and Japanese buyers. Catalysts, standard on U.S. normally aspirated Carreras, were optional on German market cars, reducing output of those engines to the same U.S. specification of 207 horsepower.

The 1987 Turbo 3.3 differed only in degrees and subtleties from its predecessors with dual exhausts and a deeper tea-tray rear wing. Turbos sold well in North America after reintroduction to Canadian and U.S. markets in 1986. *Porsche Archiv*

For 1987, Gerhard Schröder's electrically operated convertible top became an option on Carrera models and it was standard on the newly arrived Turbo Cabrio. The company introduced a Turbo Targa at the same time. Drivers noticed a change in shifting with Porsche's new G50 transmission using Borg-Warner synchromesh. Reverse gear moved far to the left and forward, creating four planes of gears for the driver. A hydraulically activated clutch connected the new transmission to a new rear axle attached to the body with new rear torsion bars.

"With the G model, every year we made new things on the car."
— Bernd Kahnau

The 959 models began production. Engineering prototypes, 16 in all, emerged in 1985 and underwent extensive testing. Another 21 pilot production cars appeared in late 1986. A former bakery near Zuffenhausen assembly turned out the series 959 cars, delivering 113 in 1987. The price remained 420,000 DM; however with the exchange rate slipping from 2.2 to the dollar down to 1.8, the relative price in American currency rose to $240,000. Another 179 cars emerged during 1988. (Porsche assembled a final 8 in 1992, fabricated from extra parts.) This brought the total to 337 cars.

In retrospect, calculating a price in U.S. dollars proved a pointless exercise. Bott and Schutz understood that meeting USDOT and EPA regulations meant additional delays and expenses. The production run had sold out without accounting for deliveries to the 50 U.S. buyers who had left

One of the final pilot-production 959s underwent yet another round of development tests. With all the car's new technology, Porsche lost money on the series but won Weissach countless consulting clients from dozens of carmakers. *Porsche Archiv*

deposits. Some 30 of those individuals had arranged for delivery and service through Pennsylvania Porsche racer and dealer Al Holbert. Holbert had contracted with the new Porsche A. G.–owned distribution organization called Porsche Cars North America (PCNA) to import these vehicles. Zuffenhausen began the process, stripping the cars of all interior appointments. PCNA identified these vehicles on shipping and customs documents as race cars not legal for road use. When the first eight reached the States and the EPA did its inspections, it noticed full vehicle identification numbers (VIN), not simple racing chassis tags, and it changed its mind.

Subsequently, Porsche delivered something like 16 of the cars to U.S. buyers under strict qualification that the cars remained outside America. Over time, all these and a few more entered the States. EPA and DOT regulators did allow one example in, destined for a recognized automobile museum in southern California that belonged to Porsche 935 racer and car collector Otis Chandler.

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Perhaps more than any working writer at the time, former journalist/Porsche press chief Manfred Jantke enjoyed the 959 media introductions. Porsche rented a private airfield at Gstaad, Switzerland, in January 1987, to demonstrate its all-wheel-drive capabilities. *Porsche Archiv*

NO 959 IN AMERICA

In a postmortem on the cars within months of those final 1992 deliveries, Helmuth Bott admitted he was not unhappy about the U.S. restriction. “Your system in consumer protection goes 100 percent against the product and the company. And I really am glad to have all the years of so much strength and safety in our cars,” he said. “But we had stupid things, like a NASA engineer who was stopped at a red light. And a woman in a Cadillac drove into the 911. Afterwards he couldn’t use his legs anymore. We really had no responsibility for the accident. And what did we have to do?

“We bought a Cadillac the same age. We found a 911 the same year. We took dummies the same weight like the man and his wife. We put them in the car and we made the accident at Weissach. And we could tell people that there is no possibility for any system to be safe if you get [hit by] a Cadillac from behind at 50 kilometers speed onto a car standing at a red light.

“The whole thing cost us I think one and one half million because we had to do so many things to show there is really no fault from the car. At the end it was a compromise. The Cadillac driver didn’t have money so they said, ‘Well, there is Porsche who makes the seat. They have to pay.’ There were other incidents. A young girl with a turbo. Others.

“And so if we were going to bring the 959 to the United States and anybody would drive at 320 top speed and have an accident. . . . That was the thinking behind the decision.”

By the time production of the Porsche's 959 ended, enthusiasts and journalists recognized that this vehicle had defined a new type of automobile: the supercar. Mastering the various technologies that appeared in it and functioned on it brought Weissach engineering consulting clients for another decade. The cars appeared on the cover of every automobile magazine and hundreds of other publications that seldom paid attention to cars. But that weighed against the world economy as it shifted gears and continued to take the German currency down against the U.S. dollar. The exchange-rate balloon—and other business dreams—popped on October 19, 1987. The Dow Jones Industrial average lost nearly 23 percent of its value in a day, dropping 508 points. Porsche production had floated along in 1987, slipping to 48,520 cars with U.S. sales dropping below half, at 23,632, for the first time anyone cared to remember. For 1998, the American sales numbers dropped a third again, to 15,737. Peter Schutz cut production acutely.

For 1989, Porsche introduced long-planned models created in happier, more confident days. With these launches, it still hoped to boost sales. A small run of Club Sport Carreras appeared, from which Weissach engineers had removed 110 pounds of air conditioning, insulation and undercoating, and power seat and window mechanisms. Raising the redline to 6,850 rpm brought horsepower up to 255 for rest-of-world markets and 234 for U.S. buyers. The company manufactured 381 of the coupes in 1987 and just 97 in 1989, of which fewer than a dozen reached American customers. Schutz slowed production further, furloughing employees for a week each month to keep them on payroll and the company alive.

After displaying the *Gruppe B* concept car in 1985 and introducing the production model as the 959 in 1986, Porsche needed to keep visitors and journalists excited. This 3.2 Speedster studie, for Frankfurt 1987, did exactly that. *Porsche Archiv–Photo by Jens Torner*

Nearly a decade after Bott had shown Schutz his Speedster, Porsche offered a production version of that to buyers. Inspired by the original 356 from 35 years earlier, the new car incorporated a double-humped fiberglass tonneau cover over the rear package area that also hid a tricky manual top. The factory assembled 2,065.

However, Schutz and Bott left Zuffenhausen before the first Speedsters drove off the assembly line. Historian Karl Ludvigsen learned that each 959 had cost Porsche 1.3 million DM, almost $720,000 at the time and nearly three times the selling price. But the convulsing economy made every miscalculation more apparent. The legacy of Ernst Fuhrmann's expansion was three car lines that shared virtually no parts in common. For Bott, the previous eight years had been spent resurrecting and reenergizing the company's most profitable car line and he paid rather less attention to the water-cooled products. He acknowledged that fact and he accepted the responsibility for the 959's failure to make money even though an enthusiastic board had supported his proposals. He retired early, at age 63.

Still looking for someone to blame, the supervisory board eyed Schutz. Until the world economy undercut businesses and investments of all kinds, Schutz had exceeded Ferry's job requirements: He had made the company money and he had reunited the staff. However, his wife Sheila never had felt comfortable or welcome in the Porsche/Piëch world. She had opened a business in Florida at the beginning of 1988 and was spending more and more time there. Schutz read the handwriting on the wall. The board willingly let him out of his employment contract a year early. It was ready for change.

This single-seater concept had tremendous appeal and many hoped the flip-up tonneau cover was an option when the production Speedster appeared in 1989. However, it was much easier for engineers to fabricate a top system for the two-seat version. *Porsche Archiv–Photo by Jens Torner*

When Porsche put the 3.2 Carrera Speedster into production, Zuffenhausen offered the car in standard width body and Turbo Look. The manual cloth top folded underneath a rigid fiberglass tonneau cover that also covered the rear of the passenger compartment. *Porsche Archiv*

THE THIRD GENERATION: 964

"When we went ahead to design the 964," Hans-Peter Bäuerle explained, "we took all that we had learned from the G model and we applied it. You could say that the G model was the test object for the 964. The new rear axle, the G50 that came in 1986? That axle was divided. And that was with the idea of the four-wheel drive of the 964. That was because Bott already had decided that we would take ideas from the 959.

"That rear axle with the torsion bar was a patent of our old father Ferdinand. And nobody was allowed to put that out! The only argument that could change that—or discard it—was the four-wheel drive because we had to go to the front with a driveshaft." The driveshaft and front differential helped the engineers with body stiffness as well. The driveshaft necessitated a higher tunnel, which provided a greater cross section. "So we said, 'Great! If you need a driveshaft, we give you a good space for it!'" Bäuerle said.

"This was the first car for which we made the endurance run on the test bench. The convertible, the G model, and the 928 ran 8,000 kilometers on the Weissach endurance road; that was the criterion for releasing them.

"And for 964 we made hydro pulse tests. We worked together with the University of Darmstadt because they had done it already for airplanes. They had a 16-channel rig, eight hydraulic cylinders in front, eight in the rear. This configuration allowed the lab to exert every force, every moment that occurs during driving," Bäuerle explained. The challenge is operating the bench so the correct

The long-lived G Series, from 1974 through 1989, ended with introduction of the 964 model, available in rear- and all-wheel drive. Except for badges in the rear, this all-wheel-drive C4 was impossible to differentiate from the rear-drive C2. *Porsche Archiv*

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One of the great legacies of the early 911 development came with adapting the rack-and-pinion steering of the Formula 1 car. With its articulated steering column, it made manufacturing right-hand-drive 911s an easier proposition. *Porsche Archiv*

forces are applied. “If you have the wrong forces, you make the whole body into powdered sugar. Everything is shattered.” It required years of track time to measure the forces that occurred and then to calculate the pressure applied by the hydraulic cylinders to get an accurate, meaningful test.

“A car is designed for 20 years, for 200,000 kilometers, under very rough conditions. So we simulated that,” Bäuerle continued. “First was with the rear-wheel drive and then with the four-wheel-drive 964. We did this in the mid-1980s. It was so good that in the beginning of the 1990s, Porsche bought its own test bench for Weissach. We saved a lot of money. You need no driver; weather conditions don’t affect the test. No tires or fuel. You need no test track.

“The other advantage is we can test very early. As soon as we have the first body-in-white, hand made, we can put a dummy engine and gearbox in, two dummies in the interior for weight, a dummy tank, some axles, and start the test. Before this, you had to wait until there was a car that could run on a track. We know two years earlier now if we need to change something important. So only a handful of cars actually go on the test track today. Just for final tuning.”

Despite Bott’s departure, his signature and influence were all over the 964 when it appeared as a 1989 model in late 1988. At the start of its development in 1984, with a healthy cash reserve, a new wind tunnel installed, and a new paint shop and body shop under construction (Werk V, with a sky bridge flying over Schweiberdinger Strasse to conveyor-belt car bodies from assembly to paint), Bott settled on three possible ways to take the 911 into the 1990s. One expanded the lineup by keeping the G model but adding the 964 all-wheel drive as a second model. Another option gave the G model a substantial facelift, mounting it on the new all-wheel- and rear-wheel-drive running gear. Lastly, he brainstormed with Friedrich Bezner and Manfred Bantle the benefits of designing and engineering a unitized body in which the body served as chassis on two- and four-wheel-drive running gear.

The supervisory board, enamored of both its fiscal health and Dick Soderberg’s concepts for the 959, approved Bott’s third idea, but it allowed Tony Lapine’s stylists only to update the body. Fenders and headlights—essential elements that Ferry Porsche defined during the testy discussions between Komenda and his son—remained holy ground, as did the roof panel. Möbius and Soderberg collaborated on an appearance that meant to satisfy the loyalists who claimed they embraced change but never indicated how much was acceptable.

The drag coefficient of the G models—0.395—embarrassed Porsche engineers and designers who knew the 959 was worlds better. They fitted a belly pan beneath the 964's front end (shielding its front differential and driveshaft tunnel from drag), flush-mounted the bumpers, and delicately adjusted front valences to improve airflow. In back, they devised an electrically operated/speed activated rear spoiler that rose from the rear deck lid at speeds above 80 kilometers per hour.

Bott and Bezner did their calculations and they established front and rear balance of the new four-wheel-drive car at 59 percent of the weight and 69 percent of the engine power on the rear wheels while the front carried 41 percent of the weight and operated with 31 percent of drive power. The driver had a manual override to electronically lock up front and rear drive. To meet the tightening nitrogen-oxide emissions standards for the state of California, engine chief Paul Hensler's staff developed twin spark plug heads, whose better combustion through higher heat left less unburned fuel for the catalyst to consume, and it increased horsepower. But two spark plug holes compromised the space available for cooling fins. Engineers eliminated the cylinder head gasket to better transfer cylinder head heat inward to the heavily finned cylinders. It proved to be a less-than-ideal compromise and leaks occurred.

Displacement settled at exactly 3,600cc by using a 100-millimeter bore and 76.4-millimeter stroke, and this new flat six produced 250 horsepower at 6,800 rpm. Its performance beat the 3.2 Carrera despite the addition of nearly 500 pounds of new electronics, computers, their wiring, front drive mechanisms, and other features to the new car.

C2 and C4 running gear shared identical car bodies. Both took advantage of an automatic electrically operated small rear spoiler to reduce rear lift at speeds above 50 miles per hour. *Porsche Archiv*

With the new car, Porsche still had three distinct product lines, the 928, the 944 Turbo/968 models, and the 964, still with precious few shared parts. During 964 development, a brash, ambitious young production engineer named Wendelin Wiedeking accused Helmuth Bott of destroying the company through fiscal mismanagement. His comments came while exchange rates still profited Porsche, so Wiedeking's charges fell on deaf ears among supervisory board members. Convinced no one cared, Wiedeking quit.

The all-wheel-drive Carrera 4 or C4 reached dealers midway through the 1989 model year, making a bold strategy and marketing statement in the process: Four-wheel drive came first. Its sibling rear-drive C2 debuted months later. MacPherson struts attached to aluminum transverse links suspended the front end. Anti-lock brakes were standard equipment as was a high-pressure hydraulic brake booster on the C4 or a vacuum booster system for the C2. Power-assisted steering eased maneuverability. A new four-speed Tiptronic transmission operated as a full automatic or a clutchless manual gearshift. Top speed of the C4 and C2 with five-speed manual transmission was 162 miles per hour and 0-to-100-kilometer acceleration took 5.7 seconds.

THE HEINRICH BRANITZKI ERA

These new cars accompanied the ascent of the frugal business manager Heinrich Branitzki to take Peter Schutz's former job. Branitzki held a degree in marketing and an interest in finances, and he had joined Porsche in 1965 just in time to see the earliest 911s head toward customers' hands. A cautious, sensible man, he understood the company product history. The 356 lasted 17 years.

As Weissach managers imagined the G Series Turbo successor, they began to envision a technological and visual successor to the 959, known as the Typ 965. Tony Hatter created evolutionary new front fenders, and he carried over and evolved the 959's bread basket handle rear wing. *Randy Leffingwell*

The current 911 had stayed, barely changed in his view, for twenty-four years. There was no reason to expect anything less from whatever followed. At the 964 C4 introductions, he hailed the new car as “the 911 for the next 25 years.” Engineers, designers, and enthusiasts gasped. It was not that these were inferior cars, but as Bott had taught them, look only ten years down the road because with technology changes, you get there in two.

Sensibly, though, Branitzki killed several projects. With 928 sales at a level where even Ernst Fuhrmann may have considered euthanasia, proposals for a 928 cabriolet and a four-seater disappeared. Incredibly, a sharp-looking 964 Turbo held on. Designated the 965, the car that stylist Tony Hatter fashioned had strong visual ties to the 959 including its basket-handle rear wing. Bott and Bezner, as they labored to develop a turbo 965 engine, experienced similar cooling and horsepower shortcomings to those of the early 964. As alternatives, they contemplated a V-6 version of Porsche’s latest water-cooled V-8 Indy race car engine using four valves per cylinder and dual overhead cams. It was exciting technology for an exciting-looking car. By late summer 1988, water cooling the flat six appeared the best solution.

> “When we went ahead to design the 964 we took all that we had learned from the G model and we applied it. You could say that the G model was the test object for the 964.
>
> — Hans-Peter Bäuerle

It retained that status even through the personnel upheavals that ended 1988: Schutz and Bott, gone. Lapine, in a dispute with management while recuperating from heart troubles, was asked to stay home. Harm Lagaay, who had designed the 924 under Lapine’s direction, left Porsche, gained experience at Ford and BMW, and returned as Lapine’s successor. Ulrich Bez, another Porsche ex-pat from a previous decade, had served his time and developed cars elsewhere before coming back and replacing Bott. Bez saw two issues with the water-cooling approach: First, it was increasingly necessary. Second, it needed years, not months, to perfect it. However, it was the economy of exchange rates and the rates of exchange of personnel and ideas that shoved all such ideas off the table. Porsche needed a Turbo; even Branitzki recognized that. Bezner and Bez accepted that their sole alternative was to bring the existing 3,299cc engine into a 964 C2 body for production start in May 1990 as a 1991 model. Incorporating bits and pieces of the *Sonderwunsch* optional Sport kit gave them 320 horsepower output at 5,750 rpm. Federalization for American markets took another year.

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Each of the 965 mules became test beds for a variety of engine ideas as well. In one configuration, engineers installed a water-cooled 4.2-liter Audi V-8 into the engine compartment. *Randy Leffingwell*

The 964 left-hand-drive models manufactured beginning in February 1991 were equipped with driver and front passenger airbags. Along with the ABS, this was another of the reasons the 964 had to come to production. Porsche had introduced these two passive restraints on the 944 Turbo in 1987, becoming the first car in the world to offer both front occupants this protection as standard equipment. The 964 beat the U.S. deadline for standard driver and passenger passive protection by seven years and this generated considerable research and development business for Weissach as other manufacturers sought to meet the 1998 compliance date.

For 1992, Porsche offered new 964 variations, including a Carrera RS coupe and a Turbo Look Carrera 2 Cabriolet, marketed in the United States as an America Roadster. The RS, inspired by the 2.7-liter version 20 years earlier, reduced weight wherever possible, stiffened the suspension, increased engine output by about 10 horsepower to 260 at 6,100 rpm, and essentially gutted the interior after the style of the 2.7 Lightweights. As with the predecessor, Porsche assembled three versions, a no-compromises base version, a “touring” version with sport seats and electric windows, and an even-fewer compromises road-legal N/GT configuration that filled the gutted interior with a full roll cage. Lacking catalytic converters, the Carrera RS models were not offered to American buyers, though some exist in the States now in private collections.

While the Turbo Look C2 Cabrio may have been named for the 1952 America Roadster in U.S. markets, this new car was the luxury-edition update, which incorporated features yanked from the RS, plus a few duplicated from the Turbo coupes. The Turbo S topped the 964 roster, using new camshafts, improved ignition and fuel injection profiles, and slightly higher boost to achieve 381 horsepower at 4,800 rpm, compared to the normal Turbo at 355. Body engineers introduced

When budgeting died for the radical and evolutionary Turbo 965, engineers and styling staff retrenched around the 964. They carried over ideas from the G Series Turbos, widening the rear track from the 54.1-inch normally aspirated car to 58.8 for the Turbo. *Porsche Archiv*

One of the most desirable 964 C2 configurations was this Carrera RS coupe from 1992. Lightened by 286 pounds, with 260 horsepower at 6,100 rpm, the new RS renewed the tradition invented in 1973. *Porsche Archiv*

The 964 Carrera 2 Turbo Look Cabriolet for 1992 was available worldwide. For the U.S. markets, Porsche named the car the America Roadster. *Porsche Archiv*

composite and lightweight plastics for door panels and the front deck lid. As with the RS, side and rear glass was thinner gauge. For the first time, Porsche delivered a road car on three-piece composite wheels, 8x18-inch Speedlines at the front and deep 10x18s at the rear. Massive four-piston red-painted brake calipers seized hold of cross-drilled ventilated rotors. Porsche quoted the car's top speed at 180 miles per hour with 0-to-100-kilometer speed coming in 4.6 seconds. The factory assembled just 86 of the Turbo S models.

For 1993, the final year of the 964, Porsche updated the Turbo with a new 3.6 version. The company had improved its 3.6-liter engine in its 964 series and, with substantial internal upgrades, turbocharged the engine to achieve 360 horsepower at 4,200 rpm. To stop the 174-mile-per-hour car, Weissach engineers carried over the brakes system from the 1992 Turbo S.

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For the final year of the 964 Series, Porsche reintroduced the Speedster, mainly assembling the cars on the standard C2 platform. Zuffenhausen manufactured 930 narrow bodies, and Sonderwunsch converted another 15 to Turbo Look bodies. *Porsche Archiv*

As it had done in the final year of the long-lived G model, Porsche added a Speedster to the lineup. Unlike the 1989 model, Porsche assembled this new 964 version for 1993 in narrow-body form although Porsche Exclusive, the successor to *Sonderwunsch*, converted some 15 to wide Turbo Look bodies. Assembled on the C2 platform, engine output remained 250 horsepower. Porsche delivered the cars with five-speed manual gearboxes but offered the Tiptronic in the spring of 1993. The low windshield concerned Weissach body engineers who feared air-bag activation might shatter the glass, so very few were equipped with the not-yet mandatory protection.

Zuffenhausen also introduced an RS America variation. With limited color choices and fewer options, the C2-derived RS America offered U.S. customers the flat rear wing of the 1974/1975 Carrera 3.0 models together with a decontented interior. At price point some $10,000 U.S. dollars below the fully equipped 964 C2 coupes, it was instantly desirable to a strong enthusiast base in the States. American EPA and DOT regulations prohibited any engine modifications, but the slightly lighter cars—about 110 pounds less—inspired their owners with deep loyalty.

Porsche capped the model year with a 30th Anniversary 964 C4 commemorating the three decades passed since the Frankfurt show introduction of the 901 in 1963. Porsche assembled these models on a turbo body that used the normally aspirated car's electric rear spoiler. Marketing may have launched this vehicle to help consume Turbo bodies; very clearly, however, it and the C2 Turbo Look cabriolet inspired a subsequent popular and successful product line that Porsche developed and discovered through these C2S and C4S predecessors.

The 30th Anniversary 911 appeared as a 1993 model year C4 assembled on the Turbo Look wide-body platform. Zuffenhausen limited production to just 911 examples for worldwide buyers. *Porsche Archiv*

When Porsche wound down production of the G Series, engineers at Weissach who knew that the 964 was coming believed that its body and platform could not support a Flachtbau configuration. By model year 1994, they had found a way to make it all work and they manufactured 76 of them. *Porsche Archiv*

In a final burst of creativity, Porsche Exclusive produced a run of slant nose Turbo 3.6 cars. Pop-up headlights came from the front-engine 968. With its larger turbocharger, modified camshaft and intake manifold, auxiliary oil cooler, and four-pipe exhaust the final slant nose offered its buyers 385 horsepower. Zuffenhausen assembled just 76 of these cars.

Through the four years of its life, the 964 had sold steadily. Zuffenhausen assembled 63,570 of the C2 and C4 models. During this time, the economy reeled and retched, barely providing the company revenues to develop the next 911 generation. It made them reexamine their front-engine cars. By the end of model year 1995, both the 968 and 928 models had served their purpose, introducing new customers to the company's products. With output of only 1,188 of the 968 coupes and cabriolets and just 119 of the 928 models in their final year, everything demanded more rational product development and production management.

"A car is designed for 20 years, for 200,000 kilometers, under very rough conditions. So we simulated that."

— Hans-Peter Bäuerle

THE FOURTH GENERATION: 993

"I didn't think they would ask me to come back," Harm Lagaay said in an interview near his retirement home at Inning, southwest of Munich. "But when they asked me, I definitely had a very strong plan. I knew what Porsche was, what they had been in the 1970s." Lagaay was there in those days, arriving in time to see Piëch's radical mid-flat-six engine proposal and all its variants. Lagaay had styled the VW EA425, which became, after VW stepped away, the Porsche 924, and he left in 1977 soon after the car launched.

"I thought: This is what they need. They definitely cannot go on with the 964. . . . Nothing was right anymore." With the 911 under F. Porsche and F. Porsche Junior and F. Piëch, the car came to life, and as it advanced, it defined sports car performance and appearance. When Fuhrmann arrived, the car entered a period of benign neglect (though it's likely Bott and others felt this was more malevolent) until Schutz, the 911's champion, arrived. With Schutz, the 911 played catchup. And then it rocketed ahead. The 1983 SC Cabriolet was the world's fastest production convertible. Four years later, the 959s routinely touched 200 miles per hour on German autobahns. Notwithstanding its financial costs and the management upheaval it precipitated, it had one other fault: it looked startling, like an automobile from another planet. Not the next Porsche, but the New 911. The 959 put gray hair on the G model and, while engineering and design changed the 964 in many ways, it looked like the next 911, not the new Porsche.

Tony Hatter, assigned to create the body for the 993, drew on what he had developed for the 965 as well as some of the work Steve Murkett did for Ferry Porsche's birthday Panamericana. The 993 debuted as a rear-drive model for 1994. *Porsche Archiv*

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As the Frankfurt motor show approached in September of 1989, Harm Lagaay asked stylist Steve Murkett to create something to dramatize Porsche's new all-wheel-drive capabilities. Murkett's radical Panamericana, which went on to be Ferry Porsche's 80th birthday gift, was experimenting with and developing body forms for 911s many years ahead. *Porsche Archiv*

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Dune buggies, off-roaders, and other multipurpose vehicles intrigued designer Murkett. His interior, with its speedboat-like zip-on-zip-off top, was almost traditional compared to the exterior shapes of the 1989 Panamericana. *Porsche Archiv*

"I am not someone who is afraid of changing the 911," Lagaay continued. "On the contrary, I was absolutely convinced that it had to change radically. We started the 993 immediately after I arrived." This was 1989, the year of Ferry Porsche's 80th birthday, a natural anniversary for a special car for the founder. Lagaay gave the styling assignment to Steve Murkett, who had joined Porsche in 1983 and had admired the 928 since its introduction, and had completed the production version of the 959. Styling cues from both those cars—and from Murkett's fascination with off-road vehicles and dune buggies—inspired and appeared on the 1989 Panamericana, a very radical glimpse into Porsche's future design language intended first as a Frankfurt show car to spotlight Porsche's new four-wheel-drive series cars.

To change the 911, Lagaay assigned Tony Hatter to style its exterior and he pulled cues from the ill-fated 965 Turbo. Across the compound in Weissach, Ulrich Bez, as Bott's successor, was firing up—and some said—igniting his engineering staff. The new 993 had to be less expensive and less time-consuming to manufacture. It had to look better, perform better, weigh less, emit less, and do all this by last week. Because Bez expected all the development work he had scheduled to see tomorrow on the new four-door sedan, the Typ 989, to be completed by noon yesterday. Bez, fresh from a decade at BMW developing the Z1 sports car and future sedans, intended Porsche's four-seater to take the company up market and to set new benchmarks for engineering accomplishment.

A chance to test drive the new Carrera 4 proved irresistible even to world rally champion Carlos Sainz. The 993 C4 appeared as a late 1994 model. *Porsche Archiv*

Some automobile stylists describe their work as managing reflections, and certainly automotive photographers agree the best car bodies can show their form even in a still photo. The 993 demonstrated what its designer Tony Hatter meant when he said, "At Porsche, we work the forms to perfection." *Porsche Archiv*

Herbert Ampferer's engine group, resigned to carrying over the 3.6-liter engine from the 964, nevertheless made significant improvements. They eliminated a troublesome torsional vibration damper from the crankshaft. They reduced valvetrain weight and incorporated self-adjusting hydraulic valve lifters. They redid the entire exhaust system. All this work gave them an engine that developed 272 horsepower at 6,100 rpm and was quieter than any 911 engine before it. Engineers reconfigured the G50 transmission to add a sixth gear, lowering the ratio on first and stretching the new top gear to get the car to 168 miles per hour.

It has been said that engineers design a car from the inside out and stylists conceive it from the outside and work in. With the 993, both procedures got polished and proven.

"I didn't think they would ask me to come back. But when they asked me, I definitely had a very strong plan. I knew what Porsche was, what they had been in the 1970s."

— Harm Lagaay

REAR STEERING THE 993

"We designed the rear suspension for 993 from 964," Bernd Kahnau explained. "At that time we had the idea in Germany that all cars needed steering on the rear axle, all-wheel steering. That was the idea and we made an axle for the 993. But it was only drivable with four-wheel steering. Then two years before starting production, we decided it was not a good idea. So we had nothing to work with."

Engineering colleague Georg Wahl came to them. Working for Bez on the 989, he and his team had developed the steering rear axle for the sedan (and intended for the 993), but after that was stopped for costs and weight, they were forced to develop a replacement, which he offered to Kahnau's group.

"We threw away the idea of rear steering. We had the subframe, that was necessary to make the rear-steering work, and this new axle was alloy, lightweight, and it made for a very comfortable ride. It improved the handling," Kahnau said. Because Wahl's group had developed it under budgets for the 989, it cost Kahnau's 993 team nothing. The new rear axle assembly yielded another benefit.

"We made the 993 so that we really didn't need the four-wheel drive," Kahnau said. "With the new axle, the new platform, the rear engine, you don't need four-wheel drive, even in Switzerland in the snow. But we went into special markets, like Austria, Switzerland, like Sweden, and they said, 'We need four-wheel drive.' They didn't, but we redesigned the front drive system for the Carrera 4 models for them." The engineers replaced the heavier 964 configuration with a viscous coupling at the transaxle, connecting a torque tube to a compact, exposed front differential that sent power to each wheel. The new system saved 110 pounds over the 964, further benefiting ride and handling.

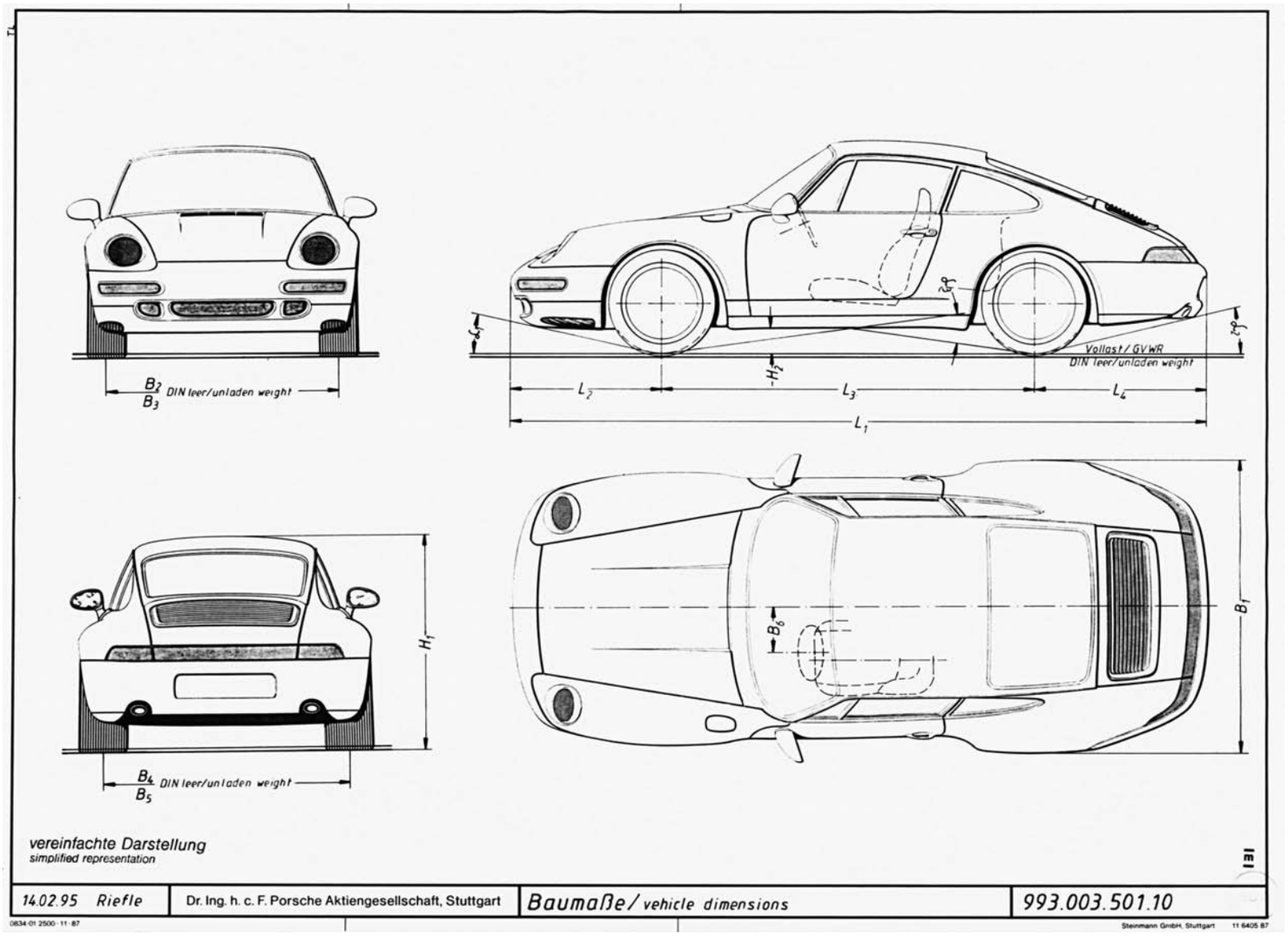
For stylist Hatter, his goal was to address the proportional balance of the 911, something he and others felt had gotten slightly off with the 964. "I always like to compare the forms to muscles," he explained, "forms with a lot of surface tension to them, not just rounded biological forms. There are no shapes or forms on the cars that don't have to be there. The bulges, that's where the wheels are. You can see where the people sit." Not everyone was immediately thrilled with the new look.

"I remember F. A. Porsche came a week or two weeks before Christmas," Bernd Kahnau recalled. "I was supposed to show the 993 to him. He sat in the car and said nothing. Five minutes.

"'Mr. Porsche? Is it not good what we have made with the 911?'

"Papa doesn't see the fenders," F. A. replied, referring to Ferry's styling edict that he must see the fenders to know where his front tires were located. Aside from a few such moments, the 993 largely escaped acute scrutiny.

"It was a fantastic time for us," Kahnau continued. "Mr. Bez, he had the F1 [efforts with Footworks] . . . and all the executives, the first team, paid attention to the 989. And nobody paid any attention to those of us who made the 993. We had it all to ourselves. We all knew something important, however: if it is not good, we are dead. It was not very simple for us. But what I know now is that the best years we have made the 911 is when the rest of the company is making another car."



This drawing, completed February 14, 1995, was labeled "Simplified Representation." It did very much simplify the labors of stylists and modelers and engineers who worked for years to create the Typ 993. *Porsche Archiv*

THE ARNO BOHN ERA

Through all this time, the personality and perspective in the front office changed. Heinrich Branitzki, who had hoped the 964 would endure for a quarter century, was gone barely a year after expressing that ambition. On March 4, 1990, a former computer company director, Arno Bohn, who only had joined Porsche's board at the beginning of the year, became Porsche CEO. By the time the 993 reached the market, the struggling economy—and difficult personalities—had caused more leadership changes. Bez, pushy and imperious, was forced out in late 1991. Bohn, the wrong man in a difficult place at an impossible time, was released from his contract in late September 1992 as the company teetered toward bankruptcy. In a magazine interview, Ferdinand Piëch recommended that Ferry Porsche should retire; soon after, Bohn, supporting Ferry, wrote to Piëch suggesting he resign from Porsche's supervisory board. Instead, Bohn was gone within weeks. Wendelin Wiedeking, who had returned to Porsche in 1991 to head production, became company CEO two years later, as the 993 neared production start.

THE WENDELIN WIEDEKING ERA

In a now-legendary confrontation with Porsche tradition, Wiedeking enticed two former Toyota executives to bring the philosophy of *kaizen*, or continuous improvement, to company manufacturing and to teach them efficiency in production. Calling the existing factory facilities "warehouses" because stockpiled parts occupied as much floor space as assembly lines, the Japanese inspired Wiedeking, who eventually reduced assembly floor inventories from 28 days on hand to 30 minutes, forcing Porsche's outside vendors to adapt or fall off the preferred suppliers list.

The streamlined Zuffenhausen operation manufactured 2,374 of the new 993 coupes—and 221 pilot production cabriolets—by the time Porsche closed for its Christmas/New Year holiday break at the end of 1993. Labeled as 1994 model cars, they began deliveries to European customers in April. The first American buyers saw 1995 models in September 1994.

The cabriolet roof presented challenges to Tony Hatter and the design engineers he worked with. Gerhard Schröder's top system designed for the 1983 SC passed largely unchanged through the 964 models. Hatter was not a fan.

"I never liked the look of the early cabriolets. The classical 911 shape is the coupe. With the 993, we tried to get some of that form into the roof." The 993 was the first time designers or engineers had been allowed to revise the cloth top.

Production for the first year reached 7,865 coupes and 7,074 cabriolets. For all of their dramatics, the efforts of Ulrich Bez and Wendelin Wiedeking delivered benefits to customers—with a base price $5,000 less than the 964—and profits to the company, incredibly. The new car helped rewrite Porsche's financial statement as the economy finally returned to solid footing in 1995. By this time, Porsche had begun delivering all-wheel-drive Carrera 4s. Weissach updated and revised the Tiptronic transmission, renaming it the Tiptronic S; however, it was available only for rear-drive models.

In spring 1994, Porsche unveiled the C2 cabriolet, followed a year later by the open C4 models. The 3.6-liter engine in the 993 developed 272 horsepower at 6,100 rpm. *Porsche Archiv*

In March 1995, Porsche introduced the 993 Turbo at the Geneva Motor Show in Switzerland. It offered buyers 408 horsepower at 5,750 rpm. *Porsche Archiv*

A new Turbo arrived, delivering 408 horsepower at 5,750 rpm, through all four wheels, hinting at a coming-Porsche philosophy that any of their automobiles providing the customer with more than 400 horsepower was available only through all four wheels. Weissach's engineers coupled the six-speed manual transmission to a dynamic limited-slip differential with active braking. This was 959 technology brought to a broader audience. The Turbo topped out above 180 miles per hour and reached 100 kilometers per hour from a standstill in 4.5 seconds.

A Carrera RS model appeared for model years 1995 and 1996. Fitted with subtle front corner spoilers and a flat rear wing, all in body color, this package for the serious enthusiasts shaved 220 pounds off the standard C2 coupe and engine designers sweetened the package by increasing displacement from 3,600cc to 3,746—designated the 3.8-liter engine. This increased displacement, along with other tricks and treatments, delivered 300 horsepower to some 1,100 customers. Another key to this additional power was an innovative fuel induction system, called VarioRam, that utilized long intake tubes to broaden the torque performance at low and medium engine speeds, and short ones at high engine speeds to produce greater horsepower. Vacuum-operated sliders manipulated all of this technology. The system had debuted a season earlier on the competition-derived GT3 models. An even less common Club Sport package provided slightly closer gear ratios for those intending racing or serious track-day activities. Porsche manufactured only 227 of the Club Sports.

The meanest and leanest of the 993s came in the GT2 model, a vehicle with little pretention and clear ambition for the winner's circle. Where the standard C2 coupe weighed 3,014 pounds with 285 horsepower for 1996, and the RS Club Sport came in at 2,794 pounds and 300 horsepower (and sold for 164,700 DM—$109,800 at the factory but unavailable to U.S. buyers), the GT2 put 430 horsepower into the same weight (for 278,875 DM—$185,917.) As only 172 of these cars emerged from Weissach's shops, it was clear, with their plastic wheel arch flares, aluminum doors, and massive three-piece Centerline 9x18 and 11x18 composite wheels, that the GT2 was not intended for mass consumption.

VarioRam managed induction on all normally aspirated Carrera engines for 1996, elevating output to 285 horsepower at 6,100 rpm. In addition, the company introduced two new models—a C4S, fitting the normally aspirated all-wheel-drive running gear under a turbo coupe body but using a retracting rear spoiler instead of the Turbo's fixed wing, and a new Targa, fitted with a large retracting tinted-glass roof. Targa models started life as cabriolets onto which assemblers bonded and bolted a separate roof system.

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To homologate the 993 Carrera RSR 3.8 for racing, Zuffenhausen produced a run of 1,014 street-legal 300-horsepower RS 3.8 models in 1995, including this yellow coupe. On the right is the M003 RS 3.8 Club Sport, of which Porsche assembled 227. *Porsche Archiv*

Weissach conceived a radically different Targa concept on the 993 platform using a large glass panel that retracted inside the rear window. Zuffenhausen assemblers mounted the glass roof structure onto a cabriolet platform. *Porsche Archiv*

The opening glass slid back down and inside the rear window. Drivers could open or close the roof at any speed. The Targa was produced on the C2 platform only. On July 15, as assembly line employees prepared for the change over to 1997 model year cars, they celebrated a milestone, driving the 1 millionth Porsche off the Zuffenhausen assembly line. Configured as a coupe with Tiptronic S, the company donated it to the autobahn police of its home Baden-Württemberg region.

For the 1997 model year, Porsche offered a Carrera S coupe. This model supplemented the wide-body C4S as its rear-drive sibling, adding the capability of using the Tiptronic S gearbox. Similar to the C4S, the S appeared only as a coupe. Standard normal body C2 and C4 models, in coupe and cabriolet, remained in production.

Model year 1998 marked the end of an era of Porsche automobile engineering. Weissach engineers had spent much of the previous decade reckoning with questions of water cooling the 911 engines. Discussions arose repeatedly as the 993 was conceived, designed, and developed. For that model, the costs outweighed the benefits. For the next generation 966, necessities and regulations outweighed everything. As the company prepared to introduce the 996, it dropped the C2 and C4 coupe and cabriolet models from the 1998 lineup. New models of these cars were arriving soon; however, Porsche kept the Turbo, the Targa, and the wide-body Carrera S and C4S coupes in production through this final year. The car that was coming was both the Next 911 and the New Porsche. It projected a subtle change in direction and definition even as it reflected a massive transformation in technology.

> "We made the 993 so that we really didn't need the four-wheel drive. With the new axle, the new platform, the rear engine, you don't need four-wheel drive, even in Switzerland in the snow. But we went into special markets, like Austria, Switzerland, like Sweden, and they said, 'We need four-wheel drive.' They didn't, but we redesigned the front drive system for the Carrera 4 models for them."
>
> — Bernd Kahnau

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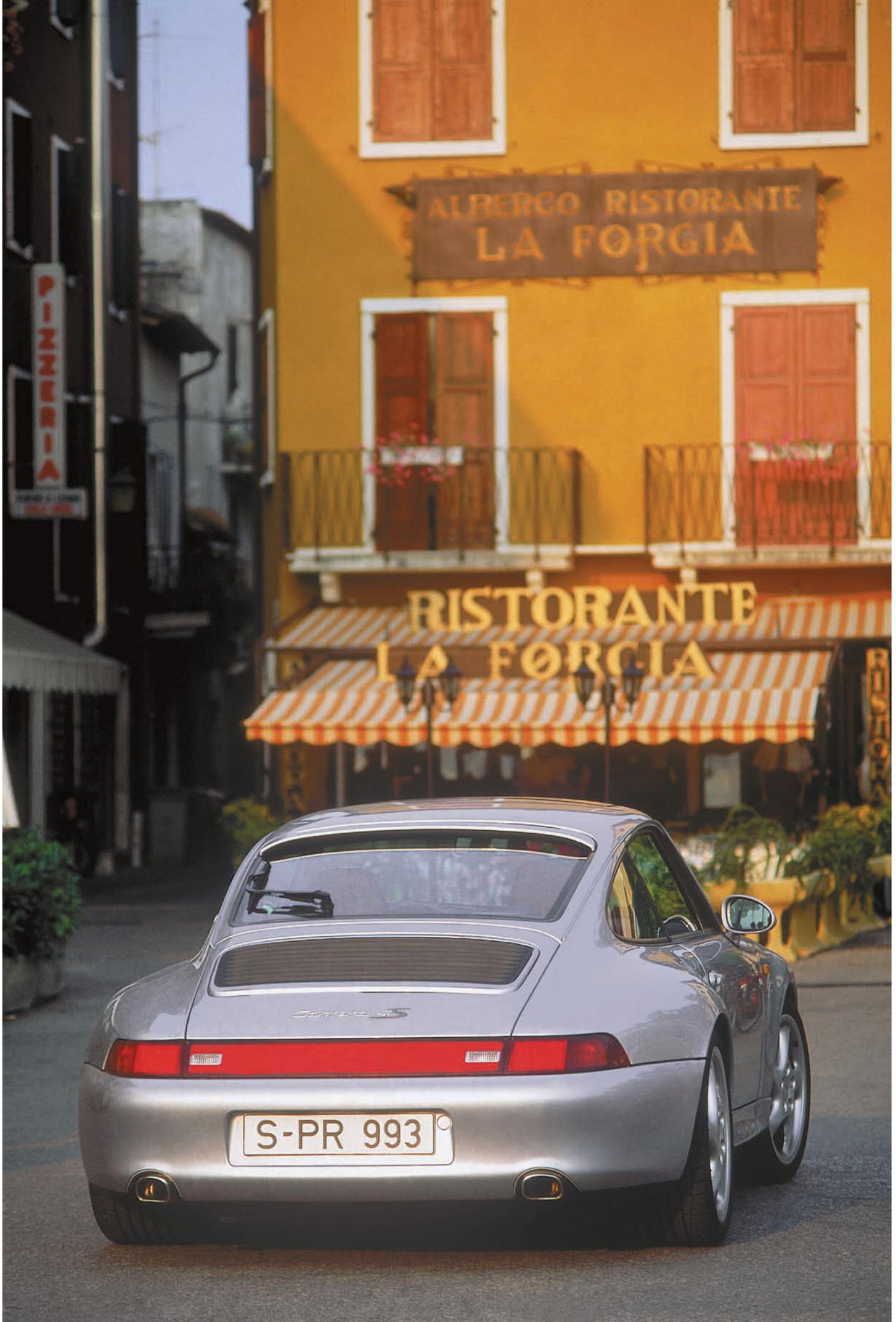
Porsche launched the C4S for 1996, adapting the Turbo coupe body to the all-wheel-drive platform. It followed for 1997 with the Carrera S coupe, a similarly bodied rear-drive model. *Porsche Archiv*


ALBERGO RISTORANTE
LA FORGIA
PIZZERIA
RISTORANTE
LA FORGIA
S-PR 993

Horst Marchart's innovative idea to create two cars using the same face challenged engineers and stylists alike. The result, the 986 Boxster, and this, the 996 model, saved Porsche millions but initially confused some buyers.
Porsche Archiv

CHAPTER THREE

EVOLUTION VERSION 2.0

FROM AIR TO WATER

THE FIFTH GENERATION: 996

”In 1991, we had one big problem in the company,” Horst Marchart recalled in an interview in 2012. Marchart had just joined the Porsche board. He had started as a design engineer in the engine department in 1960, and from 1972 till 1988, he served as a leader for external projects at Weissach. In 1988, after Helmuth Bott left, Ulrich Bez pulled Marchart back into Porsche’s mainstream, making him responsible for the complete development for cars. He supervised 350 people. He had watched this “one problem” as it emerged, sometimes seeing it from the perspectives of Porsche’s outside clients.

“The 944/968 was an excellent car,” Marchart acknowledged, “but no one said it was a true Porsche. Next was the 928—the original concept to replace the 911. This split the company—one side was for the 911. The other side was for the 928/924/944. It always made a competition inside the company. And outside the company, it was a competition of appearance—the 911 was the true Porsche and the 928 was a Porsche, but not the true Porsche.”

When Marchart joined the board, Wendelin Wiedeking gave him the task of solving the one big problem, and the others that grew from it. “We had three products with no common parts,” Marchart said. “My job was to reduce the company to two products with a lot of parts similarities. And it was my idea to use the same face for both cars to give the identification equally. And with the Boxster and the 911, nearly the same from the nose to the front of the doors, we show it is possible for Porsche to build two cars that are both true Porsches.”

Design, engineering, and development testing took place simultaneously on both 986 Boxster and 996 car lines. Engineers performed close-follow tests such as this to challenge door seals and interior and engine filter systems. *Porsche Archiv*

One more issue had been present from the start. Fuhrmann had attempted to resolve it with his 924 and 928, but it eventually became clear these were not the best solutions to a real problem.

"Our next big situation was to stop the air-cooled engine. Nobody in the world had air-cooled engines except us. With all the regulations in the various countries, all that we had to respect, we had these special engines that needed special parts unlike any other manufacturer. We could only have two valves. We needed a special cooling and heating system, different from everyone else in the world. It took a lot of money to make special systems since we could not share technology with anyone else," Marchart said.

He considered making immediate changes. The 964 was ready for release, but among the gasps heard during finance man Branitzki's suggestion to keep that car around forever were Marchart's 350 engineers with a much clearer view of coming safety and emissions standards. The development of 993 began even before Branitzki spoke those words.

"We made studies and investigations to make the 993 water-cooled. But we had special conditions. We would have needed a new heating and cooling system for a water-cooled engine, and we didn't have the room in the car body. So we decided to let the 993 stay with the air-cooling and we would start fresh with the next car, the 996.

"In the meanwhile, we also had made the studies for a four-wheel steering system, which we liked. But we could find no partners for it. Bosch asked for 60,000,000 DM at that time (about $40 million) to develop the electronics and cooperate with us in development. At that time we had no money in our pockets, so that made the decision to stop that project easy but disappointing. But that was the reason why, in the 993, we had the subframe. We had started to develop the system, and it required the subframe. Then Bosch needed too much. The comfort was excellent. We decided we will stay with the subframe and stabilize the rear axle. And I think it made us the most comfortable 911 ever, in the 993.

With its wind deflector in place, the 996 Cabrio showed off the graceful lines Pinky Lai had labored to produce. Cabrio buyers received an aluminum hardtop as part of their purchase price. *Porsche Archiv*

"For the 996 water-cooled engine, we knew the boxer motor had one problem. The length of the engine is defined with the crankshaft. Not by the cylinders. If you have a 2-liter or 3-liter or 3.5, it is always the same. So when we changed from air-cooled to the water-cooled, the length dimensions came from the old engine. But all other decisions were completely new. As a result, the engine for the normal car was a completely new design.

"We had choices. We know that maximum lateral acceleration with our road cars is 1.4 G, maximum. Maximum! And the normal Beetle, for example, 0.8. So we decided to develop dry sump only for the competition cars and for the normal car we had a normal sump and oil pump. The race version was the latest development of the racing engine from Mr. Mezger. Also with the dry sump."

At the same time, Marchart asked Porsche's procurement people to prepare for him the cost of all the parts in the cars. After long discussions with each development group, he tasked them with determining existing costs and making a cost goal for each part. Most of his engineers told him it was not possible to reduce the costs. Five months later, they had saved 30 percent. He concluded that if it was so easy to reach those goals, they could try to go further.

"It became a sport in the entire company to reach these goals," he said. "We realized that to save our company we had only one chance. I had a lot of problem in Weissach when I came to my colleagues and said, 'Now we are going to make two cars. One 120,000 DM and the other 75,000 DM.' I remember one told me, 'You are crazy. The same parts, the same length, where are we going to find 40,000 DM?'"

Tight design and development budgets originally eliminated the elevating rear spoiler, but it appeared in production. The 996 grew slightly in dimensions over the 993, stretching the wheelbase from 2,272 millimeters to 2,350 for the new car. *Porsche Archiv*

It proved to be not so difficult. Both cars shared many of the same parts. He established a production plan of 15,000 to 20,000 911 cars and 20,000 to 25,000 of the Boxsters. He told everyone that the 911 paid the development costs and the investment costs—and the parts costs—while the Boxster paid only for its parts costs.

Producing one car in the lineup that shares half its parts with another saves a great deal of money. Marchart has always maintained that this tense period was an exciting time to be at Porsche. For any company, saving 5 percent is admirable. All these ideas saved 30 at the time when the automobile world was rife with rumors that Porsche was about to be acquired by Mercedes-Benz, General Motors, or Toyota.

"So the basic idea when I made this proposal was we need 3.5 billion [DM] turnover [revenue] with our cars. And the basic car in Porsche could only be the 911—at that time. Because it was the heart of the company. The possibility was if we went to a higher car, it is expensive. So if you set a production number of, say, 20,000 cars in the year, well, 20,000 cars a year in this existing company means 50 percent of the people we must fire. So you must have in the minimum 35,000 to 40,000 cars to produce that turnover. So I said we must have a car *under* the 911, cheaper than the 911 to bring up the production numbers. And also we bring in younger people who will look up to the 911.

"The next question was then how do we find the way for the second car to give the image that it is a true Porsche. I'm not sure how many Porsche drivers are really sports car drivers. A lot of them are really image drivers."

In many ways, Marchart's concept had a ruthless economy to it. Even with the 911's rear engine (and the Boxster's mid-configuration), more than half the parts and costs in the car exist between the front bumper and the driver's seat: front impact safety (and the expensive crash tests), fuel tank, heating/air conditioning, steering, suspension, instrument panel, entertainment systems, main operational computers. . . . The list is staggering in its quantity, costs, and complexity. To standardize two cars with one set of these elements saves a fortune. Making two cars with the same front structure and infrastructure alone would have proven economical. But everyone got to weigh in.

The complex one-piece headlight assembly resulted from production demands for faster assembly. The one-piece fixture incorporated five light functions yet mounted in the car in 20 seconds. *Porsche Archiv*

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For the second time since the cloth tops Gerhard Schröder and Eugen Kolb devised for the SC Cabrios for 1983, Porsche allowed stylists and engineers to redesign the convertible. This 2003 Cabrio showed the smoother transition line from the cloth to the car body. *Porsche Archiv*

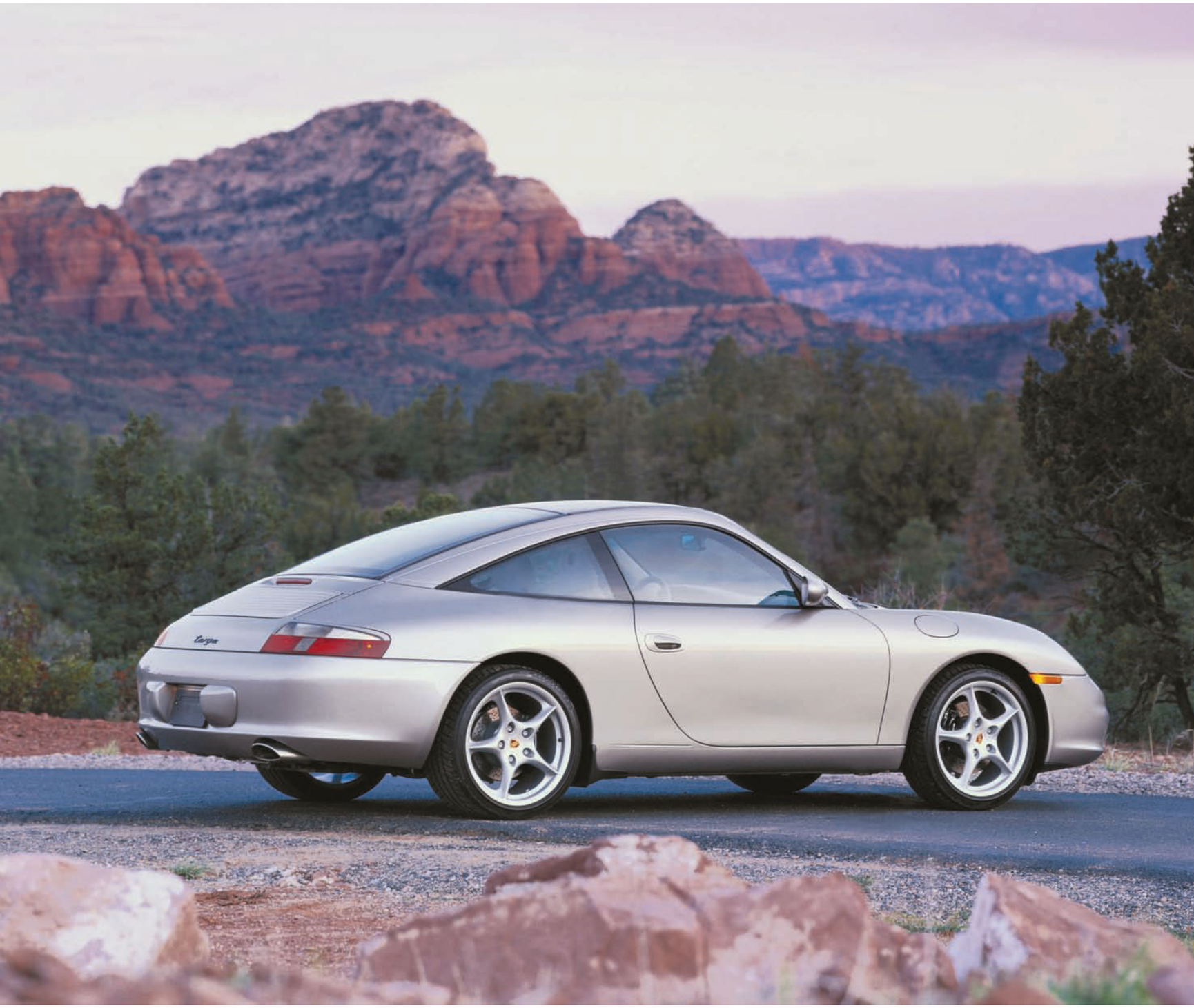
Production engineers wanted to shorten assembly-line time and decrease the number of processes, procedures, and actions for each assembler. Someone set a goal of no more than 20 seconds for mounting, installing, and connecting the low- and high-beam headlights, fog lamps, parking lights, and turn signal on each side of the car. Not even a robot could accomplish five fixtures in 20 seconds. As a single subassembly, it was possible. But this meant using the same lighting module in two models. If headlights are a significant part of the "face" of the car, making two cars with the same face was a radical product-planning concept as well.

For chief designer Harm Lagaay, it presented huge challenges. The least of them was enlarging the studios because Marchart's concept meant two designers had to work side by side. A flash of inspiration from one designer meant the second car had to change identically. Instead of a 911 studio and a Boxster studio down the hall, there were a series of teams of designers working on each team of cars, all in a competition with each other to create the appearance that will capture the audience.

Lagaay knew his staff. Some he inherited from Lapine, some he brought with him from BMW, and some he hired himself. He knew their personalities and he carefully gauged his pairings. He had nearly a half-dozen teams working on concepts for the two cars.

As important as knowing his staff, Lagaay had an idea what he wanted. This helped him direct and encourage his teams so each pair of proposals reached the same level of style, sophistication, and Porsche-ness. The design director may never touch a pencil to paper, shave a millimeter of modeling Plasticine, or input a single keystroke into a CAD/CAM terminal anymore. Their job is to direct, to manage the imaginations and ideas of their staff and of each team with a word, a hand gesture, a literary or music reference. Designers and board members had become more polished, with higher expectations. While the board expected to be asked its opinion and for that to carry weight, it also wanted direction. No longer could Erwin Komenda redraw and resize seats in front of the decision makers and then ask, "Which do you take?" That was a time of development not only in design and materials but also in presentation. The process had become more like what F. A. did with his father: "We did these and these. But here: This is it."

The winning design came from Pinky Lai's concept for the 996 and Grant Larson's for the Boxster. It is a familiar story: in the midst of the stress of a tight economy and new car development, CEO Arno Bohn asked Lagaay to produce a show car, something to excite audiences and show



The pleasing lines of the 996, as well as its quieter performance, invited many first-time Porsche buyers into a 911. While they were happy, purists felt the car had lost some sportiness. *Porsche Archiv*

them Porsche still was around. Lagaay tagged Grant for that assignment even while Larson worked alongside Lai developing the production cars.

Steve Murkett christened Larson's sporty Boxer-engined roadster the Boxster during a design staff meeting, and the car's positive review before the board put it on an airplane to the North American International Auto Show in Detroit in 1993. By the time it appeared, Bohn was gone and Wiedeking was in his place. When the chairman pulled away the cloth in Detroit, it had the effect of putting the car in front of the public and saying, "Here, this is it!"

The media and enthusiast response energized Lagaay's exhausted design teams. He reached Lai by telephone in a wind tunnel where he and modeler Eberhard Brose were struggling to make aerodynamics work on a car that could not afford an electric rear spoiler anymore. Yet the company could not afford a new roofline that would solve the conundrum without changing the fundamental—and necessary—silhouette of a 911. Lai went back to work, Lagaay worked on the chairman, and Wiedeking found the funds to electrify a rear wing.

PREDEVELOPING THE 911

The development work on the 996 was far from finished and for every few thousand DM that Wiedeking released, there were other ideas, improvements, and upgrades that didn't make the cut. Soon after Ulrich Bez arrived, he overturned or overruled many of the ideas, goals, techniques, and procedures that Helmuth Bott had kept in place for many years. It was one of several actions that did not endear him to Weissach staff. But one good thing came from the Bez revolution. The company established a predevelopment department. In essence this was a kind of practical and theoretical experimentation group that looked into new or alternate technologies and materials that might be useful to Porsche. Hans-Peter Bäuerle was part of that group.

"Because I had still been working in lightweight materials, in aluminum, with space frames," he said, "they gave us the responsibility to see if aluminum space frames would be suitable for the Boxster and the 996. Eugen Kolb was working in this predevelopment department with me. We worked together on this space frame, using aluminum profiles."

"We had the idea to make the floor of a car without any welding," Bäuerle continued. "Because if you put heat into aluminum, it is not so good for the durability. I think Kolb has the patent to clamp and glue the entire 996 floor panel. We even built prototypes, not running but hydro-pulse prototypes—I think there were five or six we made.

"Then came Mr. Wiedeking and he looked at it. 'Good looking. Good technology. But too expensive.' I must admit, it was his job to save the company. I understood the decision to make the Boxster and 996 in steel technology, but where we put our ideas in place, we used not just normal steel but high-strength steel—in a high amount. In those times we had more than 50 percent high-strength steel, which no other manufacturer was doing.

"I got a lot of people laughing at me. 'Wow, warm-formed steel! You are crazy!' We had a special design of the firewall of ultra high-strength steel so the Boxster and the 996 had a very good ratio between strength and rigidity, nearly double the rate of other cars. Very good crash performance. In the 911 it always has been important to keep the tank from the passengers, also to save intrusion in the leg area. We saw that we could realize a high intrusion protection." It made for a stiffer pair of cars than Porsche had achieved before, improving road holding and handling as well as passenger protection.

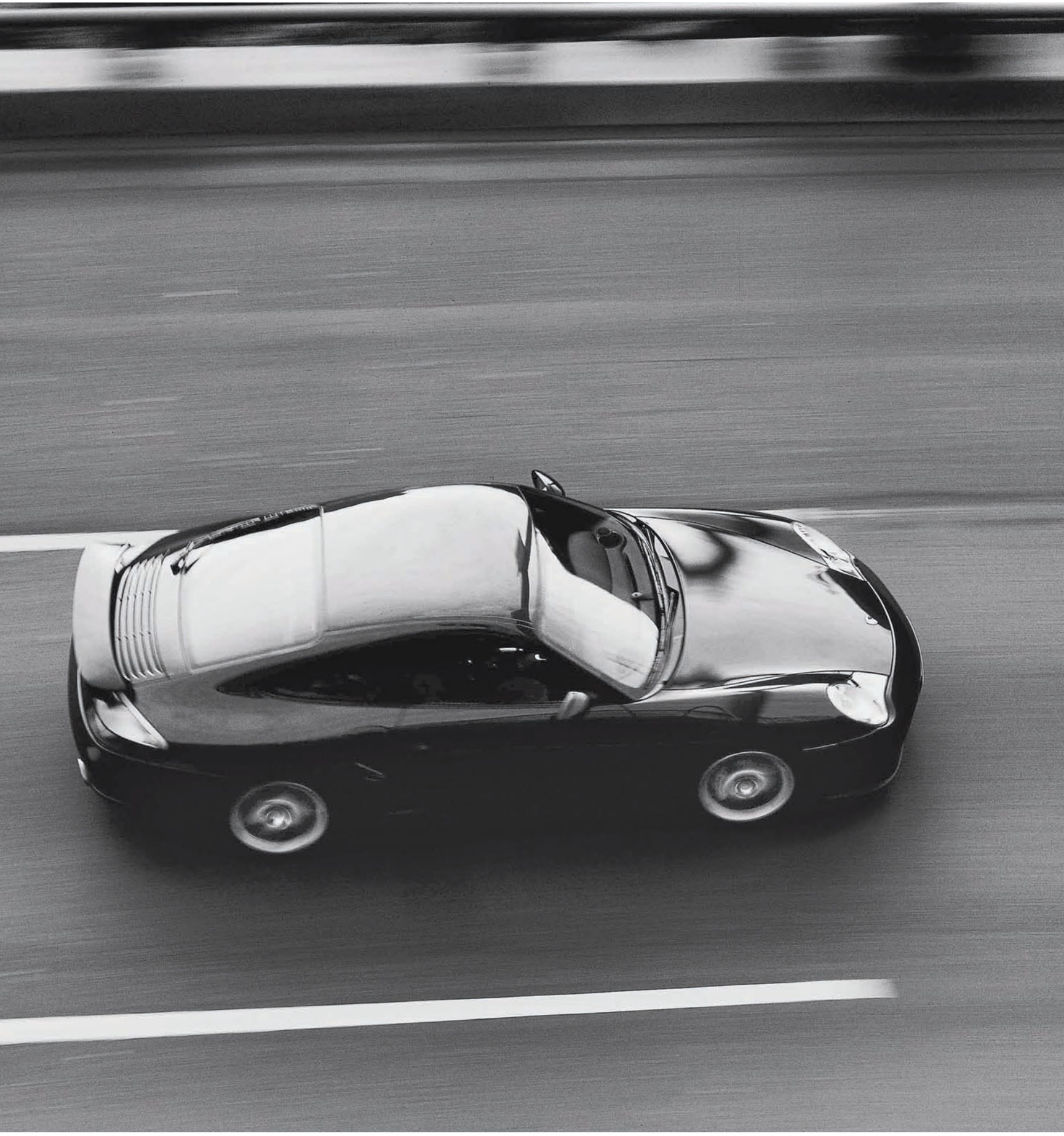
The cars, by necessity, grew heavier, if for no other reason than the addition of 20 liters of cooling water, the radiators, pumps, and plumbing. Ironically, as Lai struggled to control aerodynamic lift at the rear of the car, he raised the rear profile. This provided engineers the extra room they needed to accommodate the slightly larger engine. The wheelbase grew 3.2 inches to 92.6 and overall length gained 6.8 inches to reach 174.5. Front and rear track widened nearly 2 inches while the body width grew an inch.

The new engine displaced 3,387cc, with bore and stroke of 96 millimeters by 78 millimeters. By eliminating the air-cooling fins, the design engineers had room for four valves in the heads and they returned to a single spark plug ignition. This combination gave them 296 horsepower at 6,800 rpm. While the water cooling muffled engine sounds somewhat, engineers fine tuned intake and exhaust manifolds for the sound they produced as much as for flow efficiency. “The 996,” Bernd Kahnau put in perspective, “was the car for everyone who said they wanted a sports car but didn’t always want to have sports car noise.”

Water cooling also greatly improved heating and defrosting. Getrag and Porsche collaborated on a new six-speed transmission that could accommodate much more power than the new engine produced with an eye toward down-line development. The Tiptronic S transmission provided five speeds.

Zuffenhausen began series production of the coupes in early fall 1997 as a 1998 model for Europe. Cabrios followed a few months later. Porsche Cars North America launched both models simultaneously in mid-April 1998. However, because all these introduction dates came more than a year after the Boxster had appeared, an unanticipated and unfortunate impression fell on some customers and observers. Everyone recognized that the 996 was the company flagship, yet with the same face on two cars, some people got the sense that it was the overpriced upgrade of the entry-level model. Once they drove the car, however, there was no mistaking its potential.

The 996 GT3 looked great from any angle. Porsche introduced the car to European customers as a 1999 model, discontinued it in 2001, and reintroduced it worldwide in January 2003 with 381 horsepower in a 3,083-pound automobile. *Porsche Archiv*



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The 996 Turbo appeared in late 2000 as a 2001 model. Weissach engineers tuned the 3.6-liter engine to develop 420 horsepower at 6,000 rpm and mounted it on an all-wheel-drive platform. *Porsche Archiv*

The Carrera 4S offered superb handling with its all-wheel drive and its turbo-body wide rear track. Introduced as a late 2001 model, it had a 3,596cc engine that developed 320 horsepower at 6,800 rpm. *Porsche Archiv*

Acceleration from 0 to 100 kilometers came in 4.6 seconds, a figure that only a few years earlier had been turbo performance. Porsche quoted the 996 top speed at 174 miles per hour, aided greatly by all of Pinky Lai's long hours in the wind tunnel that reduced the coefficient of drag (cD) to just 0.30.

When the cabriolets appeared, the new cloth top system was a remarkable update from the 993, which itself had changed the long-lived G model's profile. Together with Lai, Eugen Kolb, in his last assignment before retirement in 1997, fashioned the new kinematics. The 993's cloth top collapsed on the rear deck and it required a cloth cover to finish its appearance. With both the Boxster and 996 Cabrio, Kolb devised a system that raised a rear body panel that covered the mechanisms to open or collapse the top and a well in which it was stored. It disappeared in the Boxster and in the 996, the rigid front bow and glued-in-place cloth folded back on themselves to appear as the front of the tonneau. Kolb received his final design patent for this system. Generously, Porsche included a removable hardtop in the Cabrio purchase price so those who used the car in winter were better insulated. Dealers offered to store these, a blessing to owners but a burden to the shops that sometimes found themselves holding them for years.

In October 1998, Porsche introduced the 996 Carrera 4 Series coupes and cabriolets and U.S. buyers got their cars starting in January 1999. Drivetrain engineers modified the optional Tiptronic S and configured the C4 chassis from the start to mate these technologies. Porsche Stability Management (PSM), a system jointly developed by Bosch and Porsche, also debuted on the C4 Series, recalling a technology from the 959 in which sensors fed information to the ABS system to

After some tough challenges with the 993 glass-roof Targa, Weissach body engineers reconfigured the entire concept for the 996. This new top system mounted to the car body from the inside and the rear window operated like a hatchback. *Porsche Archiv*

electronically apply brakes to an individual wheel when excessive understeer or oversteer affected cornering stability.

Some observers had criticized the 996's appearance as demure. That comment never came up in connection with the Turbo models that began to appear in 2000. Pinky Lai widened the rear of the car 2.6 inches to accommodate fatter rear wheels and tires, yet amazingly this harmed the cD by a single 0.01, raising the number to 0.31. With all-wheel drive and 420 horsepower, the package was a technological delight. Porsche's racing department had expanded the capabilities of the VarioRam system to include an innovative variable camshaft profile, called VarioCam. Updating those mechanisms for this Turbo to VarioCam Plus provided the engines with between 3-millimeter and 10-millimeter valve lift and the technology also altered valve timing from early to late depending on driving loads. What's more, the Tiptronic S, engineered to handle all-wheel drive, had been beefed up enough to accept Turbo power and torque. This combination gave the Turbo acceleration to 62 miles per hour in four seconds and a top speed above 190 miles per hour.

Visually, beyond the wider rear end, Porsche enthusiasts praised the new Turbo for its revised headlights. The five-in-one system created to meet production installation-time requirements suffered some interior glue problems that gave some of the units the appearance of a smashed fried egg. New fixtures were more visually appealing in every way and they appeared on all facelifted 996s, including the C4S coupes and cabriolets that appeared in 2002. These updated the engine spec as well, with new displacement of 3,596cc, accomplished by lengthening stroke from 76 millimeters to 82.8. This, along with VarioCam Plus and other changes, brought horsepower up to 320 at 6,800 rpm.

As the 996 lineup proliferated, the 911 celebrated another milestone in 2003. The 40th anniversary edition commemorated four decades since the Frankfurt IAA launch in 1963. *Porsche Archiv*

"The basic car in Porsche could only be the 911—at that time. Because it was the heart of the company."

— Horst Marchart

Porsche showed the 997 in Shanghai at the international motor show in April 2009. This special edition resurrected the 1973 RS Carrera body side script. *Porsche Archiv*

Later that year, Porsche reintroduced the Targa. Engineers had been forced to rework the system that appeared on the 993 but sometimes jammed. Instead of welding the Targa assembly on top of the Cabrio body, now a robot inserted the entire structure into the interior through the windshield frame of a reinforced (but decapitated) coupe so attachment grew stronger when high-speed driving generated lift.

In the summer of 2003, Porsche again celebrated an anniversary, commemorating this time forty years of 911 engineering, design, and production since the 1963 Frankfurt introduction. The 40th Anniversary 911, painted in GT Silver, arrived on a C2 platform with a specially tuned engine delivering 345 horsepower. Production ran to 1,963 cars and it heralded the coming of the next generation of water-cooled cars that began to appear within months.

As the 50th anniversary of the 911 approached, Marchart took another look back at the 996 in late 2012. “I am sure that if we were not in that crisis,” he said, “nobody would have given me the release to change the air-cooled engine to water-cooled. We were very proud because we were able to bring a new car to market without the help from VW or from Daimler. And we had this goal from the beginning, that the 996 will be a better car than the 993. If we had not made a better car, then there would be discussions in the house and in the press: Why did you make a new car if it’s not a better car?”

The 997 profited, literally, in its engineering and design from the great success the 996 lineup brought to Porsche. Porsche launched the 997 for 2004 model year. *Porsche Archiv*

THE SIXTH GENERATION: 997

If Bernd Kahnau's appraisal of 911 development is correct, that the quality of any 911 is related to the distraction of other management by other projects, then the 997 was on line to be every bit as uncompromised and as promising as the 993 had been. Porsche had an SUV to think about.

The process of developing the 986 Boxster and 996 car line led Horst Marchart to reexamine the entire process of taking a car from concept to the dealership. It brought to mind a conversation he had with Peter Schutz years earlier.

"Schutz had told me during a drive we made together," Marchart said, "that he had an idea to make the 944, 928, and 911 all the same price and the customer can make the decision of which one he wants. That is unrealistic because you need market segments and you have one for the 911, one for the next, and the next.

"We now know that the average 911 driver has 2.5 cars in the garage so they can have the 911, have a Cayenne, and have perhaps a sedan. The Boxster driver is a little different: 1.5 cars. We started this segments program for 996." It led to reorganizing the development of Porsche's cars.

"So in development, the first step is describe without design what do you want, a strategy," Marchart said. Sometimes called the *lastenheft*, this often is a book that defines the existing car, the state of the art, and sets targets, sometimes philosophical, sometimes metaphorical, sometimes literal. In the *lastenheft* for the 993, Peter Falk called for renewed agility in the 911, suggesting that the G and the recent 964 models over time had lost that attribute.

"Then," Marchart continued, "we make, normally, a concept phase. During this time we make the first design studies, the hard point development, what engine is necessary, gearbox, variations, two door, four-wheel drive. And so on. So you have a rough idea of the complete concept of the car. Where are the axles, what is the wheelbase, height of windshield, and so on.

"The next step is a definition. Now the different departments start with their design of their components. Always we do this together with the team that makes the package of the car. Here is the coordination between the different components—where they are identified and modified if necessary. After this phase, we go to the board with our information and also with the design models we have made up to this time, to get the decision to go ahead."

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Porsche's optional composite carbon brake system, PCCB, made downhill sprints feel comfortable and secure on the Model 997. Porsche introduced the system first as an option on 2001 911 GT2 models, and the brakes were easily recognized by their bright yellow calipers. *Porsche Archiv*

If the board is receptive, if Marchart or his successors are convincing, Weissach begins the three-phase vehicle development portion of the process. The time needed for each step is different for each model.

"We started in 1991 with 911 and Boxster," Marchart said. "In 1996 we began production. Nearly five years. Because all the components were completely new. If you have an existing engine and you just modify it, or you have another gearbox and you make updates, then it could be only three-and-a-half years. As a minimum."

First phase of vehicle development is design, of the car and of its components. Subcontractors and suppliers make prototype parts and they go into tests, which is phase two. Engineers have opportunities for modifications during testing. All the results and information from prototype design and testing come back into Weissach to make adjustments and develop the modifications. Typically, each modification in a design gets a number. Marchart made an inquiry and learned that—on average—each part will change ten times during these three phases. A bolt probably is not modified ten times, whereas a crankcase may undergo hundreds of changes. A normal car has between 15,000 and 17,000 parts. Keeping track of these items and their changes is part of the organization process.

Before Hans-Peter Bäuerle and his colleagues perfected the hydro pulse tests on those hand-assembled body-on-white prototypes, Marchart's drivers ran Porsche prototypes 80,000 kilometers in this second round of testing to develop the information necessary to know if the prototype was good. This took a big team. When they finished with the drives—and it took nearly five months to drive 80,000 kilometers—they needed another three months to analyze the data. That meant eight months.

"So we reduced this to 35,000 and this reduces the team," Marchart explained. "It takes out a personnel problem. The engineers kept telling me it was impossible to get the information from only 35,000 kilometers, but we changed some things and now it is possible and so they can bring the results into phase two. For instance you could drive on a smooth autobahn for 100,000 kilometers. Or go on the Belgian Blocks for 10,000 kilometers.

Minimal body camouflage involved a clever paint scheme that resembled the predecessor 996 headlight configuration. By the time development models reached this stage, engineers were fine tuning optional suspensions. *Porsche Archiv*

"You can calculate the difference so that the effect on the car is the same. Normally in the 80,000-kilometer test, you get information about other problems, the door and window seals. But those are not so big problems. If you drive 10,000 kilometers on the Belgian Road and the rear axles fall out, that is a big problem. If you drive 35,000 or even 80,000 kilometers and the door seals fail, that is not as big a problem."

The advantages of the modern-day hydro pulse tests are clear. Now most road testing is reduced to running prototypes in winter and in summer. Early on, Marchart—or Bez or Bott before him—sent cars and drivers to do winter tests while another group went to a different continent and hemisphere to perform summer tests. This sometimes gave inconsistent results. In earlier days, the procedure sent cars for winter testing in North America, then back to Weissach for modifications, and on to South Africa or Australia for summer tests.

"Well, that's not the same car we have tested in the winter because it's changed," Marchart explained. "Normally we need three months to prepare the prototypes. So I decided we will go in the future for summer test in Australia before Christmas time. We come back for Christmas and the cars go to North America, and after Christmas we go to drive the *same* car in the wintertime. That way, all the information comes together and we need make only one set of modifications. It saves money. It saves time. It saves parts."

Another significant development procedure evolved with the arrival of the 997: platform development started with the cabriolets and the coupes simultaneously. It was an idea and an approach that came from the engineers on the project themselves.

Concept sketches early on during the 997 creative process showed the car with 19-inch wheels and immensely wide tires. As engineers tested the idea with carryover 996 platforms, they realized an entirely new structure was necessary to handle the forces for this new 997. *Porsche Archiv*

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August Achleitner's decision to develop the Cabrio alongside the coupe was one development innovation that differentiated 997 models significantly from all that came before. It led to much greater stiffness and rigidity in both cars, which improved further with these second generation cars for 2009. *Porsche Archiv*

"We didn't talk about it," August Achleitner revealed. Achleitner was the 911 project development manager. "The convertible is more difficult, because of the body in white and the stiffness that is necessary. You have to consider some reinforcements from the beginning. You are developing, in an easier way, when you consider these special parts right from the beginning and not to make a coupe first and then, after that is finished, start to develop the convertible."

Beginning with Gerhard Schröder and Eugen Kolb, those difficulties were clear. It was nearly impossible to create an open car in 1965; it was challenging to develop the 1967 Targa; it was manageable—if hectic—to stiffen the G model for the 1983 SC Cabrio. Over the years, the engineers took notes, had memories, and started each new platform from a better-educated perspective. The starting point for 964 and 993 and 996 cabriolets was far beyond the 10 percent stiffness that Kolb and Schröder and Bäuerle discovered. For Achleitner and his development team, a separate revelation made this new procedure easier to adapt. This came from Grant Larson's first sketches of the car and from the chassis department's wish list.

Larson made dramatic three-quarter rear views of the car with very large wide tires. It was visually arresting in its portrayal of power and potent handling. At the same time, as the chassis group contemplated what it wanted from the next generation, they reported to Achleitner.

"They said, the only thing that we can change that will make the car better and faster than before is that we have to enlarge the wheels on the front and on the rear," Achleitner said.

"We just wanted to take over the body-in-white structure from the 996." He approved enlarging the wheels not only by width, but also by diameter. "Enlarging the diameter means you also have to change the center of the wheel in relation to the body. Otherwise the car would be come too high. So every angle of all the arms of all the suspension components changed," he added. "This led to the problem that all the forces transmitted by the wheels to the aluminum frame inside, and . . . the body in white also changed dramatically. And suddenly we had some problems with body-in-white components, some cracks.

"We took an exacting look and found out that, coming from all these different and new angles, there were forces transmitted to the body. Once we understood that, we made changes and solved it, As a result, almost 80 percent of the car is completely new, and if you look at the remaining 20 percent that we did take over, this is the 3.6-liter engine of the normal Carrera," Achleitner continued.

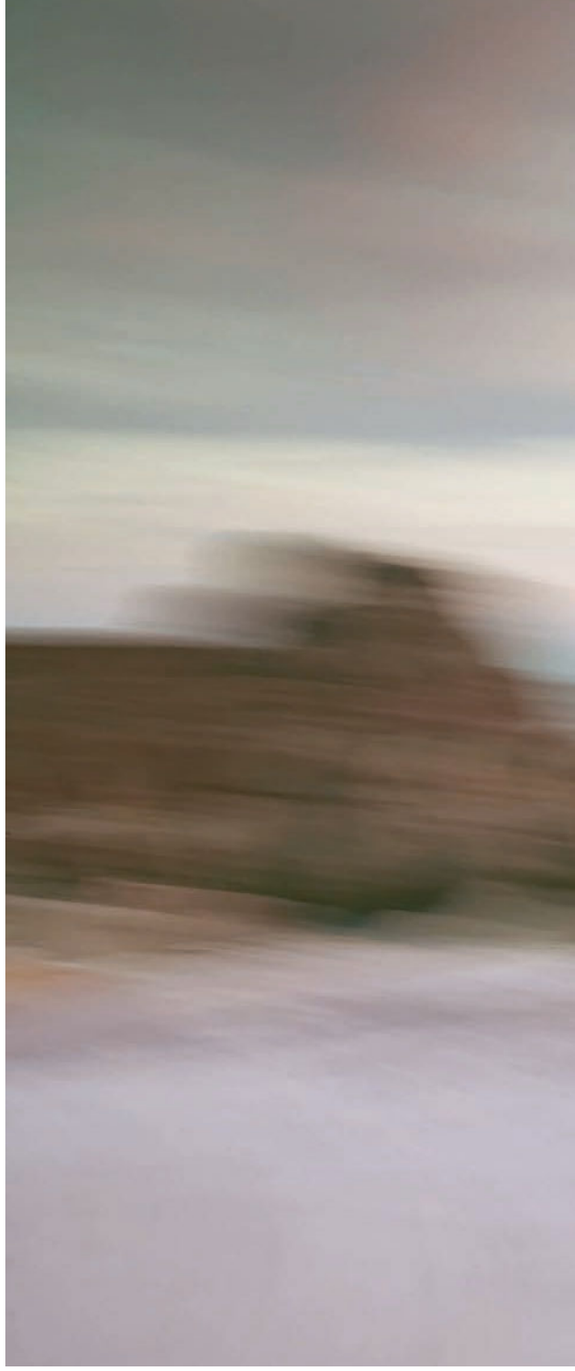
"They said, the only thing that we can change that will make the car better and faster than before is that we have to enlarge the wheels on the front and on the rear."

— August Achleitner

Not a single suspension piece came from the 996, and while this conflicted with Wiedeking's publicly stated goal of common parts, many of these new pieces were simpler and less expensive to manufacture and easier (and therefore less expensive) to install. Significantly, Wiedeking, who in those days ranked among the world's best business managers, understood that Porsche's goal was to produce the best sports car possible.

That goal brought awareness that predevelopment and forward planning provided benefits. Through the 993 and 996 Series, Porsche had offered narrow- and wide-body coupes and convertibles, wide-body Turbos, narrow-body Targas, and GT2 and GT3 versions. With 964s, some of these models were experiments; with 993, these were successes; and with 996, these became accepted patterns. So, if a Porsche engineer understood that any new 911 was, in its ultimate form, a GT2 RS, modifications done in design and engineering reduced development and production costs. This forced Weissach to plan all these models from the start.

With Porsche's economy restored, the design and engineering team were allowed to divide up light sources again. Grant Larson's 997 face looked more familiar to longtime 911 enthusiasts. *Porsche Archiv*



IN STRENGTH THERE IS INNOVATION

Across any Porsche lineup, body and platform stiffness and rigidity and light weight have always been top priorities. As long ago as 1965, Werner Trenkler and Gerhard Schröder understood that it was easy to make a coupe stiff because of its structural roof. By the time the SC cabriolet appeared, the lightweight/high-strength steel guys in Hans-Peter Bäuerle's groups had strengthened floor pans and rocker arms. With the 997, engineers developed what they called a "third load path," a new structural configuration that increased passive safety and greatly enhanced longitudinal bending or flexing stiffness and torsional rigidity. In a front-end impact, this system transferred forces through the top of the door to the rear of the car.

An ultra-high-strength steel beam inside the sheet metal extended across the top of each door, from the base of the A-pillar at the instrument panel. With the door open, a triangular aluminum piece was visible in the B-pillar at the rear of the door. This was the point at which this door beam connected, making for a very rigid support. In the cabriolet alone, this provided 5 percent greater torsional stiffness and 9 percent greater flexing stiffness than the 996 cabriolets. The same beams were fitted in all 997 bodies. Wolfgang Dürheimer, who replaced Horst Marchart after his retirement as vice president and board member for research and development, took pride in his engineers who always kept notebooks and filled their desk drawers with ideas for the next car so when approval came, they were ready. "Don't stop making suggestions," he said. "If you're not successful in bringing it into the present project, bring it next time. Do not abandon it."

Sometimes projects were refilled because their costs were too high, or a partner had not stepped up to share development. Sometimes, ideas slipped back a generation or more because technology wasn't ready. One idea that arose during the 996 development phase, but for which electronics and hydraulics were not ready, came back for the 997, the Porsche active stability management system, PASM. By instantaneously monitoring cornering forces, body lean, and other factors, PASM had the ability to take a single automobile and turn its driving and road-holding characteristics into two or three kinds of sports cars.

"For some people," Achleitner said, "the 996 was a little too soft at that time." The company had not yet introduced the Turbo or 996 GT3 models, and only engineers and designers knew what was coming, but they took these comments seriously and decided the 997 needed to be a bit more muscular and sporting.

"Meeting the target to make the car comfortable wasn't so hard," he continued, "because we did see a way to make the car better than the 996. But we learned a lot about what was possible with software. We could make tiny changes, even to accommodating a single bump in a smooth road."

It also gave them the capability to tune the suspension for coupe drivers and for the needs and expectations of those who bought a Cabrio. For example, front springs for the coupe were 10 percent stiffer than those fitted to the open car, while the cabrio's rear suspension bushings were much harder than those for the coupe. They adjusted the range within the settings on the PASM as well, knowing convertible drivers did not push their cars as hard. So the coupe's sport setting was about 15 percent stiffer than the sport calibrations for the Cabrio, while the open car's softest setting was a bit gentler than the coupe ever was.

The 2006 Model 997 Turbo delivered 480 horsepower at 6,000 rpm, a 60-horsepower increase over the second-generation 996 models. Porsche offered it only on the all-wheel-drive platform. *Porsche Archiv*

What's more, 997 coupes offered a Sport Suspension option that lowered ride height about 0.8 inch, but this left it too low for USDOT right height regulations—and put the nose at risk for steep American driveways and curbs. The same option also provided a mechanical differential lock of 22 percent on acceleration and 27 percent during braking to improve directional stability.

Powertrain engineers improved intake and exhaust flow that added 5 horsepower to the base Carrera, bringing it to 325 for the 997 versions. VarioCam Plus carried over in the 3.6-liter engine and Weissach fitted it on the new 3,823cc flat six for the Carrera S. This new engine with 99-millimeter bore with 82.8-millimeter stroke developed 355 horsepower. This propelled the Carrera S coupe from 0 to 100 kilometers per hour in 4.6 seconds and to a top speed of 182 miles per hour. The base Carrera was only a fraction slower, at 4.8 seconds on acceleration and 177 miles per hour at the top.

Porsche began deliveries of the 997 Carrera and Carrera S as 2004 models in Europe and 2005 models to the United States. While Weissach finished development on the 997 versions, Zuffenhausen carried over production and sales of 996 Turbo S coupes and cabriolets. As had become the pattern, all-wheel-drive Carrera 4 and 4S versions appeared midsummer, and Targas, Turbos, GT3, GT2, and other models followed through 2006, 2007, and 2008.

For the first time since the 1970s, Porsche offered a base 911 Carrera (with a 3.4-liter flat six) and a 3.8-liter Carrera S model, with corresponding differences in horsepower and trim. All-wheel-drive C4 and C4S models appeared for 2005. *Porsche Archiv*

This fully equipped Carrera S interior boasted not only the Porsche communication navigation system, but also the Sport Chrono Plus option, visible through the steering wheel on the dashboard. Porsche's active stability management, PASM, also fitted to this model, was another 997 introduction. *Porsche Archiv*

Inside the 997 cabin, nearly all of it was new except for the structure and shape of the rear seats. In the late 1990s, Harm Lagaay hired Franz-Josef Siegert away from Mercedes-Benz, and in typical fashion, Siegert brought with him a number of his favorite talents from the M-B interior studios. Porsche had a challenge ahead for the 997; the 996 regularly earned compliments as Porsche's most comfortable and user-friendly interior of any in its history. While Weissach hoped to engineer performance and handling to appeal to a sportier enthusiast buyer, it was not about to push away its new enthusiasts who liked the way the car felt and operated from the inside.

Work that Tony Hatter had accomplished to redesign the 993 convertible top went further with Grant Larson and Matthias Kulla on the 997 versions. While Schröder's original version incorporated aluminum and alloy die castings, the 997 used magnesium and a Z-fold mechanism similar to but updated on the 996 system.

Wolfgang Dürheimer and Bernd Kahnau had the sales figures and research data that led them to offer 40 percent of the 2005 997 output as convertibles, knowing that 50 percent of U.S. buyers purchased the open car. Porsche acquired full ownership of CTS (Car Top Systems) and this subsidiary delivered the fully assembled top and its mechanisms, like every other outsourced system, to the assembly line just in time for two assemblers to mount it onto the painted car body.

The Z top system unfolded even at sensible speeds. The new design enabled drivers to raise or lower the roof while cruising as fast as 30 miles per hour. *Porsche Archiv*

In its 997 configuration, the Targa evolved from only a rear-wheel-drive automobile to only a four-wheel-drive vehicle. Buyers tended to use their cars year-round, even to winter skiing outings. Fitting the glass roof to the 1.7-inch-wider rear end gave the car a slightly more aggressive look and better handling that its buyers appreciated.

The 997 Turbo debuted at Geneva in February 2006 and the Turbo cabriolet arrived 18 months later. The Turbos provided buyers 480 horsepower, and with this package, Weissach engineers achieved a longtime goal, virtually identical performance between coupe and cabriolet versions. Acceleration from 0 to 100 kilometers an hour required just 3.9 seconds with the six-speed manual transmission. Incredibly, the only way to arrive there quicker was to order the Tiptronic S, which shaved off 0.2 seconds, making the launch take just 3.7 seconds.

The GT3, introduced alongside the Turbo at Geneva, was instantly popular, with 415 horsepower providing 0 to 100 kilometers-per-hour acceleration in 4.1 seconds. “It’s as close as you can get to a race car with a license plate on it,” Andreas Preuninger explained. Preuninger was GT3 and GT3RS project leader, and the engineer/former magazine journalist/car tester was responsible for creating the car’s capabilities. “We wanted to translate the feeling a race car gives you, the emotion, the wish to drive to your destination in a circle, not in a straight line, because you don’t want to get out of the car.” A wilder-looking GT3RS, with bolder graphics and a larger fixed wing, appeared at the same time.

A year later, Preuninger’s colleagues working at the racing shops in Flacht turned out Porsche’s most potent 911 to date, the GT2, with 530 horsepower. Porsche developed this car to homologate

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Porsche introduced the 997 GT3 for 2006 model year with new tweaks to the 3.6-liter engine to develop 415 horsepower at 7,600 rpm. Weissach made the PASM system standard on GT3 models. *Porsche Archiv*

its racing versions for events such as Le Mans and the American Le Mans Series, and because the FIA ran events only on paved roads, it does not allow all-wheel-drive vehicles, so the GT2 was rear drive. Weighing only 3,175 pounds, the GT2 reached 204 miles per hour, making it Porsche's fastest street-legal 911 ever. (Ironically, because of the capabilities of all-wheel drive and the quick-shifting Tiptronic S gearbox, the Turbo S coupe remained faster, accelerating to 100 kilometers at 3.5 seconds while the GT2 reached the speed in 3.6 seconds.)

For many people, the 997 facelift slipped in below their radar. But its changes were anything but subtle, despite a very understated appearance evolution. The first thing noticeable to most observers was the switch from 12-volt incandescent bulbs to LED fixtures for front marker and rear taillights. What was far more significant was what happened under the proverbial hood. The 996 engines suffered some reliability and durability issues, and while the company honored warranties, the fact that an engine might have failed catastrophically sent engineers back to their drawing boards. While they promised that the improvements built in to the 997 Carrera engines eliminated these risks, they took no further chances and when the time came to switch over to direct fuel injection (DFI), Horst Marchart authorized new blocks all around.

Direct fuel injection blasts a succession of the gasoline-air mixture sprays right into the combustion chamber through injectors placed between the two intake valves. This eliminated the intake plenum or runners previously used to improve the mixture. The travel along the plenum allowed for microscopic amounts of wasted fuel. With DFI, under routine load, the fuel entered the cylinder at 1,740 psi, and even at idle, the pressure was 1,015 psi. To eradicate another historical problem, Porsche eliminated the secondary air injectors by creating a system that shot in a second

The facelift 997 introduced much more than LED lights. The engine utilized direct fuel injection (DFI) for improved performance and economy and the long-awaited Porsche Doppelkupplungsgetriebe PDK double clutch transmission arrived for the road. *Porsche Archiv*


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Porsche manufactured a special and very limited production run of GTS models, called the B59s, for Jacksonville, Florida, dealer and race team Brumos. Stylist Grant Larson developed the Brumos-racing colors paint scheme for these five coupes, of which this is number three. *Photo © 2013 Sean Cridland*

blast of fuel late in the combustion cycle on cold starts. This added heat to the exhaust that raised catalysts to operating temperatures very quickly. The engine management system registered intake and exhaust temperature as well as hundreds of other inputs to vary the timing, duration, and quantity of first and subsequent sprays.

The new engines had new displacements with the Carrera using 1.0-millimeter larger bore at 97-millimeter bore and 1.3-millimeter greater stroke (for 81.5 millimeters) to displace a total of 3,614cc while the S engine shortened stroke from 82.8 millimeters to 77.5 and opened bore from 99 millimeters to 102, to create an exact 3,800cc engine. The 3.6 developed 20 more horsepower than its predecessor, taking base output to 345 while the S increased by 30 to 385 horsepower.

Weissach carried over the six-speed manual with only minor modifications. However, the second engineering marvel on the 997/2 was the arrival of the long-awaited Porsche Doppelkupplungsgetriebe, the seven-speed PDK double-clutch transmission. Weissach invented this gearbox for racing purposes in 1980. Its development process was bedeviling, and the company did not win with it until 1986 at Monza in a 962. Its potential became apparent to all, but the production version introduced in late 2008 for the 2009 models was similar to the racing gearbox only in name and the fact that it used two clutches. Porsche worked with ZF and tested the system with drives in the hills of San Francisco and the traffic in Los Angeles. It shifted gears so rapidly that fuel economy improved 12 percent over the old Tiptronic. Buttons on a new and dedicated

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A variety of technologies and improvements made the 2010 GTS a welcome addition to the 997/2 lineup. The 1.7-inch-wider rear track on 19-inch center-lock RS Spyder wheels made good use of the 408 horsepower available. *Porsche Archiv*

PDK steering wheel toggled up or down or drivers used the short shift lever on the center console. An entertainment feature available for buyers who included Sport Chrono Plus on their option list was Porsche's launch control, a technology the company introduced on its dry-clutch manual transmission GT2. With the PDK, drivers depressed the brake and accelerator simultaneously. At 6,500, slipping a foot off the brake pedal shot the car forward. It apparently was an option of limitless enjoyment as the wet clutches were configured to take the abuse; the GT2 dry clutches were not so forgiving in their tolerance for such brutality.

Within another year, Porsche brought DFI to the Turbo, updating its variable turbine geometry in the process. Twenty more horsepower appeared as a result, elevating the 997/2 Turbo output to a nice round 500 horsepower at 6,000 rpm. More importantly, the handling of the first-generation 997 Turbo—with a tendency to understeer and to display noticeable weight transfer under acceleration, cornering, and braking (a function of the manner in which engineers set up torque split among the four driving wheels and axles) was eliminated. As chassis engineer Ulrich Morbitzer told *EXCELLENCE* magazine's Ian Kuah, "We had a complete rethink of spring, damper, and anti-roll bar settings. The front springs are unchanged . . . but we made big changes at the rear." These were sufficient for Porsche testing and development driver Walter Röhrl to lap the Nurburgring in 7:39 on road tires compared to a 7:32 time he accomplished on Cup tires that he claimed would have improved the Turbo times by five seconds. For operating the PDK-equipped Turbo, Porsche fitted true paddles behind the steering wheel.

The new PDK transmission offered drivers a seven-speed near-instant shifting gearbox that was a perfect mate to draw the best performance or the best fuel economy out of the new 2009 DFI flat-six engines. Fingertip levers on the steering wheel or the gearshift lever were available for those wishing to change gears themselves. *Porsche Archiv*

ENDURANCE RACER FOR THE STREET

Whether Porsche was looking to create a new legend or simply set a benchmark so far out there that competitors simply shook their heads, it met that goal with the GT2RS. This car looked subtly—and that is a word that Porsche takes seriously in its appearance lexicon—different from the updated GT3RS but its statistics set it far apart, and a bit beyond anything Porsche ever offered for the street before. This was one more adaptation of the strong steadfast Hans Mezger–designed 3.6-liter split case dry sump flat six. But with new intercoolers, new twin turbochargers, new pistons, a heavily revised engine control unit (ECU), and many other changes slight and mighty, this 223-cubic-inch engine developed 620 horsepower at 6,500 rpm.

Only a manual six-speed could hold onto this performance, but its numbers left some targets to the imagination: time from 0 to 100 kilometers per hour was quoted as 3.5 seconds. Time from 0 to 100 miles per hour was quoted as 6.8 seconds. Top speed was listed at 205 miles per hour. Two of those numbers looked familiar. A Turbo with PDK and Sport Chrono Plus actually could beat this thinly disguised race car to 100 kilometers per hour. However, with 516 lb-ft of torque available steadily from 2,500 rpm to 5,500, and with gearshifts necessary on the way up the speedometer, perhaps only its design engineers knew the real potential of this automobile. A lap of Nurburgring in 7:18 turned out to be just one of its achievements. It was for sale worldwide—that was another. And its third accomplishment spoke volumes about where the automotive performance world sought audiences at the beginning of the second decade of the twenty-first century: Porsche unveiled the GT2RS at the Moscow auto show.

Simple facts: 3.6-liter displacement with two turbos developed 620 horsepower at 6,500 rpm. The 2011 GT2 RS weighed 3,0921 pounds and Porsche claimed a top speed of 205 miles per hour, the fastest yet for a 911. *Porsche Archiv*

As the company wound down its 997/2 series, it released two special and limited production models meant, once again, to tug at the heartstrings from earlier generations. One model, the 911 Sport Classic, put the Carrera S rear-wheel-drive running gear, Porsche composite carbon brakes (PCCB), and the PASM system in a somewhat distinctive-looking body with a slightly lowered roofline (raised ever so slightly for driver and passenger heads in a double-bubble style reminiscent of Italian race cars from the 1950s and 1960s). An offspring of Porsche Exclusive, one of the Sport Classic's most tantalizing visual treats was the 1973-style burzel fitted onto the rear deck lid.

Restricted to a run of just 250 cars and not offered to American customers, the cars were painted Sport Classic Grey, set off with two slightly darker grey stripes and a coffee brown interior called Espresso Nature by the creative writers inside Exclusive. To propel the Sport Classic, engineers applied the SportKit that fitted the 3.8-liter engine with ported and polished cylinder heads, a variable resonance intake manifold, a unique exhaust system, and a rewritten ECU program, all of which helped the engine deliver 408 horsepower at 7,300 rpm. This car addressed the same motives that had inspired engineer Rolf Sprenger to establish *Sonderwunsch* in 1979; he hoped to bring that lucrative aftermarket/tuner/modification business in house. Exclusive had the same goals with this car and its sibling, the 2010 911 Speedster.

Porsche Exclusive created the Sport Classic, debuting it at Frankfurt in September 2009. Limited to 250 cars, it incorporated a twin-bulge roof and a ducktail spoiler reminiscent of the 1973 RS Carrera, and similar to the GTS, it offered 408 horsepower. *Porsche Archiv*

In upholding a 911 tradition missed only during 996 days, Porsche brought out a 997/2 Speedster, limited to 356 vehicles available in either Pure Blue or Carrara (like the marble) White. With the same 408 horsepower on tap as the GTS and the Sport Classic, the Speedster was linked only to the PDK transmission. *Dave Engelman/Porsche Cars North America*

For its limited-production open car, Exclusive held output to just 356 copies, a symbolic number in both Porsche and Speedster history. Where the first car, introduced in 1954, was a cut-rate Spartan affair, built for a price at the request of American distributors Max Hoffman and Johnny von Neumann, its second and third editions levered the concept up market even as they nurtured some of the myth and more of the mystique. Porsche assembled just two Speedsters on the 993 platform, one for favorite son F. A. Porsche and the other for longtime friend and supporter Jerry Seinfeld. The company skipped the 996 entirely. Oliver Herting, product manager for the 911 range within Exclusive, explained the inspiration for the new car to *EXCELLENCE* magazine's Ian Kuah: "The Speedster project came out of a discussion on what we could do as a follow-up to the Sport Classic, particularly with an open car." Faithful to all of its predecessors, the car carried over the manual top and even adopted and updated the twin-hump tonneau that covered the rear of the passenger compartment and the top when it was stowed. Based on the C4 body shell, Exclusive lowered the S Cabriolet body by 1.6 inches and cut the windshield frame height by 2.4 inches. Porsche offered the car either in Pure Blue or Carrara White, with the sales split coming up nearly equal. The car was available to customers in the United States despite receiving the performance-enhancing 408-horsepower-inducing PowerKit, a fact that in the past had excluded American buyers from such offerings.

The 2011 Turbo S arrived next, resetting a calibration on performance expectations for drivers who might never achieve record-shredding lap times on the Nurburgring. The word *subtle* applied again with this model as Weissach's Style Porsche never lost sight of the dictum that great design required great taste and great judgment. Another wag described it as knowing when to lift the pencil. Externally, the S looked only slightly different from and slightly more aggressive than the standard Turbo, with an often indefinable something about it that even cognoscenti sometimes missed.

Taking advantage of the DFI enhancements to the 3.6-liter Mezger block, but essentially doing nothing with either the turbos or the intercoolers while increasing boost from 1.0 to 1.2 bar took horsepower up to 530 throughout the range from 6,250 to 6,750 rpm. With this output and the PDK transmission, acceleration time from 0 to 100 kilometers per hour took a brief 3.1 seconds. Porsche worried that its robust six-speed manual gearbox might struggle with this much, so the PDK was the sole transmission offered. Any lingering weight-transfer and cornering issues completely disappeared with the new car's active engine mounts, counteracting longitudinal and lateral acceleration instantaneously.

To develop Porsche's final offering on the 997/2 platform, its RS 4.0, to reach its four-liter displacement, the racing engineers at Flacht developed a 4.0 for the GT3 RSR and GT R models. For this road version, they plugged the same new crankshaft—with 4-millimeter-longer stroke, at 80.4 millimeters—into the production-bound engine derived from the already bored-to-the-max 3.8-liter split case. Along with this milestone displacement came milestone power output reaching an even 500 horsepower at 8,250 rpm. The Carrera RS 4.0 profited as well from decisions made by

Reluctant to match its 530-horsepower twin-turbo 3.8-liter engine to any of its manual gearboxes, Porsche chose to connect it only to the PDK. This made for excellent acceleration for the 3,494-pound coupe from 0 to 60 miles per hour in 3.1 seconds. *Porsche Archiv*

the same engineers for the GT2RS handling, and it blended the best of bits from the GT2 and the previous generation RS 3.8 models. Porsche manufactured 600 for the world.

THE SEVENTH GENERATION: TYP 991

"We had this idea to lengthen the 911's wheelbase long ago," August Achleitner said, "even before 2006 when we first started investigation into the next car." The longer wheelbase became one of the new car's most controversial changes. "We didn't say exactly 100 millimeters, but it was roughly that number in 2003. That's when we started development work on PDK, and we considered the technical requests from our chassis engineers to make the wheelbase longer." It simply wasn't practical for the 997 and so it was an idea that got filed away.

This was not, however, Porsche's first wheelbase increase. The span increased for the first time in 1969 when engineers added 2.24 inches. During the step from 993 to 996, Weissach stretched it another 3.2 inches, a move that Achleitner and his chassis engineers still consider "quite a good step," he said. "The reason came out of decisions for vehicle dynamics, to make the car more stable, more calm, more precise. But widening the front track was as important to the engineers as the longer wheelbase.

The new 991, introduced for 2012, was immense fun, especially when equipped as an S with PDK and launch control. Four hundred horsepower (or 350 in the base Carrera) accelerated the 3,043-pound S coupe from 0-to-60 miles per hour in 4.3 seconds. *Dave Engelman/Porsche Cars North America*


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Weissach engineers lengthened the wheelbase four inches to 96.5 and widened front track 2.24 inches, both of which changes improved ride and handling and virtually eliminated understeer. The seven-speed PDK transmission allowed engineers to develop a seven-speed manual gearbox as well. *Randy Leffingwell*

"By widening the front track we can support more rolling forces by the struts, and this allowed us to make the stabilizer a little bit thinner and not so stiff. Simultaneously this avoids understeering. So this new car is much more neutral than the 997. And with this new feature, the PDCC, Porsche Dynamic Chassis Control, it's completely another world." Weissach developed PDCC to limit body roll on its larger vehicles, the Cayenne and the Panamera.

"I'm honest here," Achleitner said, laughing, "we had several discussions: PDCC in a sports car? My God, are you serious? We are adapting Cayenne technology to our sports car? Can that be?

"It makes a sports car completely different because it avoids any body roll. By avoiding rolling, we can keep the tire in its optimum position to transmit the maximum of forces to the road in every dimension. So this car is 14 seconds faster around the Nurburgring than the 997, but only four of those 14 come from PDCC. The rest is this longer wheelbase and wider track. It is 52 millimeters wider, so about one inch on each side. The structure takes up part of this number because we needed a little more space for the 20-inch wheels—the whole wheel, its diameter, its depth, to allow it full turning capacity." The Carrera S rode on 20-inch tires, the Carrera on 19s. Those familiar with Porsche's development process knew the engineers set goals or targets and they expect to encounter conflicts along the way.

"The target and the conflict," Achleitner continued. "One of these. Bigger wheels have a lot of disadvantages. They need more space; they are heavier. When we started the development, our chassis guys came to me and said, 'We want to install twenty-inch wheels.' And I said, 'Well, okay, but first, go home and make a comparison between advantages and disadvantages. Because there are a lot of disadvantages.' But finally, the number of advantages was bigger than the disadvantages because we can transmit more forces because of the bigger contact patch and we can reduce the tire pressure because the possible tire load is higher with these tires than it is for the smaller tires. This is another small step not only to make the car faster but to make it more comfortable."

Tire, road, and wind noise intruded into the 997 cabin, but it became an issue too late for Achleitner's development engineers to fully address it at that time. It involved chassis and tire engineers, aerodynamicists and body designers, and the interior group. It was another target conflict that provided an unanticipated opportunity to heighten the driving experience for buyers.

"It was not a target from the start," Thomas Wasserbäch explained. He was general manager for 991 base engine development. "The new car is so much more quiet. Less tire noise, less wind noise. And by reducing these noises there was some space left in our ears for the engine noise we wanted to hear," he said. That led to the Symposer, a joint development between Porsche and the Mann+Kummel Group in neighboring Ludwigsburg. Their multichamber module transferred acoustic pulses from the air intake through a funnel-like opening that housed a tuned membrane.

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A new roofline adhered more closely to the 911 body shape as Michael Mauer's exterior stylists worked to reduce the difference in appearance between closed and open cars. Convertible top engineers inserted a slim composite panel between cloth layers above the seats to better hold the roofline shape. *Porsche Presse*

“From there we ran a tube to the steel bulkhead at the rear of the passenger compartment,” Wasserbäch continued. “We developed a new exhaust system that merged the exhaust gas for all cylinders in a new manifold—in the past our Boxer engine sounded like two three-cylinder engines. The new system sounded like there are six cylinders, and we ran a tube from there as well. That steel bulkhead became the subwoofer for our exhaust system. And our sound is mechanical, not synthetic; outside the car you heard exhaust. Inside you heard intake and engine. The sound Symposer brought outside sound in. And incidentally, you could deactivate it if you wanted a quieter ride by pushing a switch on the console.”

The 991 represented a fresh start with countless opportunities. With the 997, stylist Grant Larson sketched bigger tires onto his concept drawings and this sent chassis engineers back to their computers to redesign and strengthen rear structure and suspension to handle the additional stresses the larger tires introduced. The 991 emerged differently, and in the end only a few internal pieces of the direct fuel-injection type 9A1 Carrera and Carrera S engines survived the transfer process.

“In the structure of the 997 we started with the 996,” August Achleitner said. “Of course we modified it, tire sizes, and so on, into the 997. But the structure basically was the same. Over time we had to reinforce it in several locations, sometimes just to make it suitable for all these crashes that were required. But then the car began to go away from its optimum. You can do it for one generation, maybe for a second one. *Maybe*. But then it’s over.

The Carrera S delivered 400 horsepower from its 3.8-liter engine while the base Carrera developed 350 from 3.4 liters. The Cabriolets began to reach customers in early 2013. *Porsche Presse*

"You have to throw it away and take a clean sheet of paper," he went on. "Now you have to make a development for the next six or seven years, as long as you know the requirements for the structure." Engineers understood there would be 21 variations of this car. Long-term requirements influenced the design and development of the controversial electronic steering.

"We looked at every system out there," Michael Schätzle explained. Schätzle was project manager for the complete 911 product line. "We didn't like anything we drove. So we started from scratch. And that gave us the freedom to develop our own parameters, to address the way Porsche 911 drivers use their cars." The new system employed a vehicle status sensor that constantly calculated forces impacting the steering rack-and-pinion from road and steering wheel inputs, such as steering angle and vehicle speed. The sensor interpreted these data and sent a calculation to an electric motor on the steering rack that applied appropriate steering torque by means of toothed belts and a recirculating ball. Steering feedback, crucial information about road surface and driving conditions, came to the driver through the steering wheel.

The new 991 benefited profoundly from predevelopment. Dr. Heinz Soja arrived at Porsche in 1999 and helped establish the group that now tackles all things technical for any new vehicle. As each phase of vehicle development reached "freeze," the moment at which specifications, designs, innovations, the appearance, the options, were set, the new ideas that each engineer and designer had devised went back into their desks to be retrieved when they started considering the successor. For Soja and his team of 70 engineers, these became the technical columns that defined the new car.

"We looked intensely at our competition," Soja said. "In this case, that even was our 997. And we asked 'What are the mistakes in these cars?'" Porsche's new motto, "Intelligent Performance," was more than a catchy phrase. For the engineers at Weissach it was a guiding philosophy they used in reaching the primary target for any new 911: it must be faster than its predecessor. Every target seemed to come with a conflict. To be faster required more horsepower from a larger, heavier engine that used more fuel; better performance required a lighter-weight automobile, perhaps made from more expensive materials.

STEERING ELECTRONICALLY

Porsche engaged its longtime development driver Walter Röhrl repeatedly in developing the new car. It was Röhrl who posted the 991's 7:40 Nurburgring lap time. Nowhere was his input more important than with its new E-steering system.

"We spent five days developing the steering on the handling course at Nardo in southern Italy," he said. "Then the engineers went back to Stuttgart and worked on parameters. One test we gave very much attention was driving in snow. Sometimes when you drive fast in snow you need to turn the wheel very rapidly to control the car and the system must keep up but not overcontrol it." Holding an imaginary steering wheel in his hands, he snapped his arms to opposite lock. "They worked on that. Then we just spent three more days at Nurburgring. That was all it took to make it perfect. One thing the E-steering does is makes driving less fatiguing by filtering out minute road imperfections.

"Our biggest challenge with this new system," Achleitner recalled, returning to the question of long-term development, "was finding a motor that was small enough, light enough, and powerful enough to accommodate forces acting on the front wheels of the 991 GT3 RSR when it bumps the curbing at 200 kilometers an hour."

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As design director Michael Mauer admitted, the harder character line changed the 911. With that emphatic crease, it suddenly became acceptable to introduce subtle (always a watchword with 911 styling) edges in other places. *Randy Leffingwell*

"One of our early questions," Soja explained, "was to determine if aluminum was the lightest-weight solution. We built an entire car in aluminum. And we learned it was not lighter and it was more costly. So we settled on the concept of a multimetal car. We had lots of ideas. We calculated and tried every one. The most important ones went to actual hardware. We tested our technical innovations on 997 mules. The skin, to save weight, was 45 percent aluminum. Structure came from a variety of high-strength steels, and where we integrated functions, we designed them so they met on die-cast magnesium.

"We knew this car would be raced. Racers need a very stiff car to steer very exactly. But what also is important is extreme light weight. We talked with motorsports often. These considerations became part of our technical columns. They formed the car. The designers shaped the car around the technical columns."

The shape is one of the greatest challenges to creating a new 911. Somewhere in the world, dictionaries must illustrate the word *icon* with a silhouette of the 911. One definition of the word was "an important or enduring symbol."

"The roofline was inherited from all the 911s that came before," Matthias Kulla said. Kulla was the general manager for exterior design at Porsche. "The only thing we could do," he went on, "was to adapt it to the different proportions of the longer wheelbase. We tried to shift the weight point a little further back, not so far forward as the older ones. It started with the windscreen. It was an aerodynamic consideration to have a 'faster' windscreen. So we left the end where it was, but we pulled the foot of the windscreen forward 70 millimeters, nearly three inches. I think it was the roundest in the industry."

Working for design chief Michael Mauer, Kulla, and ten studios of designers, clay modelers, computer wizards, and studio engineers, had created the latest Cayenne, Panamera, Boxster, Cayman, the 918, and now the 991. Mauer challenged his entire staff, devising an internal competition for concepts for the new 911.

"What happens at first, people have a lot of respect for the car," Kulla explained. "They say, 'Oh, it's the 911. We shouldn't change it.'" He recited the competition rules: "First, don't be afraid. Be brave. Second thing, don't exaggerate. Third, make it modern."

One of the car's more distinctive new forms was its rear character line. "The back end character line appeared on a single sketch," Kulla recalled. "And this was where I thought, okay there will be discussions."

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"The roofline is inherited from all the 991s that came before," Matthias Kulla, exterior styling boss, explained. The longer wheelbase allowed stylists some creative options and a slight edge appeared in headlight lenses. *Randy Leffingwell*

“This was very controversial.” Michael Mauer explained recently. “Because it gave the car, how should I say it, a harder character?” Another line, an edge that stirred discussions, was the roofline that started at the A-pillar. It accentuated the roof, made it look longer, and finally it descended to the rear and formed an elegant sweeping crease around the new, smaller taillights.

“We had gigantic tail lamps for what, 30 years?” Kulla asked. “So we decided to make them as small as possible, as low as possible. That was actually the reason for the reflector down low. If we had to include that function in this light, it would have made it 10, 15 millimeters taller. It was vertical once, actually. Which was interesting!

“Every single surface inside every lamp was done in the studio, not by the engineers, and not by the suppliers. This is design work. Because they don’t know how to handle the surface contours like we do. So we gave them a set of data, they ran tests and the simulations, and they gave us feedback so we can correct our lines. And this took place 20, 30 times.

“For the longest time we have had a really soft-sloping rear on the 911,” he continued. “You probably understand that there are not many areas where we can really make a big step. So it’s always in the subtleties.” There was that word again. “Those are the things that turn a nice car into a really good one. We worked very closely with the engineers and the toolmakers. All these little details made this by far the most precise 911 ever in terms of execution,” Kulla added.

“I look at this car in beautiful light,” Mauer said, “and I think, ‘Oh, damn. It will be tough to improve on that one.’”

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As typical with all-wheel-drive 911 models in the past, Weissach engineers widened rear track, by 1.65 inches in this new model, with rear fenders flared 0.87 of an inch beyond normal. The Porsche traction management system, PTM, maintained the balance between front- and rear-wheel drive, making decisions in 0.1 second. *Porsche Archiv—Photo by Dieter Landenberger*

What was the toughest improvement for Achleitner and his engineers to make advancing from 997 to 991?

"For me, it was quite clear. It was the reduction of weight," Achleitner admitted. To resolve the conflicts between efficient consumption and performance, he knew they had to reduce the weight. If not, they needed more horsepower, which was in conflict with the targets for consumption. From the start, he had his engineers calculating weights. This was done without the parts on the table but from designs still in a computer. Out of these efforts, they all concluded—no matter how many times they calculated the weight—that the car was heavier.

"We did two or three workshops without the parts. And then again a workshop with the parts, the prototypes, and we made many comparisons. Even using motorcycle parts! In the end we found that our colleagues had some 'reserves.'" At this, he began to laugh: "Everyone had some small 'reserves.'

"And we put the first car on the weight station, the first car made from the pre-series where the parts are coming from the final tools. . . ." He laughed again. "The car was lighter than we calculated. This was a very, *very* happy moment. And this was without exotic materials. Only with aluminum. Steel. Some magnesium parts."

Lightweight parts filled the updated engines. These were all new for the 997 and substantially changed for the 991.

Depending on traction that the car's electronics sensed, power shifted from 100 percent at the rear axle to all at the front. A new system, standard on C4s equipped with PDK, was adaptive cruise control, called Active Safe, which reacted to closing distances suggesting a collision. *Porsche Archiv—Photo by Dieter Landenberger*

"For the 997 these were the first developments," Thomas Wasserbäch explained. Like his colleagues, he constantly developed ideas for the next-generation car. With them written down, when that project materializes, everyone knew exactly what they wanted to do. "We wanted to bring the engine speed of the GT cars to the serial production; it was our idea to lift the speed 300 rpm more. But to do that, you have to make it a little lighter in the drivetrain," he said.

"We learned it was better to make some mounted camshafts very exactly, to make the tribology, the interplay of friction and lubrication, better. So the friction goes down. That was another idea," Wasserbäch added. "This would improve fuel economy *and* performance.

"Our oil pump is a variable oil pump," he continued. "We saw when we optimized the electronic application, the oil pressure was better; it improved on racetracks. So we retuned our system and we had lower oil pressure on the road when you drove on the highway in normal conditions. And when you went on the racetracks, the oil pressure came up." Since they had forces of 1.3 or 1.4 G lateral acceleration with the 20-inch wheels, they had to provide a system for the engine to serve those needs as well.

"It truly can be a car with two characters. It's always a special engine for this car. Its optimums you see in the packaging. There is no free space! The engine is optimally configured for this car.

"You always must have ideas because it never ends," Wasserbäch said. "In the next generation you have to look for how you can increase performance again and drop fuel consumption and emissions more. So you need ideas. Our aim is that in the future, Porsche always has flat six-cylinder engines on the market. We know we have to hold onto the flat six."

Journalists reported that the additional front-drive hardware imparted more feeling to 991 C4 steering. This addressed a sense some writers expressed that the new electronic steering lacked some of the feedback present in the previous hydraulic system. *Porsche Archiv—Photo by Dieter Landenberger*

C4 models were made for this, or for weather or surface conditions that were worse. Experience gained improving off-road capabilities of the Cayenne, as well as those managing the power and performance capabilities of the most potent Turbo models, improved all-wheel-drive hardware and software on the new 991 all-wheel-drive models. *Porsche Archiv—Photo by Dieter Landenberger*

The engine for the 991 Carrera, still 3,614cc displacement, developed 350 horsepower at 7,400, while the S engine, at 3,800cc, turned out 400 at the same engine speed. Both the 991 coupe and cabriolet achieved their best acceleration times with the seven-speed PDK—making the 0 to 100 kilometer-per-hour run in 4.6 for the Carrera and 4.3 for the S. With Sport Chrono Plus, it was possible to shave another 0.2 seconds off each acceleration time. The new seven-speed manual, based on the seven-gear PDK, provided the greatest top speed potential, taking the S up to 189 miles per hour and the Carrera to an even 180.

The cabriolet, introduced in the fall of 2012, provided equally sensational performance, achieving another of Porsche's targets—to close the gap between closed and open car capabilities. Another target for Style Porsche staffers was to further improve the looks of the cloth top when it was raised. With this convertible, the look was nearly Speedster-like as the arc from windshield to rear deck lid was the smoothest—and most reflective of the coupe lines—yet. The tendency to use magnesium in the convertible top systems went further with this new system, as not only the front frame, but also the panel bows were die cast from the lightweight metal.

Conscious decisions in spring and damper rates—meaning using exactly the same ones in the coupe and the convertible—provided slightly softer handling and slightly more understeer for the open car, a combination that Porsche learned over nearly thirty years of convertible production fit its open car buyers comfortably.

Porsche followed along in its now-traditional path and introduced the Carrera 4 and 4S models at the end of 2012 for sale throughout the world as 2013 models. The carefully planned proliferation of models included 991 GT3 introduced at the Geneva show in March and a 2013 Fiftieth Anniversary model and Turbos throughout the year

Driver Jo Schlesser and navigator Robert Buchet won the final stage of the 1966 Monte Carlo Rally. They finished second in GT class behind another Porsche 911. *Porsche Archiv*

CHAPTER FOUR

RACING THE 911

The 911 and the 904: On the left was the race-legal road car and on the right was a road-legal race car. Especially for international rallies, such as the Monte Carlo, these two models often competed together but in different classes. *Porsche Archiv*

It was inevitable. As soon as the new Porsche reached its customers, they felt the urge to test it, to compare it against the other makes out there. Neither the factory nor privateers wasted much time. Barely four months after production and deliveries began in September 1964, Peter Falk and Herbert Linge ran a factory-prepared 160-horsepower 911 on the Monte Carlo Rally, starting from Frankfurt on January 15, and finishing in Monaco on the 20th. From the start, they kept pace with another Porsche entry, a 904GTS, with Eugen Bohringer driving and factory racing mechanic Rolf Wütherich as co-driver and navigator. When the results were tallied, the Bohringer/Wütherich 904, No. 150, finished second overall and the Falk/Linge 911, No. 147, came in fifth, giving the new model its first international class win.

Ferry Porsche liked his cars competing in rallies. The multi-day events usually drove through several countries and brought attention to the cars from spectators and newspapers. To anyone with doubts, events such as the Monte, the Liège (Belgium), Rome-Liège, and other long-distance runs demonstrated the versatility of these cars and their durability and tractability on hard pavements as well as on dirt, ice, or snow.

The next year, Günter Klass and codriver Wütherich took first in the German Rally and first in the GT class on the Alpine Rally, and they finished well enough through the season to win the Group 3 European GT Rally Championship for 1966. Porsche 911s first appeared at Le Mans in 1966 as well. French distributor August Veuillet, founder of SonAuto, begged Zuffenhausen for cars to race and Ferdinand Piëch sent a prototype 911S for the 24-hour endurance run. Drivers Jean Kerguen and Jacques Dewez finished 14th overall, covering 2,369.3 miles averaging 98.7 miles per hour.

They stayed clear of the Ford GT/Ferrari battles and won the under 2.0-liter class. Dewez drove it from Veuillet's dealership in Paris to Le Mans and back after the race. To prove this was not some fragile prototype, Veuillet put it on sale in his 16th Arrondisement showroom on Rue Paul Valéry the following morning.

The company had long supported hillclimbs as well, and since the inauguration of the European Hill Climb Championship in 1957, Porsche cars and drivers had won the outright title in either Sports Cars or GT every year since. These uphill sprints not only earned newspaper space, but also provided engineers opportunities to explore extremes of power development and weight reduction. Eberhard Mahle won the GT class championship in the seven-event series driving a factory-prepared 911 in 1966.

Across the Atlantic, in early February at Daytona during the first race of the International Sports Car Championship season, Jack Ryan, Linley Coleman, and Bill Bencker finished 16th overall and first in two-liter GT class. This was the car's first significant North American victory. They took second in class at Sebring six weeks later.

In southern California, former Porsche racing mechanic Vasek Polak had become a Porsche dealer, but he never lost his roots in or love for competition. Polak teamed up with Jerry Titus, one-time jazz trumpeter–turned-mechanic-turned-racer-turned–*Sports Car Graphic* magazine editor. In 1966, Titus drove a Polak-prepared 911 to win the Sports Car Club of America (SCCA) D Production national championship.

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On the Rossfeld hillclimb in 1966, Eberhard Mahle drove this 166-horsepower 911 to victory. At season end, he placed first in the European Hillclimb Championship. *Porsche Archiv*

THE 911S AND THE 911R

Two new models arrived for 1967 that sharpened the competitive edge for many 911 racers. The S entered dealer showrooms as a high-performance production model that many buyers took out and raced, and a much smaller run of 911R models established a pattern for special racers to come from Zuffenhausen for the next half century.

Ferdinand Piëch, who ran the company's *versuchabteilung*, or experimental department, developed the R (for *rennen*, or race) to determine 911 performance maximums and weight minimums, similar to hillclimb cars but constructed and tuned for endurance events. Compared to the fully equipped 911S, the R weighed 502 pounds less, at 1,764 pounds. Compared to the standard S 160-horsepower engine, the aggressively massaged R engine developed 210. Piëch was less interested in producing the car than learning from it, but racing and press chief Huschke von Hanstein imagined broader enthusiast interest and he worked to convince marketing and sales that Porsche could sell as many as 500 of these cars. They never agreed.

After working through a series of four development prototypes during 1967, Piëch commissioned 20 preproduction cars from Karosseriefirma Baur, Karl Baur's body manufacturing operation in Stuttgart with a reputation for uncompromising quality. Baur and Piëch left the basic 911 steel unibody unmolested, recognizing that its inherent strength was crucial for any race car's handling. But Baur skipped body undercoating. It replaced steel body panels with thin gauge fiberglass for the front fenders, front and engine deck lids and bumpers, and doors. Baur used aluminum hinges

Porsche provided a 911R for Nurburgring medical crews to use during the 1,000-kilometer race. With its four tires off the ground, it's likely the M-car driver was Porsche racer and test driver Herbert Linge. *Porsche Archiv*

on doors and deck lids. The exterior door handle was plastic, as was the T-handle used inside. Side and rear windows were extremely thin Plexiglas, and the windshield was half as thick as a production version. Dozens of other tiny features differentiated the R from production S models. For months racing mechanic Rolf Wütherich had a full-time job drilling holes everywhere to eliminate extra grams of weight.

Once the car was lightened, the engine was the next crucial element. Frustration with the performance limits of the twin-fan Typ 745 flat six led engineers Hans Mezger and Piëch to develop the production 901/01 engine and its racing version 901/20 that used a magnesium crankcase and saw most use in the 906 race cars. The engineers evolved a special version for the R, 901/22, using aluminum cases and feather-light titanium connecting rods on its forged steel eight-main bearing crankshaft. To create the 1,991cc displacement, Mezger specified 80 millimeters bore and 66 millimeter stroke. A dual-spark plug ignition helped achieved the high horsepower output. Engineering choices for high-speed racing gave the engine radical camshafts with extensive lift and overlap between intake and exhaust open and closure. Another choice, the large Weber 46 IDA 3C carburetors, used short throttle arms that made accelerator pedal throw extremely quick. The car was meant for flat-out driving. Weissach finished assembly of the 20 Rs in fall 1967, making them 1968 models with appropriate serial numbers.

Because “preproduction” and production ended with the 20 cars, it remained a prototype during its competition career so the company used it most in rallies and endurance events where its rarity was no drawback. In August 1967, drivers Vic Elford, Jochen Neerpasch, and Hans Herrmann won the 84-hour Marathon de la Route around the Nurburgring in a 911R with the Sportomatic transmission. The Marathon relocated the former Liège-Rome-Liège rally off public roads as speeds grew too high to ensure public safety. Two months later, a marathon of a more private sort engaged factory driver Jo Siffert and three colleagues, Dieter Spoerry, Rico Steineman, and Charles Vogele. The four drivers launched an officially FIA-authorized distance record attempt in a long-tail 906 that Siffert and Spoerry owned, circling the oval track at Monza. But the old concrete surface on the high banks broke their race car’s rear suspension, and when they called Zuffenhausen for help, Piëch dispatched 911 R-001 and 002 to the rescue. Loaded with spares, 002 went on ahead while engine chief Paul Hensler, chassis boss Helmuth Bott, and testing director Peter Falk supervised a few changes and upgrades to 001, including replacing the engine and fitting two identical fifth gears, one in the fourth cog position anticipating that days of wear might fatigue the other.

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Codriver Jochen Neerpasch settled into one of the three 1968 911R models that Porsche entered in the 1967 Marathon de la Route at the Nurburgring. He shared driving duties with Vic Elford and Hans Herrmann to win the 84-hour trial in this R equipped with the Sportomatic transmission. *Porsche Archiv*

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The Tour de Corse in November 1966 was Vic Elford and co-driver David Stone's first experience rallying in a 911. They adapted well, winning the under 2.5-liter GT class. *Porsche Archiv*

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Around and around they went, four Swiss drivers challenging a collection of distance records in October 1967 on Monza's banked oval circuit. With extensive factory support, Jo Siffert, Dieter Spoerry, Charles Vogele, and Rico Steinemann set five world and 11 European records in an already-tired 911R. *Porsche Archiv*

At the end of 96 hours, the drivers finished their 20,000th kilometer and had established five new world and 11 international records in the process. During the entire time, Hensler was on edge because as they left Zuffenhausen for Monza he learned that the engine he had chosen for installation was not a fresh rebuild as he believed but one that just had finished a 100-hour bench test. That engine got them to Monza, sped the four drivers around it for four days, and powered the car back to Stuttgart for celebrations. Such accomplishments helped build the legend of the R models and set the stage for the production-based 911 racers that followed.

To many American racing enthusiasts, 1967 will remain the year that a great episode of creative writing changed Sports Car Club of America (SCCA) competition rules. It had the fine hand of racing manager Huschke von Hanstein all over it when the SCCA reclassified the 911 as an under 2.0-liter sedan. This interpretation allowed 911 racers to enter the one-year-old Trans-American Sedan Championship, a series with a class each for engine displacements greater and less than two liters. The judgment stunned Alfa Romeo, BMW, and Ford Cortina owners. It became a significant decision to Porsche because the SCCA established the Trans-Am as a manufacturer's championship, awarding the cars and not the driver's finishing points. This presented the winning carmaker significant advertising advantages among enthusiasts. Alfa had won in 1966; Porsche (in particular, Peter Gregg in a Brumos-prepared 911) took the title in 1967.

As 911S production passed 500 and then 1,000 units, Porsche homologated the coupe as a Group 3 Grand Touring racer. It did the same with the lighterweight 911 T model. Fitted with the S engine tuned to 170 horsepower, lightened body panels, and sport seats, these models weighed

in at 2,031 pounds. Many of the special engine and chassis parts developed for the R and the 906 race cars ended inside, on, in, and underneath these lighter models. Some of these cars became known as ST models, although Porsche used that designation officially a couple years later. Other variations including 1968 911L models with S or R running gear and T models with R engines and drivetrains, the 911TR models, were factory-invented and/or factory-encouraged cars for rallies throughout Europe.

No one inside Porsche doubted the value of extensive road and endurance testing, and it's likely that by the end of 1968, any manufacturer who was not following such a regimen regularly lost to 911 models. Even for some of its drivers, this reliability initially stretched their faith.

Vic Eford had signed on to drive a factory 911 at the Tour de Corse. When the car arrived, on an open trailer behind a van, Elford met von Hanstein and had a look inside the van. It was filled with tires and wheels.

"That's great. Car looks great," Elford told him. "But where are the spare parts? And Husckhe said, 'We don't have spare parts. Porsches don't break.'"

It didn't and Elford finished third overall.

A loophole in the British Saloon Car championship rules, perhaps inspired by the allowance in Trans-Am, classified the 911 as a saloon, and Elford won two of the series events in two-liter class while Dutchman Toine Hezemans claimed second in another of the series contests. In April at the Monza 1,000 Kilometers, Dieter Glemser and Helmut Kelleners finished eighth overall to win two-liter GT class in a 911T with 911s in three of the next five spots. A month later, another 911T won two-liter GT in the Targa Florio, the highest finish of any production-derived car. Two weeks after that, another T took two-liter GT honors at the Nurburgring 1,000 Kilometers, then again at Spa a week later, and again at Watkins Glen in mid-July with Peter Gregg and Bert Everett in a 911T. Everett won the 1967 Trans-Am two-liter title in his 911T for Porsche.

From its earliest days, Porsche used racing to test its engineering and to promote its products. The 84-hour Marathon at Nurburgring became particularly useful because it occurred in August, just before new model release. The 911 for 1969 introduced several innovations, including a longer wheelbase and a load-leveling hydro-pneumatic front suspension from Boge meant to be standard on the 911E (fuel injection) models. While the official entry listed Porsche's three Marathon entries as 911E models, they were more highly developed GTS models on which engineers and mechanics had replaced everything possible, even as obscure as steel headlight buckets, with identical structures fabricated out of paper-thin aluminum. Impossibly complex rules required each car to carry

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The 1968 London-to-Sydney Marathon was perhaps one of racing's most ambitious and audacious events, spanning four continents and 10,000 miles. Polish rally veteran Sobieslaw Zasada, who headed a private Porsche effort in cars prepared for battle against kangaroos and other wildlife, finished fourth overall. *Porsche Archiv*

its spares (except for gas, oil, and tires) and any necessary tools in the car. Pit stops for work were permitted only at prescribed times that did not allow fuel and tire changes. Drivers were allowed to stop along the racecourse to effect repairs if they were capable. Entrants developed a routine in which ailing cars limped to the pits but not into them, parking alongside the track. Drivers made repairs from instructions that mechanics shouted to them from the other side of the pit wall, a few feet away. Two of the three 911GTS entries finished first and second, and winning co-driver Herbert Linge commented decades later that his lasting memory of that endless race was that the hydro-pneumatic front suspension was far too soft. “On down hills and in braking,” Linge explained, “at night the lights pointed at the ground a few meters in front of the car. Accelerating or going up hills, the lights shined the tops of the trees. I could never see where I was going.”

The 1968 season ended with the September running of the 24 Hours of Le Mans, delayed from its typical June date by student and then civil unrest throughout France. Two Belgians, Jean-Pierre Gaban and Roger Vanderschreik, finished the season-long International Championship for Manufacturers by taking a two-liter GT class victory in their 911T. This along with outright wins in 907 and 908 models put Porsche in second behind Ford’s GT for the manufacturer’s championship but first in the Grand Touring trophy.

The starting line for the Spa European Touring Car race in July 1968 resembled a starting grid photo for Sports Car Club of America Trans-Am events. Erwin Kremer, Helmut Kelleners, and Willi Kauhsen won the race in a 911L. *Porsche Archiv*

The Le Mans 24-hour race and even the Marathon's 84 hours were barely warmup events to 1968's longest slog, the 10,000-mile London-to-Sydney Marathon. Departing from London on November 24, the route took three heavily modified 911s and 57 other entrants through Paris, Turin, Belgrade, Istanbul, Tehran, Kabul, and Delhi to Bombay, where the teams sailed to Gloucester Park, Australia, for a final 2,600-mile run to finish in Sydney. The Zuffenhausen race shops prepared three private entry 911s, drastically lightened and intensely reinforced with internal roll cages and external wildlife and brush bars. European Rally champion for 1967, Polish driver Sobieslaw Zasada, and his codriver Marek Wachowski finished third overall, taking home a prize of £3,000 rewarded by the London *Daily Express* and Sydney *Daily Telegraph* newspapers, who had jointly sponsored the event.

While Porsche suffered durability problems with its 908s during the 1968 season, racing mechanics eradicated those conditions and also launched a new entry, the 917 for 1969. For the 911s, the slightly longer wheelbase, the magnesium crankcase and transmission house, and hundreds of other modifications and improvements led to another season of racing and rally successes. Americans Tony Adamowicz and Bruce Jennings started the year with a two-liter GT

OUTLAWING THE SEDAN AND WELCOMING THE SPORTS CAR

Dissent within SCCA ranks led to several changes in American racing at the end of the 1969 season. While Porsche took the under two-liter Trans-Am title for a third year in a row, entreaties from the other manufacturers resulted in the SCCA (and FIA for European events) reclassifying the sedan as a sports car. But that was only the tip of a large iceberg that supported SCCA director John Bishop's frustrated departure and the organization of a new International Motor Sports Association (IMSA) with Bill France. France had founded National Association of Stock Car Auto Racing (NASCAR) as an organization of racing drivers, not manufacturers. For 1970, Bishop and IMSA promoted a new series for FIA Group 2 and Group 4 cars, providing a North American home for the entrants that SCCA had disqualified.

Claude Ballot-Léna and Jean-Claude Morénas took fourth overall and first in GT 2.0 in the 1969 Tour de France de l'Automobile. Paris distributor SonAuto entered this and a second 1969 911T that finished third overall and first in Special Touring 2.0. *Porsche Archiv*

victory at Daytona, finishing fourth overall. Gerard Larrousse, André Wicky, and Jean Sage took two-liter GT honors at Sebring in 12th overall; another followed at Monza with Dieter Froelich and Jürgen Neuhaus and still another in the Targa driven by Everardo Ostini and Gianpiero Moretti, again at Spa with Larrousse, and then at the 'Ring with Froelich and Neuhaus, all in 911T models. At Le Mans, Jean-Pierre Gaban and Yves Deprez finished tenth overall and first in two-liter GT in a 911S, as did Peter Gregg and Hurley Haywood at Watkins Glen in another 911S. The season ender at Österreichring saw Herbert Linge and Roland Bauer wrap up the Grand Touring Trophy in a factory 911T. With victories in Porsche's ultra-reliable 908/2 Spyders and 908L coupes, the World Manufacturer's Championship went home to Zuffenhausen, and team driver Jo Siffert claimed the driver's title.

WHAT'S IN THOSE LETTERS? TRY PERMISSION TO RACE!

FIA. FISA. CSI. WCM?

The AIACR started it all. A group of racers and racing promoters established the Association International des Automobile Clubs Reconnus (AIACR), that is, the international association of recognized automobiles clubs, in June 1904. This group approved and sanctioned European automobile speed events until immediately after World War II, when, in 1946, it changed its name and reorganized as the Fédération Internationale de l'Automobile (FIA). In 1953, the FIA created the World Sportscar Championship (WSC) as a points race series for manufacturers throughout the world. The WSC evolved into the nearly forgotten International Championship for GT Manufacturers (starting in 1966), which in 1972 had become the World Championship of Makes (WCM). The WCM opened its arms in 1976 to include Group 5 Special Production cars, such as Porsche's 935, Group 4 Grand Touring cars, including the 934, and a prototype category that arrived at the last minute in 1976, called Group 6. This accommodated carry-over open prototype sports racers such as 908/3s and Ferrari PBs that separately was labeled World Championship for Sports Cars. That lasted only through 1977.

The FIA had hoped to tame the excesses of 235-mile-per-hour Porsche 917s and InterSerie 917-30s with 1,000 horsepower in 1973, and it tried again in 1982 after years of Porsche 935s topping 220 on Mulsanne. The FIA ended the Group 5 classification and replaced it with Group C, oriented toward fuel consumption.

Throughout all this, there also existed the Fédération International de Sport Automobiles (FISA). This group grew out of a 1922 decision by FIA directors to delegate automobile racing organizations to an autonomous committee known as the Commission Sportive International de la FIA (CSI). In 1978, CSI reorganized and became FISA.

In 1993, the FIA board of governors restructured the organization and eliminated FISA, returning all racing to direct management from the FIA.

Then there was FOCA, the Formula One Constructors Organization. This group battled FISA for supremacy in virtually every decision relating to Formula One (F1) racing from the mid-1970s until 1981, when both sides accepted the terms of the Concorde Agreement, a truce that lasted until 1987.

During this time, while Porsche developed the successful TAG engine for McLaren F1 racing, the 911 had nothing to do with Formula One. However, Porsche continued to work within the rules and regulations issued to it and other competitors from the FIA.

While one set of Porsche's racing mechanics, drivers, and engineers concentrated on campaigning the 917, another group introduced the highly evolved 911 ST model with very thin gauge steel for the rear quarter panels, roof, and rear seat pan. Countless extraneous parts fell away as engineers and mechanics weighed ounces of weight and went so far as to manage the paint mixture, decreasing pigment to save a bit more of the load.

Zuffenhausen built the cars for racing or rallies, fitting either 21- or 29-gallon fuel tanks with a large filler cut through the ultra-light front deck lid. Rally customers made good use of the 2,195cc engine, tuned to develop 180 horsepower at 6,500 rpm with reliable performance for days on end. Racers received a slightly bored out (one additional millimeter, from 84 to 85 millimeters) engine that increased displacement to 2,247cc and produced 240 horsepower at 7,900 rpm. This version met FIA homologation regulations for Group 4 Special Grand Touring Cars category. Zuffenhausen mechanics modified 908 brakes for the front wheels of these cars.

At Daytona and Sebring, previous-year specification 911T models acquitted themselves well, with two-liter class wins by Ralph Meaney and Gary Wright for the 24-hours, followed by Peter Gregg and Pete Harrison for the 12. Through the 1970 European season, the two-liter S models won their classes at Monza, the Targa, Spa, and Nurburgring. Starting at Le Mans, class regulations changed, opening the category to maximum displacement 2.5-liter engines in GT and privateers Nicolas Koob and Manfred Kremer took the class win, finishing ninth overall behind the company's first outright win with Hans Hermann and Richard Attwood in the red-and-white Piëch-family Salzburg 917K. From there on, the STs ruled, claiming class wins at Watkins Glen and Austria to seal the Grand Touring Trophy once again.

Porsche prepared several of these 1970 2.2-liter ST models for the Monte Carlo Rally and other events. Björn Waldegård had won the 1969 Monte and went on to win again in 1970 in one of these STs.
Porsche Archiv

Weissach racing engineers prepared this 2.4-liter S for Gerard Larrousse to contest the 1970 Tour de France de l'Automobile. This potent ultra-light S, at 1,736 pounds with 245 horsepower, finished second overall behind a Matra prototype. *Porsche Archiv*

Le Mans and the August Marathon de la Route were interesting events for 911 watchers as Porsche left its customers to campaign the rear-engine models. The competition department, of course, campaigned 917s and the potent 908/3 Spyders for certain events. Sales and marketing promoted the new 914/6 models and at Le Mans, Auguste Veuillet's SonAuto team won the two-liter GT class with a barely disguised factory-supported 914/6GT. The same emphasis appeared at the Nurburgring where Porsche fielded a team of three of the mid-engine GTs for the 84 hours. The effort yielded extraordinary results with a 1-2-3 finish.

One other 1970 event was worth noting in 911 racing history. The Tour de France d l'Automobile was no less grueling a speed-and-distance event than its similarly named bicycle race. Initiated in 1899, four years before the inaugural two-wheel event, it reappeared after World War II in 1951. The Tour generally constituted half a dozen road course and hillclimb timed events linked by transit stages over open roads that often were timed as well. Porsche had homologated the S for racing in Group 4, the special GT class, and Group 3, the production GT category at 1,848 pounds. The Tour, however, was more wide-open because it was in the FIA Manufacturer's Championship, allowing truly special GT cars. For Gerard Larrousse, the factory set a benchmark, making a car even lighter than 911 R models. Larrousse offered a challenge: once engineers had gotten the car to 800 kilograms (1,760 pounds) on the scales, he offered them a bottle of champagne for each additional kilogram they could eliminate. He delivered nearly a case; they pared away an additional 11 kilograms, taking overall weight to 1,739 pounds. As Porsche engineer/racer/historian Jürgen Barth characterized the car, "This was the lightest 911 that kept the standard floor pan and running gear."

"That's great. Car looks great. But where are the spare parts? And Husckhe said, 'We don't have spare parts. Porsches don't break.'"

— Vic Elford

With fuel from Shell and whitewall tires from Sears, Zobieslaw Zasada attacked the 1971 Africa Safari Rally in this 2.2-liter S. Zasada and co-driver Marian Bien finished fifth overall in the highest-placed Porsche entry. *Porsche Archiv*

Standard running gear included a highly modified engine bored and stroked from normal S dimensions of 84x66 millimeters out to 85x70.4. This put total displacement at 2,395cc and raised output to 245 horsepower at 8,000 rpm. Mechanics fitted a hollowed-out muffler to appease event scrutineers. It proved a valiant effort matched by a brilliant drive; Larrousse finished second overall behind a full race-prepared prototype Matra Spyder.

Sobieslaw Zasada, the rally driver who thrived on long, hard challenges such as the London-to-Sydney, had entered the East Africa Safari Rally in 1970 privately. Factory support came in the person of racing engineer Jürgen Barth, who took his holiday to serve as Zasada's mechanic. Entrants departed from Kenya, Nairobi, and rocketed around the backcountry, entering Tanzania, and finishing at its capital Dar Es Salaam. Zasada didn't finish because a rock cracked the crankcase. For 1971, the factory felt the Safari deserved better support and Zasada arrived with a full Porsche contingent of two practice cars, three rally vehicles, spares, and mechanics. Monte Carlo Rally winner Bjorn Waldegård ran in front for much of the event until he and teammate Aake Andersson fell out. Zasada soldiered on to finish fifth. For 1972, Zasada returned, but only with Barth and one of the 1971 team cars.

To handle the brutal terrain, Porsche fitted Bilstein shock absorbers and raised the otherwise unaltered 911S suspension as high as possible. A full-length aluminum skid plate protected the underside of the car. Barth's mechanics supplemented the regular 26.4-gallon fuel tank with a separate 5.3-gallon reserve and fitted three fuel pumps (one as a spare) and duplicate oil lines to a second oil cooler tucked in under the left front fender. The standard 2.2-liter production engine developed 180 horsepower for the Safari, and, as Barth reported, to keep out the incredible dust, "the engine compartment was almost hermetically sealed."

Sponsorships for racing are essential and occasionally they arrive from surprising sources that yield startling visual effects. Predictably, decals for Shell gasoline, Bilstein shock absorbers, Bosch ignition parts, and Cibié lights appeared on the Safari car that used these parts. However, Sears Roebuck, the North American catalog general merchandise chain, wanted to promote its new line of all-purpose tires. Incongruously, the Porsche entries raced through African safari land on white-sidewall tires.

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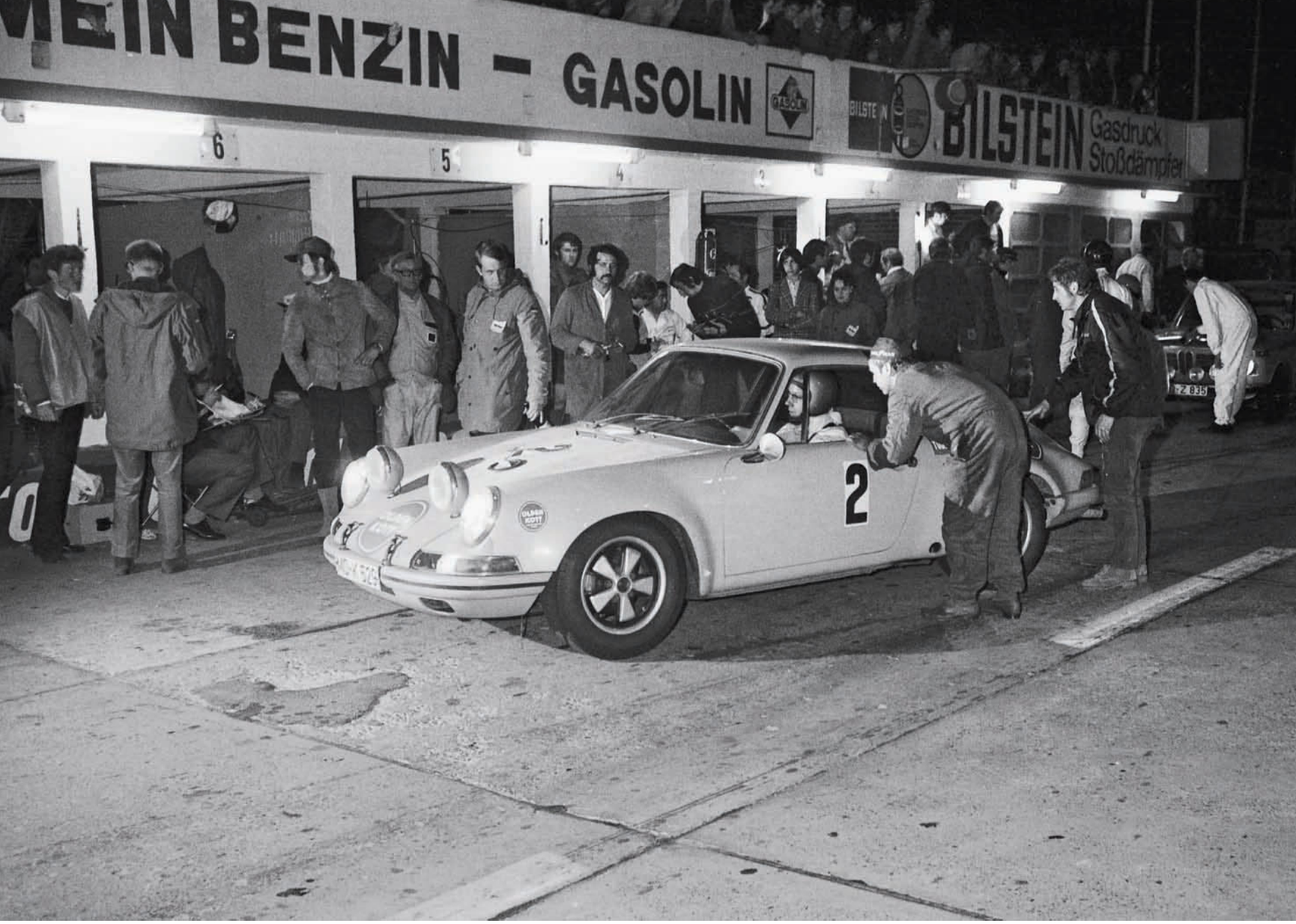
Clemens Schinkentanz, No. 1, led Jürgen Krzikalla, No. 9, around the Norisring 200-mile touring car race at Nuremberg in July 1971. Schinkentanz drove a 2.3-liter 911ST with prototype M471 equipment. *Porsche Archiv*



As the 1972 season began, the racing department turned out something like 21 racing versions and two rally cars as 911 prototypes with 2.5-liter engines, the so-called 911S 2.5. According to 911 racing historian John Starkey, Zuffenhausen developed two versions of the engine. The first, with bore and stroke of 86.7x70.4 millimeters for total displacement of 2,492cc, produced 270 horsepower at 8,000 rpm. The engine, as Starkey reported, "tended to loosen its flywheel bolts or, in extreme cases, break the crankshaft. There was little doubt at the factory that this was totally due to the longer stroke being used." The solution was a new configuration, relying on the previous crankshaft stroke of 66 millimeters inside Nikasil cylinders with an 89-millimeter bore. This created an engine with 2,466cc displacement, but through careful tuning, it matched the earlier engine's 270 horsepower output at 8,000 rpm.

Porsche had used its original Typ 901 transmission until this time, and it was durable, reliable, and distinctive with shift pattern that set first gear to the far left and rearward, reflecting the philosophy that drivers, especially racers, needed first gear only for startup and placing two-three and four-five in the same plane made for a more sensible shift pattern. But with the additional power the 2.4- and 2.5-liter engines developed, stronger gearboxes were essential. This gave Porsche the chance to satisfy the greater number of road car drivers who complained about the dogleg shift from first to second. Engineers designed the new transmission, designated Typ 915, to handle 20 percent more torque than the original transmission. They incorporated a pressure oil pump to lubricate the gears, an improvement over the original splash system. They also reconfigured the gear placement, putting first and second on the same shaft. Fifth gear moved to the far right and forward, with reverse straight behind it.

Nurburgring inaugurated a 24-hour race for touring cars in 1970 primarily for amateur drivers. Taking advantage of the long 15.5-mile North Loop circuit, the event allows 200 cars to start, including, in 1971, this 911S 2.5-liter coupe. *Porsche Archiv*

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After starting 25th on the grid for the 12 Hours of Sebring in March 1972, Peter Gregg and Hurley Haywood headed to a second GT/2.5-class win in as many U.S. starts. The two won their category a month earlier at Daytona as well. *Porsche Archiv*

For 1972 in the States, Brundage Motors in Jacksonville, Florida, much better known by their cable address Brumos, ran Hurley Haywood in a Peter Gregg–prepared 911 ST to win the International Motor Sports Association (IMSA) Camel GT Championship inaugurated that year. While these cars had filled prototype needs, Porsche—and in particular Ernst Fuhrmann, recently returned as chief engineer—was very aware that the 911S no longer was remotely competitive in regional and national GT racing. Responding to a provocative demand from Fuhrmann, young engineer Wolfgang Berger and his bosses, Norbert Singer and Helmuth Bott, tackled the succession of challenges that were keeping Porsche 911 racers from the winner's circle.

THE 911RS AND THE 911RSR

Starting with the burzel ducktail to eliminate rear lift and tame its oversteering tendencies, engineers at the new Weissach engineering center, opened in 1972, made extensive changes to the 911S. What they created became the RS 2.7 Carrera in a lightweight form (known internally as the M471) for racing homologation and a touring form (M472) to satisfy the anxious personnel in sales and marketing. (RS was the abbreviation for *rennsport*, or racing sport.) Porsche manufactured 1,580 of the cars, silencing the cautious sales staff and meeting not only requirements for Group 4, but also for Group 3 competition. Bott assigned Singer, an extremely clever racing engineer, to take the car further, to develop a successful racer for Group 5, a new Special Touring Car category for limited production racers that the FIA announced effective for the 1975 season.

USING GROUP 5 TO PUT ON THE BRAKES

Porsche had blindsided the FIA in 1969 with its Typ 917. The racing organization had watched engine displacements grow as Ford used ever more cubic inches to push its GT40 racers to championships. The cars had topped 200 miles per hour at some circuits, and the FIA felt it was necessary to contain the speed. Starting with the 1970 season, it limited displacement to five liters, expecting that race car makers would adapt and recycle existing engines. They did not expect that Ferdinand Piëch would stretch the three-liter flat-eight of the 908 out to 4.5 liters with 12 cylinders. Nor did they expect Eugen Kolb's sleek 907 and 908 bodies to grow to accommodate such power. And they never expected long-tail versions to hit 235 miles per hour along the Mulsanne Straight at Le Mans. As a result, their next round of rules called for smaller overall displacement for prototypes and an emphasis on, really, a return to silhouette racing, competing in cars derived from production models.

In Weissach's racing department Singer and his group developed a new model known internally as the M491, the Carrera RSR (*rennsport rennen*, literally racing sport racer). They bored out the production M471's RS 2.7-cylinder barrels from 90 millimeters to 92, retained the 70.4-millimeter stroke, and developed overall displacement of 2,806cc. With the 2.7 engine crankcase, crankshaft, and connecting rods; twin-plug ignition; a slightly smaller cooling fan; a front-mounted oil cooler; and 10.3:1 compression ratio, the engine developed as much as 308 horsepower at 8,000 rpm.

For suspension, Singer's group adapted the RS system, adding coil springs surrounding the stiffer front and rear struts, and fitting adjustable anti-sway bars. Brakes came from the 917, with ventilated and cross-drilled rotors, aluminum alloy calipers, and adjustable front-rear bias. They fitted 9-inch front and 11-inch rear wheels inside fenders flared out two inches per side. They relied on an 80 percent lock-up limited slip differential at the rear to get power to the ground. The cars weighed 1,980 pounds and according to racer and racing historian Jürgen Barth, Weissach assembled 57 of the cars plus two slightly heavier versions for the Corsica Rally (at 2,112 pounds with the extra reinforcement, undercarriage protection, and other gear).

Porsche chose Daytona in early February 1973 to debut the RSR, offering Brumos and Roger Penske each a car to run. Since the homologation process moved slowly, the cars ran as prototypes. The race began with a full field of sports racing entries as well as GTs, some 53 cars in all. However, by the halfway point, dozens of cars had retired, leaving the event to the GT cars with Mark Donohue and George Follmer leading in Penske's car. A collection of Ferrari Daytonas, Corvettes, Camaros, and 911S coupes followed, though Peter Gregg and Hurley Haywood in the Brumos-sponsored RSR ran within exhaust-sniffing distance of the Penske entry. At around 5 a.m., Follmer pitted with a problem highly unusual for a racing Porsche: his RSR had holed a piston. This opened the track for Brumos. At the 20-hour point, when a rock shattered their windshield, they commanded a 35-lap lead over the second-place Ferrari Daytona. The Brumos crew, under the direction of "Peter Perfect," as Gregg was known, had rehearsed every procedure, even to changing the front glass. However, with their comfortable margin, no one hurried. At the checkered flag, Gregg and Haywood claimed the first international victory for the new car, still holding a margin of 32 laps over the Ferrari. Historian Janos Wimpffen summarized the context and importance of this accomplishment:

"Gregg and Haywood were still relative unknowns at this time and their effortless win put them on the international racing map. The outcome focused attention on the potential of the Porsche 911 in its new disguise. About a decade earlier, Porsche was maturing from its reputation as merely a class winner into a competitor for overall honors. Now the same growth process was occurring to its 911 family of models. They showed they could outlast and defeat the authentic Sports category members."

Those who questioned the capability either of Norbert Singer's new RSR or of Brumos' accomplishment needed wait only seven weeks until Sebring when car and drivers proved themselves again. The biggest competition Gregg, Haywood, and privateer entrant Dave Helmick faced was the relentless pushing they got from the second-place RSR of Michael Keyser and Milt Minter who finished one lap down. Sebring set another milestone in 1973. By the time the green flag dropped, IMSA had achieved FIA recognition and the 12-hour race was its first sanctioned as part of the World Championship for Makes (WCM).

The FIA had homologated the RSR in Grand Touring class by the time the series returned to Europe for the season there. The car, with a wide variety of owners and drivers, was indomitable in its class, and often another of the Porsche factory RSRs followed it to a second-place finish. An early-season protest gave Norbert Singer the opportunity to run the factory entry as a prototype and it became his rule-bending test platform, on which he experimented from one race to another with body and suspension modifications. One often-seen rear wing configuration took extensions from the ducktail and ran them off to the side, blending them into the wide flares. Klaus Reichert, who was press boss and Porsche's staff photographer at the time, nicknamed it the Mary Stuart collar after the British queen known for her high neckwear. Singer also tested a long tail, which stretched the rear deck lid several feet past the end of the body and capped it with two vertical wings.

Singer and his Weissach colleagues developed a three-liter version of the RSR engine by enlarging cylinder bore from 92 millimeters to 95. The new engine's 300 horsepower, 30 more than the previous displacement, led to failures in the magnesium crankcases so engineers reverted to aluminum. The FIA approved the new engine in early May, in time for Le Mans trials and the race.

At the last-ever Targa, run on May 13, 1973, Porsche's thoroughly developed Carrera RSR2.8 proved strongest of the day taking 1st overall with Gijs van Lennep and Herbert Müller sharing driving duties. The car wore a prototype "Mary Stuart collar" rear wing that widened the aerodynamic aid to full-body width. *Porsche Archiv*

For 1974 and 1975, the car's designation changed to Carrera RSR 3.0 (with a corresponding RS 3.0 homologation model for road use and racing in Group 3). During this time the factory car ran in Martini silver, blue, and red livery.

Thinner-gauge steel, some plastic components, and fiberglass front and rear bumpers, deck lids, and a larger rear spoiler—as well as a single Recaro high-back racing seat, rollover bar, on-board fire extinguishing system, 29-gallon fuel tank, and dual fuel pumps—characterized the 2,024-pound RSR. Weissach assembled 109 of the 3.0 models: 56 as road-going RS versions, 42 as the race-prepared RSRs, and a special run of 15 more for Roger Penske for a series that Ontario Motor Speedway developer David Lockton created, called the International Race of Champions (IROC). For the inaugural season, IROC cars used RSR engines in RS bodies with the smaller *burzel*. IROC was an entertaining series of four events that invited a dozen legendary drivers from NASCAR to race against Indy car racers and endurance racing veterans in identically prepared cars. Penske painted the Porsches in vibrant colors with the driver's name in bold letters on the sides and windshield. Mark Donohue won three of the four races to take the title. Because few of these racers were familiar with Porsche's handling, Porsche's was a one-year involvement and for the next 15 years the IROC series ran in Camaros.

For 1975, Weissach assembled only another 12 RSR coupes with no changes from 1974 specifications. Porsche built these for customers to replace cars damaged or destroyed in crashes.

Working from his close relationship with Porsche racing and its 917/30 Can-Am cars, team owner Roger Penske helped devise a match race series using new Carrera RSRs. Mark Donohue won the four-event contest, called the International Race of Champions, starting with victory here at Daytona. *Porsche Archiv*

At the Nurburgring 1,000-kilometer race two weeks after the Targa, van Lennep and Müller served notice on the Sports Racing community. In their RSR 2.8, fitted with a 3.0-liter prototype engine they finished fifth overall behind a pair of Ferraris, a Chevron and a Porsche 908. *Porsche Archiv*

WORLD POLITICS AND RACING

In October 1973, the 11-member Organization of Arab Petroleum Exporting Countries (OAPEC) raised crude oil prices 17 percent. A day later, it began reduced oil deliveries by 25 percent and promised 5 percent less oil each to nations supporting the state of Israel. Few citizens and fewer racers envisioned the long-term effects this caused. Although OAPEC lifted the embargo in March 1974, gasoline prices at the pump had risen dramatically. Lines at gas stations stretched for a block and then further. State governments in the United States implemented rationing. As the impact hit Europe, Germany and other countries adopted no-drive Sundays and strict limits on purchases. In view of this, racing seemed frivolous if not irresponsible.

IMSA and the FIA canceled the 24-hour race at Daytona and the 12-hour Sebring event for 1974. They shortened 1,000-kilometer endurance races to 750. Politicians and engineers began considering that if racing were to survive, it had to benefit road-going cars, not just provide entertainment. Le Mans, which always had maintained a category called Index of Performance for the most fuel-and-materials efficient racers, introduced a new formula emphasizing consumption for 1975. This required cars to complete 20 laps between fuel stops. The FIA Group C, first contested in 1982, was the direct outcome.

The 1974 version of the RSR used a 2.14-liter turbocharged engine to develop 500 horsepower. Installed in a race car weighing 1,764 pounds, performance was impressive. *Porsche Archiv*

With neither Daytona nor Sebring contested in 1974, the World Manufacturers Championship first met at Monza in late April. John Fitzpatrick and owner Georg Loos won the three-liter Grand Touring class in Loos' RSR, a feat they repeated two weeks later at Spa in Belgium with Jürgen Barth substituting for Loos. The shortened 750 kilometers of Nurburgring made it three in a row for Loos/Fitzpatrick/Barth. A Kremer Brothers RSR took the class win at Imola in Italy while other privateers claimed second overall and first in class at the Targa in early June.

At Le Mans, the Automobile Club de l'Ouest (ACO) organizers classified Singer's prototype turbo RSR in the same three-liter Sports category as home-favorite Matra. Horsepower and aerodynamic differences between the low, open-top prototype and the 911 with its big wing made it inevitable that factory-backed Herbert Müller and Gijs van Lennep followed the Matra and they finished second overall and second in class.

Normally aspirated RSRs finished a season in which the Kremers took class wins at Austria, Gregg/Haywood won at Watkins Glen, and successive victories occurred for Georg Loos at Paul Ricard, Brands Hatch, and far-off Kyalami in Union of South Africa. In the United States, Gregg's win at the Glen helped him and Brumos seal the 1974 IMSA championship as well. When he wasn't running IMSA weekends, he competed in the SCCA Trans-Am. Organizers there were smarting from the loss of American manufacturers, who, with coming emissions and safety regulations, believed they had accomplished all they could in racing. To fill out thinning starting grids, the Trans-Am welcomed Porsche back. However, IMSA had captured spectator, manufacturer, and sponsor interest. Their races were well attended and well supported, unlike the SCCA events. Peter Gregg won the championship in 1973 and repeated in 1974, a season shortened to just three events from lack of support.

RIPPED FROM THE PAGES OF A FRENCH NOVEL

For Le Mans in 1974, Matra ran with a new gearbox that Weissach developed for them as outside clients. At about 11 a.m., with five hours to go, Matra driver Henri Pescarolo had an 11-lap lead over the RSR prototype. Pescarolo lost fifth gear and then seemingly all his gears. He found third and limped to the pits. As historian Janos Wimpffen reported in *Time and Two Seats*, "For over half an hour, the Matra crew toiled before they discovered . . . the sleeve between two gears had dislocated." They quickly reassembled the gearbox, but during the 45 minutes it required, the second-place RSR had been unlapping itself.

Except that it, too, was using the transmission and had lost fifth gear. Singer, as race director, told his drivers to take it easy and run about 45 seconds off the pace. Of course, as part of Matra's purchase agreement with Porsche, "the factory technicians had to walk over to the Matra pits and contribute to their own ultimate defeat."

When Pescarolo's Matra reentered the track, he and Müller's RSR were on the same lap. The Matra was nearly good as new, while the Porsche still suffered. By the end, Pescarolo had put six laps back on Müller. "Pescarolo even had time," Wimpffen continued, "to make a leisurely stop for fresh tires and a little freshening of both car and driver, making them properly photogenic at the drop of the flag."

Porsche was first on the track with FIA rules–compliant Group 5 cars. Derived from the production 930, this first-generation 935 weighed 2,138 pounds and its 2,856cc turbocharged engine developed 590 horsepower. *Porsche Archiv*

THE TURBO RSR AND THE 935 FOR GROUP 5

Realizing that even 330 horsepower was not enough to win outright, Hans Mezger and Valentin Schäffer turned their attention to coaxing much more power from the 911 engines. This was especially important since 1975 FIA regulations dictated that only cars derived from production models could earn manufacturers championship points.

The FIA set engine displacement limits at three liters, and it instituted a multiplier factor to take account for additional power that a fully developed turbocharging system produced. Using this 1.4 factor, Mezger and Schäffer developed a 2,142cc engine, establishing cylinder bore at 83 millimeters and stroke at 66 millimeters. They ran early experiments relying on the standard upright cooling fan. However, they concluded that mounting a fan flat on top of the cylinders cooled better. A single KKK turbocharger, similar to the unit driving Can-Am and InterSerie 917 models, force-fed the air/fuel mixture. With an induction air cooler, Schäffer cooled the mix by 100–150 degrees Fahrenheit. By the end of the 1974 season, they had 500 reliable horsepower at 7,600 rpm.

To handle this substantial increase in a car that he had lightened to 1,764 pounds, Singer had his engineers widen the body from 63.4 inches to 78.7, and they fitted the largest wing anyone had yet seen on an automobile. Ernst Fuhrmann was so embarrassed by its size he ordered it painted flat black to make it less obvious. It was legal, just vast. Beneath the wing and inside the flared body, Porsche used 10.5-inch-wide front wheels and, depending on race circuit, rear wheels measuring between 15 and 17 inches deep. Standard 911 torsion bars no longer worked at front and Singer's team instead fitted lower wishbones and Bilstein dampers with concentric steel coil springs. The rear suspension used newly fabricated aluminum-sheet triangles with similar Bilstein coil-over dampers. To minimize the effect of the weight change in the new 31.7-gallon fuel tank during a race, Singer's group set it inside the car at the driver's right shoulder.

Porsche was ready for the 1975 Group 5 season. None of the other competitors were, and the FIA postponed those regulations until the 1976 season to encourage others to join the grid. With time on their hands, racing engineers lent assistance to the road car 930 launch and provided support to privateers who raced normally aspirated RSRs or to those who, having watched Singer's success with their turbo car, asked for help in creating their own.

No homologated Group 5 cars entered in the Daytona 24-hour race. The FIA canceled its international championship status and IMSA's own rules simplified things to Grand Touring or Grand Touring-Under classes, that is, GT and GTU for cars with less than 2.5 liters displacement. Brumos, with Gregg and Haywood sharing driving duties, took the checkered flag again but had no such luck the next month at Sebring, quitting after 50 laps following a too-close encounter with a Corvette. A BMW "Batmobile," one of the winged-and-widened 3.0 SCL models, won, while George Dyer, who had acquired the previous year's Brumos car, settled for second with co-driver Jacques Bienvenue.

Sports racers made a stand at Mugello, the first of the FIA qualifying rounds. No less than three of the sleek, low spiders on the grid were 908/3 Porsches with recently turbocharged engines. An Alpine-Renault won overall, chased by Alfa Romeos and a couple of the turbo 908s, leaving the GT win to a Georg Loos RSR in ninth overall. Loos' RSR carried the day at Dijon, France, two weeks later taking GT honors and fifth overall, although neither of Georg's RSR's finished on the podium at Monza. Neither did any other Porsche product. But that was a one-race fluke and GT wins went to several RSR teams through the end of the season to give Porsche the three-liter GT championship for another year. Throughout the 1975 IMSA season, Peter Gregg and Brumos scored enough well-placed finishes to claim that season title once again. The SCCA experimented with new rules for 1975, and Corvette took season laurels, winning six of seven races. That changed for 1976 as the Trans-Am fell in line with FIA's Group 5, and the SCCA invited the Turbo Porsches into their new Class 1. Normally aspirated production-based sport cars comprised Class 2.

Porsche made good use of the time it gained in 1975. Weissach developed its 935 for Group 5 and the 934 for Group 4 in relative leisure. Rules for Group 5, officially designated Special Production, left room for interpretation, a situation that favored Norbert Singer's engineering style especially. Body engineer Eugen Kolb designed and fabricated for him a single piece of thin fiberglass incorporating

Porsche unveiled its new Group 5 contender at the 1,000-kilometer race at Nurburgring at the end of May 1976. While Rolf Stommelen and Manfred Schurti qualified on the pole, the car did not finish after a distributor rotor broke nine laps into the race. *Porsche Archiv*

the two front fenders and the front air dam. As one piece, its removal provided rapid access to the entire front end of the car during a race. FIA rules also said that, so long as the original rear of the body remained unaltered, it allowed longer tails for improved aerodynamics. In typical Weissach race-shops style, Singer's staff pared weight of the car down to 1,984 pounds in anticipation of final regulations due January 1, 1976. When those appeared, linking minimum weight to engine displacement (with the turbo multiplier), Singer's extreme diligence left them 154 pounds light! This allowed his engineers to position ballast where it established final weight balance at 53 percent rear, 47 percent front.

The Turbo 930 production car rear torsion bar suspension went away to become titanium coil springs with an anti-sway bar adjustable from inside the car at speed. Titanium coils replaced the front torsion bars, but without the adjustable sway bar. Ventilated and cross-drilled rotors and calipers came from the 917, operating from twin master cylinders providing adjustable brake bias and front/rear brake pedal pressure. Standard wheels were 11x16 at the front and 14.5x19 at the rear.

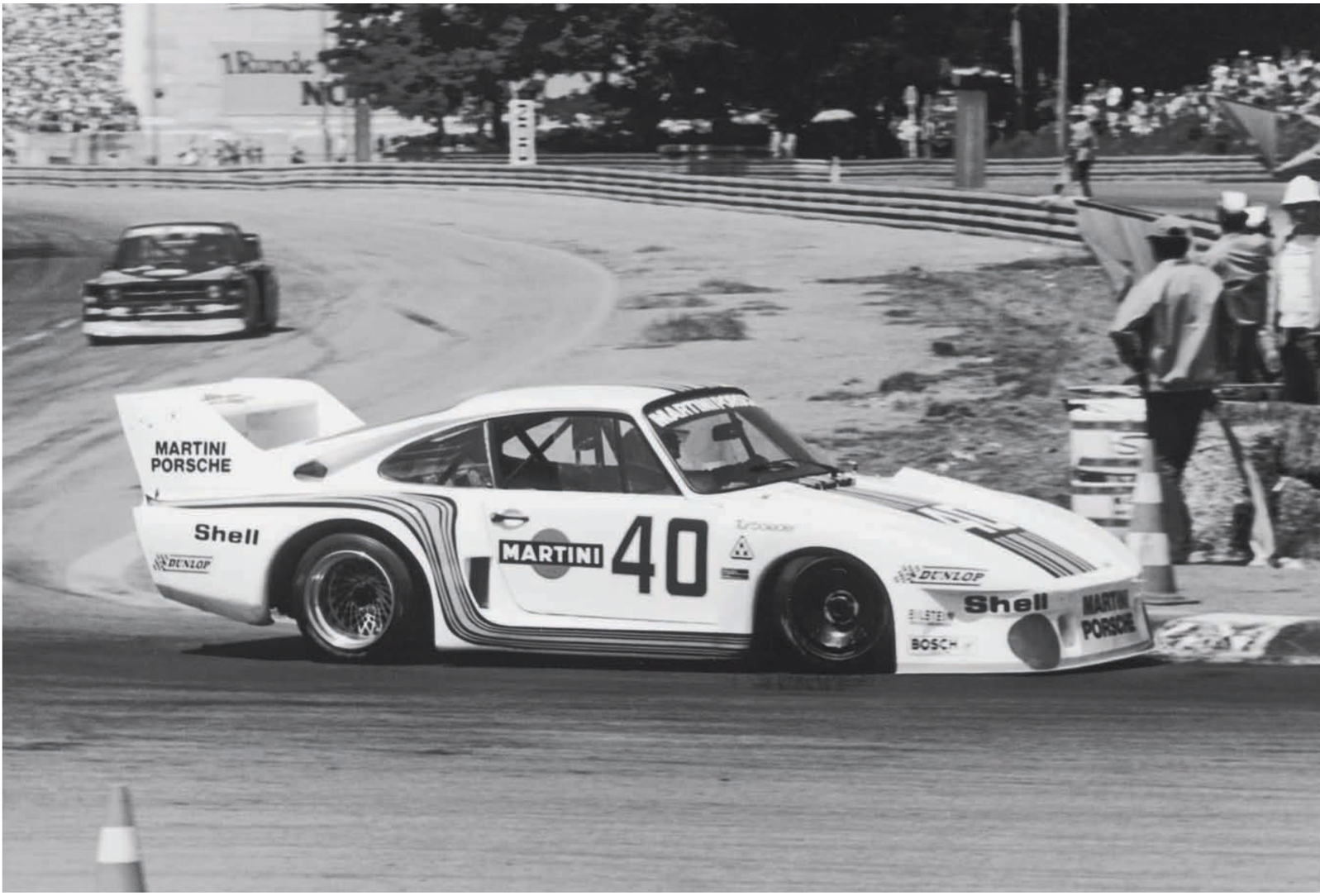
Hans Mezger and Valentin Schäffer, using the 1.4 multiplier and a four-liter maximum displacement, devised a 2,856cc unit that cranked out 590 horsepower at 7,900 rpm with turbo boost at 19 psi. Schäffer employed an air-to-air intercooler to drop temperatures and increase fuel density. According to Jürgen Barth in his *The Porsche Book* trilogy, their innovations returned 4.4 miles to the U.S. gallon, important performance for Le Mans that required 20 of its 8.476-mile laps between refuel stops. Singer's staff had completed a single car for the 1976 season, and they did not expect miracles. As they did with the Turbo RSR, they competed to learn.

At Österreichring on June 27, 1976, Dieter Schmidt and Karl Oppitzhauser shared driving duties in Egon Evertz's Jagermeister 934. Fellow driver Edgar Dören warned them the 934 behaved "like a wild animal." *Porsche Archiv*

While Group 5 offered manufacturers leeway and creativity, Group 4 adhered to their production origins. There was no question this Typ 934 was a capable race car. A gutted interior, all black, with a rigidly mounted roll cage eliminated any doubts. However, Weissach fitted plastic wheel extensions instead of a one-piece plastic fender/air dam structure to accommodate the wider wheels and tires. Rules required stock window glass and the weight minimum was 2,470 pounds compared to 2,138 for the 935.

Underneath the 934, Barth explained that "modifications were limited to adapting the suspension to the requirements of racing by a more-precise location of the moving parts, stiffer springing, different damping characteristics, the use of some reinforced parts, and racing brakes." Knowing these were requirements for this racer enabled Weissach engineers to modify the production 930 to match during the year the FIA delayed the rules.

The 934 ran on a turbocharged three-liter, and Mezger and Schäffer substantially modified the Bosch K-Jetronic injection system to accommodate the air-intake demands of racing compared to road touring. Because 934 bodies had to follow production lines, tricks that Singer and Kolb used improving aerodynamics and providing extra room for the 935's massive intercooler were impossible. Engineers adopted a water-cooled system instead, requiring radiators in front, plumbing, and pumps to move the water around. Engineers calculated the weight addition at 44 pounds, not so great a problem with the high minimum requirement that even let the 934s retain the electric window lifts of the production 930s. The intercooler system reduced fuel temperature from roughly 300 degrees to 120 degrees Fahrenheit, dramatically improving charge density. The



At its Le Mans debut in June 1976, Porsche's 935-002 #41 won Group 5 category with Manfred Schurti and Rolf Stommelen sharing driving duties. They finished fourth overall, covering 2,814 miles. *Porsche Archiv*

2,993cc engine, with its 1.4 factor, displaced 4,200cc and developed 485 horsepower at 7,000 rpm. Privateers soon learned techniques to develop as much as 580 horsepower.

When the 1976 season started, only Porsche had a true 935 Group 5 car. And it had only one. The FIA had homologated it (and fortunately it required no minimum production in the Special Production category). The FIA also legalized the 934 in Group 4. In an effort to flesh out the starting fields, Singer's competition group developed a kit to upgrade 934s into a 935. Georg Loos, Egon Evertz, and others competed through the racing season with these cars, known as the 934/5 or 934.5.

In the United States, the shoving match between SCCA and IMSA challenged Porsche and car owners alike. SCCA's Trans-Am series accepted the 934, as built, for the 1976 season. When IMSA opened its doors to the 934, it allowed owners to run the cars with the 935 conversion kits and Weissach responded with an IMSA package that former 934/935 racer Bruce Canepa called the 934 1/2. This meant that teams such as Brumos and others contesting both series needed two cars with two sets of spares.

The year 1976 remains an odd one in racing history. In its regulatory zeal, the FIA eliminated the world's three main endurance events from its points challenge. Daytona, Sebring, and Le Mans no longer counted. Whether it caused the FIA to shun the events or came as a result, the organizers of Daytona and Le Mans rallied round each other and created race weekends that celebrated not so much racing histories as political ones.

At Le Mans in June 1977, Bob Wollek and co-drivers J. P. Weilemans and Philippe Gurdjian drove the Kremer brothers 934 to seventh overall and first in Grand Touring class. Shown here during the 2011 Rennsport Reunion at Laguna Seca, Kees Nierop led Steve Lawrence's 934.5 and Dennis Singleton's Carrera RSR through the tight turn 2 hairpin. *Randy Leffingwell*

The Automobile Club de l'Ouest (ACO), which organized Le Mans, reached out to fellow 24-hours organizers IMSA and Daytona host Bill France. They extended invitations to pairs of cars from NASCAR and from SCCA to race in honor of the U.S. bicentennial. In a similar spirit of inclusiveness, IMSA and Daytona invited eight NASCAR veterans to run their cars among the Ferraris and Porsches for 24 hours. Daytona also hosted the inauguration of this AAGT category, All-American Grand Touring cars. This was a class meant to encourage Ford, Chevrolet, and others to put their cars on the track, and rules made generous allowances for modification. In hopes of enticing BMW to expand its competition efforts in the States, IMSA banned the Carrera Turbo RSR and allowed only two of the new Turbo 935s. These constitued the entire Group 5 field.

Daytona proved to be another endurance race ripped from the pages of a novel. Peter Gregg, longtime Porsche loyalist, started from the pole. However, he had deserted Porsche for a BMW-entered 3.5 CSL, sharing driving responsibilites with Brian Redman of 917 fame and John Fitzpatrick, who earned dozens of wins in Loos Carrera RSRs. The best starting Porsche, in fifth on the grid, belonged to Al Holbert and it was not one of the Group 5 cars, but his own normally apsirated RSR. The fastest Group 5 Porsche was in fact Egon Evertz and Sepp Gregor in Gregor's 934. It started 11th, though that was two spots ahead of the best NASCAR entry, a Chevy Nova that father and son Bobbie and Donnie Allison ran. Ford race car builders Holman & Moody entered a Ford Torino. NASCAR legend David Pearson qualified it 17th on the grid. There were Mazda Cosmos and AMC Gremlins and a Honda Civic among the starters.

Twenty-four hours is a long time. Ask any endurance racer and most will say they hate the long races. No sleep. Driving in the dark. It's what they get paid for. It still is hard. It also seems that in the dark things break. Or human bodies fail.

Peter Gregg, normally invincible, suffered gastric distress and he handed off the CSL to Redman, who just had finished a stint. Fitzpatrick stepped in, normally a co-driver on the second-place CSL. At that moment his co-driver, Tom Walkinshaw, was off the track, needing to perform repairs on their car by himself in order to stay legal. Then at dawn, with Redman back at the wheel, their BMW nearly stopped on the track. A moment later Al Holbert's RSR lost power as well. They pitted. Another half dozen cars, front markers and back fielders alike, slowed. Gregg's longtime chief mechanic Jack Atkinson caught it first. He saw water in the fuel lines.

"The gas truck had been through the pits," Atkinson explained in an interview in 2012. "It started at the end near where we were set up, resupplying the feed tanks in every pit as it went till it ran out. It didn't take long to realize what had happened. The track supplier had picked up a tank load of contaminated fuel. We all let race management know." At 10:10 a.m., IMSA president John Bishop halted the race.

Peter Gregg ordered this RSR in 1975 and Weissach fitted it with a number of parts from the new 934 Turbo. Because Gregg was occupied racing a BMW CLS through 1976, Jim Busby drove the car for him, taking first overall in four races. *Randy Leffingwell*

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— Jack Atkinson

At the 2011 Porsche Rennsport Reunion owner Jeff Lewis drove his 1977 ex–Vasek Polak Interscope 934. In March 1977, original owner and driver Ted Field and co-drivers Danny Ongais and Hurley Haywood finished fifth overall in IMSA GT category. *Randy Leffingwell*

Bishop allowed teams that had gotten fuel to drain the tanks in their cars and their supply reservoirs. It took four hours until fresh fuel reached the pits, during which time every team checked their supplies, cleaned tanks, and blew compressed air through injectors and fuel lines. Historian Janos Wimpffen, in his calm, understated way, summarized what started as frustration, became chaos, and finally evolved into an unexpected respite.

"The whole situation was most unprecedented," Wimpffen wrote, "and charges and countercharges about bribery, sabotage, and other crimes against racing were bandied about. Most distressed was Hurley Haywood, who had the only leading car not affected, as his section of the pits had not yet been replenished by that particular delivery truck. His anguish only became worse when Bishop ruled that the race would be restarted based on the positions at 9 a.m., when the problem seemed to first occur."

Haywood remembered it: "You asked about my best day in racing? That was the win at Daytona, with Peter in 1973. I didn't even understand how important it was, but I knew what it meant to me. The worst day? Daytona 1976."

Bishop's restart meant that all that Haywood in the Brumos Carrera and Holbert in his RSR had accomplished during those 70 minutes of racing against Gregg and Redman in their BMW before Bishop stopped the clock counted for nothing. That's racing, as many will say, and it was exactly that on that February 1, 1976, when the 24 Hours of Daytona finished on time. But it ended four hours short, racing only 20 hours, 6 minutes, 54 seconds. Brian Redman had driven 14 of those 20 hours to win; Al Holbert and Claude Ballot-Lena came second in an RSR, 14 laps down and one lap behind the winners. Haywood and friend and co-driver Jim Busby finished third in the Brumos Carrera.

Sebring saw Porsche earn a sweet revenge as Al Holbert and Michael Keyser started from third on the grid and finished first in a Holbert-owned and -entered RSR. The racing world had to wait until Mugello later in March to see the real debut of the Group 5 Porsche, however.

There, Jochen Mass and Jacky Ickx qualified on the pole just ahead of a Group 5 BMW CSL. Six hours later, Ickx and Mass finished five laps ahead of the ailing BMW. But it falls to Wimpffen again to best describe what Group 5 really represented.

"The most memorable aspect of the 935 era," he wrote in his essential two-volume reference, *Time and Two Seats*, "indeed that of the whole turbocharging epoch, was the sight of the flame-out on the overrun coming into the corners. This was the first time a 'Silhouette' car produced such an awe-inspiring act. It was another illustration of how the Group 5 era was to road going sports cars as NASCAR was to the American family sedan. Somewhere in the observers' imagination is that fantasy that their own car might be capable of the same thing." Group 4/Grand Touring went to Leo Kinnunen and Egon Evertz in his 934, in third overall. The 1976 season was off to a good start. Ickx and Mass and the company 935 repeated at Vallelunga. Manfred Schurti and Rolf Stommelen drove a factory 935 to fourth overall and Group 5 victory at Le Mans, behind Ickx and van Lennep in the hastily executed 936 Spyder for Group 6.

The wholesome welcome of NASCAR to the Daytona 24 hours extended to Le Mans, and French racing fans howled as John Greenwood's monstrous Corvettes chased Michael Keyser's Chevrolet Monza, bedecked with wings and spoilers larger than the car body itself. NASCAR legends Hershell and Doug McGriff and their Dodge Charger suffered from fuel-octane shortcomings, while Richard Brooks and Dick Hutcherson's Ford Torino, equipped with long-distance driving lights for its first adventure in the dark, lasted until well after dark when its transmission failed. Not one of the American cars finished, but it was not for lack of support from a rapturous and vocal French crowd.

Porsche's next big win came at Watkins Glen, when Schurti and Stommelen were first to the checkered flag. Ickx and Jochen Mass were first across the finish line at Dijon in late August.

What race organizers concluded at the end of 1976 was that Group 5 was about to be a single-marque series. It was not what organizers had hoped, but spectators seemed okay with what appeared to be a match race between differently painted Porsches. "That's racing," many spectators, officials, and entrants repeated then, and they repeat it to this day. Competition was close; the cars bumped, bashed, and even crashed each other out. And for about five years, Porsche owned racing.

In 1977, Porsche introduced twin-turbo versions of the 935 and its support of private team racing grew. Weissach prepared three of these 935/77 models. It proved essential as works-entry 935s won four of the nine championship points races while five privateers, Dave Helmick at Daytona, Georg Loos at Nurburgring, Ludwig Heimrath at Mosport in Canada, the Kremer brothers at Hockenheim, and Scuderia Vesuvia in Italy at Vallelunga added the other necessary points to the totals. It read like a movie writer's plot plan for the next several years. As Wimpffen wrote, "the terms 'silhouette' and 935 are nearly synonymous." This was truer than the words suggest; regulations allowed aerodynamic enhancements so long as the original silhouette remained unchanged. Singer's solution shrouded the original body with an aerodynamic shell that mounted a second rear window outside the first. Throughout 1977 and 1978, Weissach sold 935/77 models to a variety of customers.

W. H. MacEachern's Deep Steam Cleaning sponsored Ludwig Heimrath in the 1977 Trans-Am in this car that started life as a 934. A season later MacEachern added the 935 rear bodywork behind the 934 front end that characterized the 934/5 designations. *Randy Leffingwell*

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Ernst Fuhrmann conceived the 1977 Typ 935 “Baby” to gather publicity in a televised under 2.0-liter GT racing series. The car weighed just 1,650 pounds and its 1.4-liter turbocharged flat six developed 370 horsepower. *Porsche Archiv*

BABY

Hans Mezger and Norbert Singer conceived their “baby” as a result of challenges within the company and without. Porsche’s dominance in the World Championship of Makes with its turbocharged 935 motivated BMW to regroup as a two-liter competitor in the German National Championship (GNC), running against well-prepared Ford Escorts. Spectators and journalists suspected that each marque had its own series. As racer/journalist Paul Frère explained in his *Porsche 911 Story*, “The press was not always very kind to Porsche for not joining the Ford-BMW battle, sometimes even implying that they were afraid to do so.” Porsche simply had no car for that class. Then in early April, Fuhrmann discovered that German television planned to broadcast the two-liter race, but it was going to ignore the larger-displacement class event scheduled at the Norisring in early July.

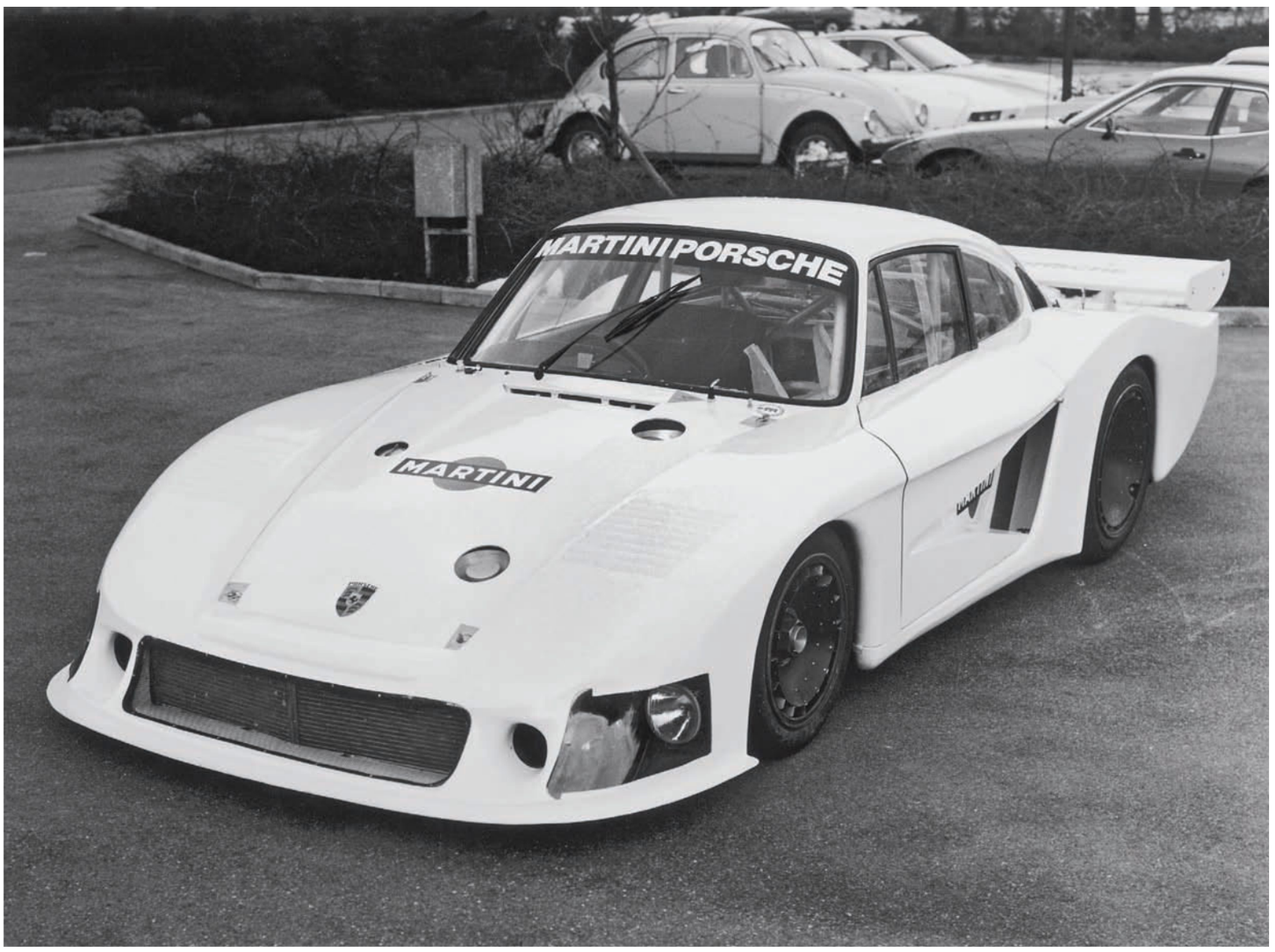
For the next two months, Mezger and Singer created a car. To meet the two-liter limit, Mezger created a 1.4-liter version of an existing engine. Singer found ways to pull some 540 pounds out of their 935/77 race cars to bring one down to the 1,598-pound minimum for the two-liter class. The two-liter engine case was too large and heavy even for the 71x60-millimeter bore and stroke, but it did allow Mezger to select a much smaller air-to-air intercooler that fit inside a standard rear deck lid. With overall displacement of 1,425cc and turbo boost at 20 psi, the engine developed 370 horsepower at 8,000 rpm. Eugen Kolb, Singer’s body engineer, delivered a car that, as the full-size 935 had been, came in underweight at 1,565 pounds, allowing them again to ballast it in places that were most useful.

The development schedule left no time for testing, and as Frère wrote, “The engine had been bench tested only and [it] turned out to lack flexibility to the point of being almost undriveable, which was made worse by gear ratios that were much too high.” Norisring did not go well. Two weeks later at Hockenheim, Singer and Mezger had sorted out everything. Jacky Ickx lapped the 4.24-mile circuit two seconds quicker than anyone else, and he finished the race half a nearly three miles ahead of second place. With his point made, Fuhrman had the Typ 935/2, or “baby” as Singer’s staff had christened it, retired to the museum collection.

Porsche's next efforts to update its 935 came with the 935/78, most widely known as Moby Dick. While Singer and his Weissach cohorts continually improved the 935 and shared these innovations with customers, excellence, as one publisher expressed it, *was* expected. In this vehicle, Singer, Mezger, and Kolb applied everything they had learned to create Porsche's most radically innovative race car yet. To address engine failures that had plagued the factory and private racers, Mezger water cooled new four-valve cylinder heads while leaving the rest of the engine air-cooled as Group 5 rules required. With new bore and stroke of 95.8x74.4 millimeters, this engine displaced 3,211cc for calculated displacement of 4,495cc. Running 20psi boost through the twin turbos developed 750 horsepower at 8,200 rpm.

The 4.5-liter displacement figure provided Singer a 2,260-pound minimum weight for a car that utilized every aerodynamic trick he had developed. His engineers fabricated an aluminum alloy tube frame welded to the full roll cage. Regulations allowed him to raise the floor to the height of the doorsills. Instead, Singer mounted a fiberglass floor pan on the tube frame and dropped a heavily modified body onto it so the sills met the lowered floor. Because fenders were free of regulation, Singer and Kolb widened them to the limits, working for hours in wind tunnels to devise and perfect the slipperiest shapes. Within the long, low body, Mezger's and Singer's engineers concluded that it was possible only to mount the transmission upside down to manage suspension arm and half-shaft angles. They took the car to Circuit Paul Ricard in France for testing. With all its aerodynamic bodywork in place, but not yet painted in Martini colors, it was a large white car. That day it earned the nickname Moby Dick.

In his widest interpretation of FIA rules, Norbert Singer felt he could extend the widened rear fenders across the door openings as he created the 935/78 that, due to its size and color, resembled a great white whale. Neither Singer's covered doors nor the low full-width rear wing passed the inspection. *Porsche Archiv*



Singer invented the car and Eugen Kolb designed it specifically for Le Mans. With Ickx, Barth, and Bob Wollek sharing duties it finished second overall but it went on to inspire dozens of look-alikes from Kremer and Jöst racing shops. *Porsche Archiv*

With this car developed specifically for Le Mans, Porsche hesitated to run it or its twin elsewhere as it competed directly against their customers. In its first outing at the 6 Hours at Silverstone, a month before the French 24-hour trial, Mass and Ickx in chassis 006 simply walked away from the rest of the 30-car field. They finished seven laps ahead of Bob Wollek and Henri Pescarolo in a Kremer-entered customer 935/77A. In June at Le Mans, chassis 007 routinely hit 220 miles per hour along the Mulsanne Straight. It ran with and frequently led the Group 5 pack until around 10 a.m. Sunday, 18 hours into the race. Then a minor oil leak slowed the pace that co-drivers Jacky Ickx and Jochen Mass were driving as Mezger's engineers feared a crack in the crankcase. At the end of the race, the car finished eighth overall, and back at Weissach, engineers determined the leak was minor and inconsequential. Chassis 006 ran at the 6 hours at Vallelunga in September but retired with ailing fuel injection. The wild experiment ended with the season, which went to Porsche through the great work of its customers in their 935/77As.

In the United States, SCCA organizers rewrote rules to parallel the FIA Group 4 and 5 as Category II, welcoming tube-frame silhouettes. Greg Pickett, driving a Corvette, took the season honors. The IMSA season was a different story with 935s racing in the new GTX category. Peter Gregg, collaborating with a variety of co-drivers for Brumos, won at Daytona (twice), Talladega, Road Atlanta (twice), Lime Rock, Brainerd, and Portland during the season to claim the title.

For 1979, Porsche withdrew from competition itself, but it delivered a run of 935/79 single turbo models with the inverted transmission, primarily to IMSA competitors. Because the 935 remained the best game in town, the Cologne-based Kremer brothers, Erwin and Manfred, took up the slack and began delivering their own highly developed aluminum tube-frame 935s, designated the K3 using sleek Kevlar bodies designed by Ekkehard Zimmermann. The Kremers built full cars for several customers and sold K3 kits to others to update earlier factory 935s.

The racing season once again began with Daytona, where FIA and IMSA shared some rounds on the calendar. Racer/car owner Ted Field had worked his way up from 911s to Carrera RSRs to 934s to a 935K3 over a period of years, establishing a solid reputation. For several years he teamed with former drag racer Danny Ongais, and they ran black-painted well-prepared cars. Everything came together for them at Daytona, where, with past-winner Hurley Haywood, they started eighth and finished first by never putting a footstep or a tire patch wrong. In the 22nd hour, they slacked

Throughout 1978, Peter Gregg campaigned this 935/78 through several North American events. At Talladega in early April he won with Brad Frisselle while here, during Rennsport Reunion IV, owner Rob Walton put it through its paces. *Randy Leffingwell*

their pace because they had built up a 50-lap lead over second place. Ironically, ten minutes before the checkered flag, their turbocharger blew up. Ongais limped the car around, trailing smoke, and he coasted over the finish line to victory. Six weeks later at Sebring, Field and Ongais failed to finish and the honors went to Dick Barbour's 935/77A. The WMC spent the rest of the season commuting between Europe and the States, where either Georg Loos, the Kremer brothers, or the American Whittington Brothers, Don and Bill, claimed the wins. In the IMSA series Peter Gregg and Brumos had their way with the GTX class again, winning eight of fifteen starts and claiming the title again. For the SCCA Trans-Am title, John Paul Sr. took honors, making it a clean sweep for the 935s in all the major series.

The SCCA enforced a new set of rules for 1980, initiating an engine displacement-to-weight ratio that steered the competition away from the 935s. IMSA's 15 rounds started and ended with Daytona again, visited Road Atlanta twice, again, and stopped at some of the same venues from 1979: Sebring; Riverside in southern California; Laguna Seca at Monterey, California; Lime Rock; Brainerd; Golden State (near Sonoma, California); Portland; Mosport outside Toronto, Ontario; and Road America in central Wisconsin. Dick Barbour, running a 935K3, won at Sebring, Riverside, Laguna, Daytona (the Paul Revere 250-miler,) Golden State, and Mosport. John Paul (father and son) won at Lime Rock driving for Preston Henn and then in their own car at Road America.

Dick Barbour's 1980 Sebring-winning 935 Kremer K3 led Andial Racing's own version of a K3 through Laguna Seca's turn 5 in early morning fog. Mazda Laguna Seca Raceway hosted Rennsport Reunion IV in October 2011. *Randy Leffingwell*

Gianpiero Moretti took the final two victories, at Road Atlanta and the Daytona GT 250 finale. In North America, any hope at winning made a 935 inevitable.

In Europe, Italian carmaker Lancia, which had made tentative steps in 1979, fielded a two-car team for the 1980 full season. Lancia added variety to what racing audiences saw on the circuits. Longtime Porsche loyalist Reinhold Jöst introduced his own 935 variation for 1980 and wasted no time establishing its credentials. With co-driver Rolf Stommelen, Jöst's new 935J won Daytona with a decisive margin of 33 laps over Al Holbert and John Paul Sr. in Preston Henn's 935K3. Ted Field and Danny Ongais, in the Interscope K3, came in third.

In a quirk of scheduling, the WMC series jetted off to Brands Hatch for a six-hour round after Daytona and before Sebring, where new Lancia Beta Monte Carlos announced to race goers that they had arrived. They finished first, second, and fourth, ahead of the best-placed 935K3 from Charles Ivey. At Sebring the results sheets looked more familiar with Dick Barbour winning over Ted Field, the Whittingtons coming in third, and Preston Henn taking fourth, in 935K3s all.

Mugello, not surprisingly, bounced the ball back in Lancia's court, with their Beta Monte Carlos again claiming first, second, and fourth, although this was a round the K3 racers chose to pass. Monza proved a better mix with Alain de Cadenet taking the six-hour checkered flag in his own Ford-Cosworth-powered Lola-chassis "de Cadenet." Jürgen Barth and Henri Pescarolo chased him on the same lap to finish second, ahead of third-place Lancia, one lap down. Racing in Europe offered variety, where in North America it remained a K3 show. The WMC title for cars greater than two-liter displacement again went to Porsche while Lancia claimed the distinction in the smaller displacement group. John Paul Sr. took the top driving title.

Reinhold Jöst fabricated his 935J cars in 1979 and 1980, evolving ideas from Porsche's 935/78 Moby Dick, and from the Kremer brothers' K3 models. Jöst and Momo founder Gianpiero Moretti co-drove this car to victory in the 1980 Daytona 250. *Randy Leffingwell*

For 1982 season, John Paul Sr. created a new 3.2-liter twin-turbo racer for his son to race in IMSA GTP. Sharing duties with Rolf Stommelen, they won Daytona in late January and father and son took first at Sebring six weeks later in the same car. *Randy Leffingwell*

Through 1980 and 1981, most of Porsche's racing engineers spent their time and effort designing and testing a new mid-engine water-cooled race car, the Typ 956, meant for FIA Group C and for the GTP or prototype classes. But they still found time to develop improvements and upgrades to the five-year-old 935s. As Janos Wimpffen reported, "The engineers did produce a much more robust engine package. Its principal features were bigger everything." Larger oil pumps, turbos, and intercoolers, and improvements in aerodynamics, body, chassis, and suspension advanced the benchmark that 935 performance and reliability represented. The Kremers, and Jöst, as well as John Paul Sr., Gianpiero Moretti, and John Fitzpatrick who acquired Dick Barbour's K3 after Barbour retired, each made significant modifications to their cars to present the GTPs a challenge for 1982. The 935s performed consistently through 1981, winning seven of the fifteen WMC rounds and giving Porsche and Porsche driver Bob Garretson their championship titles.

Owners who raced 935s did not park them with the arrival of FIA World Endurance Championship (WEC) Group C and IMSA GTP regulations. IMSA found the premise of FIA's Group C consumption regulations stifling to competition and, except for Daytona and Sebring, they contested no other races in common. What's more, nearly all entries in both these Florida races came from North American teams. Initially there were few of the prototypes anyway, so the FIA Group 5 entry lists remained robust while IMSA GTX cars became GTPs. So it's little surprise that both Florida races went to GTP 935s that John Paul Sr. and his son built and raced. In some of the European WEC events, no 935s started, though at Le Mans, John Fitzpatrick in a Jöst 935-78/81 finished fourth overall and first in GTX. Charles Ivey's 935K3 took Group 5 honors. Out of a field of 55 starters, only six were 935s. By the end of the season, 935 entries could be counted on the fingers of one hand.

This suited Weissach well. Peter Schutz's arrival at Porsche had allowed Helmuth Bott to follow some instincts that he had hidden while Ernst Fuhrmann still ran things. Bott was fascinated by the work Ferdinand Piëch's engineers at Audi were doing with four-wheel drive, especially for international rallying in FIA Group B.

FISA, Fédération Internationale du Sport Automobile, the sanctioning organization for rallies, legalized all-wheel drive in 1979, but few manufacturers embraced it, wary of its costs and the weight it added to their race cars. Regulations for Gruppe B, modified sports cars that encompassed the former Group 4 sports cars, took effect in 1982. They encouraged experimental technology, but FISA needed 200 examples to prove it was modified from something already existing. For rallies,

Kremer vs. Kremer not only was the title of a film but it often was the reality of the world endurance racing in the early 1980s. When Porsche ended 935 production in 1979, it left a void that racers/inventors Erwin and Manfred Kremer filled with cars such as these twin-turbo K3s. *Randy Leffingwell*

Porsche felt it had some advantage with its rear engine/rear drive. But within Weissach, a group of Bott's engineers advocated a different configuration.

"My racing engineers wanted to do a mid-engine car," Bott recalled in an interview in 1992 after he retired from Porsche. "They wanted to take a car on the base of the 914 and make a race car, as a Gruppe B car. And I was fighting against them. I said, 'We do so many mid-engine cars. We cannot learn anything.' And the second thing that we don't know is if any other company is making a Gruppe B car. If not, what can we do with our Gruppe B car? We build a very expensive car, we spend a lot of money, and what do we have, nothing. You had to build 200 cars. That's a lot, much too much for Porsche from the money side."

Bott argued that the requirement for 200 cars could serve as a development run for 1,000 or 5,000 series production models. With Schutz's commitment to reinvigorate the 911, Bott saw an opportunity to look into its future.

"Let's take all the electronics systems and all the knowledge from today," he said, "and let's take a very powerful engine to see the limits of the chassis and the road holding and the four-wheel drive and all these things. So, it was a goal, a task much greater than to build a race car. You see our concept with the 911 has always been that it's an all-around car. With very few changes, you can drive a rally, and then go to the racetrack at Le Mans, and to win the long distance." But, starting as late as 1981, he never could get 200 examples funded, let alone built in time to compete. "Well," he recalled, "there was no other race we could do because the homologation was not done. We had to race that car where prototypes are free to take anything.

“We can convert this car to a rally version. So we did the Paris-Dakar. The idea was not only to show the people that this car would win Paris-Dakar, but that would also show that it’s a good long-distance car. So we built the 961 for Le Mans. And in the first year, we had placed number seven, behind the very most powerful sports cars. The first race went through with no problem. The second, that was a driver’s mistake. We had an engine with nearly 700 horsepower in the 961 race version at Le Mans.”

Bott asked Manfred Bantle to develop the all-wheel-drive prototypes and he tagged Roland Kussmaul to create a group of four-wheel-drive 911s, designated Typ 953, for a series “where prototypes were free to take anything.”

Jacky Ickx, who won the Paris-Dakar desert raid in 1983 driving a Mercedes-Benz Gelandewagen, knew Porsche reliability. By this time he had won Le Mans six times, four of them driving Porsches along with hundreds of other wins in 935s and RSRs. He approached Bott with the idea of taking a 911 to the desert.

“I thought at the time it could be possible to do it with a 911,” Ickx explained in an interview in 2012. “And the reason was, I saw already a 911 from the East African Safari from 1978. Porsche was doing it at the time with Waldegård and maybe a few others.

“When I offered to do it, Porsche was preparing their first integral transmission. That was really a matter of timing. Although Porsche really didn’t want to be involved in the Paris-Dakar, officially, it was a car made in Weissach.

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René Metge and co-driver Dominique LeMoine during a training leg for the 1984 Paris-Dakar raid challenged the forward tipping point of their 953 4x4. Such techniques paid off for Metge and LeMoine, who won the automobile class. *Porsche Archiv*

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Porsche's three clean Typ 953s lined up for the start of the 1984 Paris-Dakar rally. When they left the Bois de Boulogne at the start of a 15-stage 6,000+ mile event, they traveled over paved roads through the city and countryside. *Porsche Archiv*

"That car and the three years [after] it were designed by Roland Kussmaul. Because the 911 had to be adapted first to the four-wheel-drive transmission. Secondly, to the specificity of the Dakar. Because sometimes we had stages of 800 kilometers. One of the hardest challenges was to put perhaps over 320 liters of fuel with two spare wheels in a 2-2 seater car. The space is very limited.

"After that, we had to adapt it to the surface, so we went in September 1983 in Algeria with a truck and a car, just for development. We went from Algiers to Tamanrasset, at the farthest south of Algeria, on tracks I knew from the Dakar. And every evening we were reinforcing or modifying those things that were not working properly or simply broke. So instead of running around on a short racecourse, we put ourselves in a situation that looked like the race.

"We had all sorts of comments at the time," Ickx recalled, "that it's impossible for the Porsche 911 to go onto the Dakar. It is not strong enough. It doesn't have the ability. It doesn't have a reduction gearbox on it. There were many good reasons. But the vehicle didn't have much power—I think maybe 230 horsepower, good torque, short gearbox. And light.

"I don't know how much the car weighed but . . . compared to a G-wagen, it was light. Really light. And although nobody expected it, we won the Dakar in 1984. It was not official Porsche because it was a 'Jacky Ickx team for Rothmans.' But it was an official entry. And then we repeated that three times in a row . . . . The first one was a success, the second one was a total mess. I damaged my front suspension and I retired. Jochen Mass did a mistake somewhere. And René Metge was leading, and he had an oil leak in the engine and he had to retire. But, in all, René Metge won it. René won three times. I chose him because I thought he could be the perfect solution for a team: experience, talent for the desert, more than me at the time, definitely, and he won it. The Dakar is a race made for the amateurs where professionals can find their place."

While Weissach developed and campaigned the 959s for the desert, another small group of cars mainly intended for rallies and racing appeared, a run designated the SC/RS. Jürgen Barth and Roland Kussmaul had competed in the Monte Carlo Rally in 1983 where they finished 11th behind a rash of Group B Lancia Beta 037s. Group B rules allowed that once a model had been homologated manufacturers could update it each year with a series of no more than 20 evolution models, and Barth proposed that Motorsports "evolve" a group of the G-Series coupes for competition. Designated the Typ 954, the car Barth and Kussmaul developed took inspiration from the earlier 911Rs and they started with a turbo body, retaining its brakes and suspension. They beefed up the suspension, added underbody skid plates, replaced steel panels with aluminum where possible,

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Jacky Ickx and co-driver Claude Brasseur finished 6th overall in the 6th running of the Paris-Dakar rally in 1984. The rally covered slightly more than 6,000 miles. *Porsche Archiv*

ICKX IN THE DESERT

Many racing enthusiasts and most journalists put Jacky Ickx on their short list of all-time greatest drivers. He won F1 races for Enzo Ferrari in France in 1968; Austria, Canada, and Mexico in 1970; Holland in 1971; and Germany in 1972. At Le Mans in 1969, while driving a Ford GT40, he beat Hans Herrmann by barely 100 meters after 24 hours in the closest race anyone has witnessed. The lead changed hands two or three times per lap in the last hour. But it is the desert that became the turning point in his life.

"Usually less than half of the people who start arrive at the finish. And already arriving, it's a goal," Ickx said. "For those who don't arrive, the real adventure starts. Because if you are in the middle of nowhere, 800 kilometers away from the first city, when you have a problem with your car, to get it back home . . . "

For Ickx, the sport of the Dakar event was important. But it was not supreme. "When you go far away from any kind of cities, and you go back to the desert, first it's a fantastic opportunity to discover yourself," he said. "Because there is some location on this planet, like [for] these sailors who go by themselves around the world, that you can't lie anymore to yourself.

"On that aspect, you feel very small. You realize in a way how unimportant you are. Because you can be whatever you are, famous, not famous, [but] out there, you have your feet on the ground and you realize the nature all around you is totally outside. There is nobody. I think it is a superb lesson of humility. And I think a good three-quarters of the people that do the Dakar are deeply touched by that feeling.

"If you ask me what is the best part of my life . . . Formula One, Ferrari, it was really nice and very rewarding. The temptation is to say, well, you are one of the best, and then you know, it's probably a quality too. You have to be selfish. And you can be nice outside of the car, but you still are a shark in the car. It's really two different personalities.

"The most interesting part, the most amazing part of my life, is this third part, when I went into off-road racing, the discovery of Africa, the discovery of other countries, and other people. It's what I would call a hundred-eighty-degree vision. But what I'm leading to now, with the curiosity, through the Dakar . . . it was the Dakar, off-road racing took me to that view. It was not only sport. It became sport and curiosity. And at the end, only curiosity. Another way of people living."

Metge and LeMoine and other Porsche team members carried as much as 100 gallons of fuel in these 953s. Some of the rally desert sections ran as long as 500 miles. *Porsche Archiv*

used thinner glass for the windshield and plastic for side and rear windows. Through relentless effort, they ended up with a 1,984-pound body, some 660 pounds lighter than a production Turbo. The three-liter engine, however, remained normally aspirated, and with modifications for reliability and durability, it developed 255 horsepower at 7,000 rpm. Barth and Kussmaul reasoned quicker throttle response and cooler cockpits were worthwhile tradeoffs, and, with no turbo, the car avoided the FIA displacement 1.4 multiplier with its higher weight requirement. David Richards in Silverstone, England, took six of them to prepare a rally team for Rothmans. Richards' crews dismantled the cars and reassembled them in ways that expedited in-field service and repairs.

Group C remained the endurance series throughout Europe and IMSA provided a variation as its counterpart in its GTP category. Beginning with the 1986 season in Europe, FISA initiated several shorter rounds of racing, 250–275-mile events compared with earlier six- or nine-hour endurance trials. They changed the series title as well, renaming the World Endurance Championship as the World Sport-Prototype Championship. Thereafter, 935s and even 911s of any description almost completely disappeared from entry lists through the mid- and late 1980s. Daytona and Sebring remained the exception, where the massive start lists saw a few old warhorse 935s or RSRs. FIA regulations took effect in 1989, accompanying management changes at IMSA, and these phased out turbos because the costs of cars and annual campaigns forced out competitors. As Porsche had done before with its RSR and 935 models, it withdrew from factory participation at the end of 1988, though it continued backdoor support of Reinhold Jöst's efforts.

In late 1988, the ever-creative Jürgen Barth happened on an inventory of spares from the 1984 Typ 953 four-wheel-drive 911. He conceived an ultra-lightweight Carrera 4, and when word leaked out, customers materialized. To assemble these cars, Zuffenhausen shipped car bodies to Weissach, where technicians fitted thin aluminum doors and deck lids from SC/RS parts leftovers, as well as the simplest turbo whale tail rear wing. Because he executed it as a minimalist homologation model, Barth kept everything out of the car. Even with a twin-plug 3.6-liter engine tweaked to develop 265 horsepower at 6,750 rpm, and with five-speed all-wheel-drive hardware, the car weighed 2,425 pounds compared to 3,200 for the road-going C4 coupes. Known as the C4LB or *leichtbau* for light body (C4LW in English), Customer Motorsports assembled 22 of the cars. Because no road racing organization accepted four-wheel drive in its classes, the cars trickled out of Weissach through 1990 and 1991, destined for garages of savvy collectors who seized another fascinating Porsche invention when they saw it.

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Jürgen Barth's Customer Racing department assembled 22 of these 1990 Carrera 4 Lightweights by starting with a production C4 and stripping everything from it. When they finished, the cars weighed 2,420 pounds while the engines developed 265 horsepower. *Porsche Archiv*

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Cutting his apexes tight gained Porsche Carrera Cup champion Bernd Mayländer precious tenths of seconds. Mayländer was German Cup and Supercup champion in 1994. *Porsche Archiv*

During the same time, Porsche converted the existing 944 Turbo Cup series into a 911 Carrera Cup to promote the new 964 models. Unlike Barth's C4 platform, this set of cars, executed by Roland Kussmaul and Helmut Flegl, used a stripped C2 lightened to 2,470 pounds with chassis, suspension, steering, and wheel and tire modifications, as well as hyper-tuned engines. The company delivered the first 20 in December 1989, and another 30 followed over the next two months. Kussmaul urged Porsche to keep the series exclusive to Germany initially, simply to satisfy customer demand. The engines, match-tuned for output between 268 and 272 horsepower, were sealed, and the series provided entertaining and closely matched races that supported longer endurance contests. Herbert Linge emerged from retirement to manage the 10-race series. Roland Asch, driving for longtime Porsche racer and dealer Paul-Ernst Strähle, won the championship in 1991. Uwe Alzen followed in 1992, with Wolfgang Land taking the title in 1993 and Bernd Maylander winning in 1994. Porsche allied with Pirelli in 1993 to create a Supercup series for 30 cars that accompanied nine Formula One races throughout Europe.

Back in 1991, IMSA had launched a similar Supercar Championship that Bridgestone Tire sponsored. This series put race-prepared series production sports cars from a number of manufacturers in a 30-minute televised race as part of the full IMSA weekend. Kussmaul developed a series of turbos for the series. Brumos Porsche in Jacksonville, Florida, got the first, called the Turbo II, and Hurley Haywood (with Hans Stuck filling in when Haywood had other commitments) won four of the seven races in the series inaugural year. This gave Porsche a manufacturer's title and Haywood won the driving championship. When Brumos' exclusive first-year deal ended, Kussmaul shipped a group of cars ready for the 1992 season. As production models, these debuted as the 381-horsepower Turbo S at the Geneva auto salon.

Supercar homologation required a small production run, and the S was the next generation of homologation special. Listing more items on the delete pages than fitted options, the car weighed 2,822 pounds. Weissach planned to assemble only 50 examples required for homologation, but demand pushed production to 80 cars, including ready-to-race Turbo S2 models. It proved worth Weissach's efforts once more, when Haywood and Stuck each took two of the eight wins to earn the championship for Porsche. Driving for Brumos in 1993, Stuck won seven of nine starts to claim both driver and manufacturer titles.

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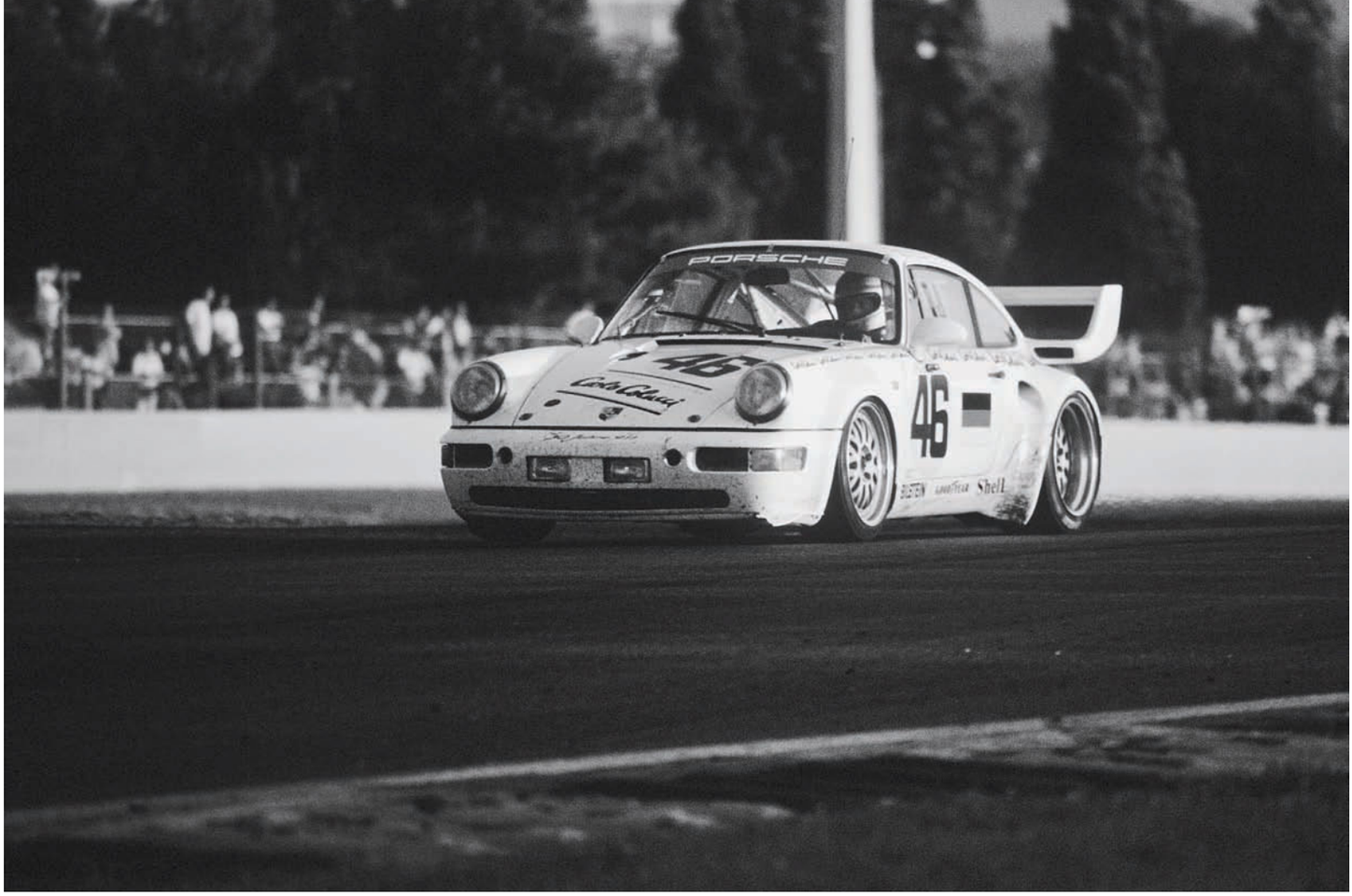
The racing was extremely close during the IMSA Supercar series. Brumos team cars 58 and 59, with either Hans Stuck or Hurley Haywood driving, held off the challenges through the 1991, 1992, and 1993 seasons, winning the Supercar championship three years in succession. *Porsche Archiv*



Earlier in 1993, Stuck and Haywood debuted another Kussmaul invention for Jürgen Barth's customer racing department. This was the 911S LM and it ran a 3.16-liter version of the twin-turbocharged flat six that developed 475 horsepower. Kussmaul brutally shaved its weight to 2,200 pounds using extensive composite materials for body panels and paper thin plastic membranes for side and rear glass. At the same time, a normally aspirated 3.8-liter Carrera RSR appeared for entry in the nonturbocharged classes. Each of these was part of the Invitational GT category as FIA's tentative steps toward making racing costs more manageable during a worldwide recession.

Brumos again carried the Porsche standard when Stuck, Haywood, and rally ace Walter Röhrl finished seventh overall and first in the Invitational GT class, ahead of 10 other invitees at Daytona. However, in France at Le Mans in June, the trio suffered an accident in the 79th lap and did not finish. One of the new 3.8 RSRs did win Grand Touring class and it finished 15th overall with the car's co-inventor Jürgen Barth driving with Frenchmen Joel Gouhier and Dominique Dupuy. A Fabian Roock–entered RSR won the newly lengthened Spa 24-hour endurance race in early August as well as the 1,000-kilometer race in Suzuka, Japan, four weeks later.

With 993 pilot production underway, Roland Kussmaul siphoned off a run of 35 cars in May 1993 to convert them into Cup contenders. Deliveries began in November. The 2,425-pound cars ran with engines bored out from 100 millimeters to 102 with 3,746cc total displacement. These 3.8-liter engines developed 305 horsepower at 6,500 rpm.

Jürgen Barth took on a new role starting in 1994, as race promoter, independent of Porsche, along with friends and fellow racers Patrick Peter and Stéphane Ratel. BPR created the International Endurance Series exclusively for private owners competing in racing versions of series production GT cars. Tube-frame cars were not permitted. Affordability was the plan, at least until Gordon Murray at McLaren introduced his V-12 BMW-powered F1 GTR in 1995. With a carbon fiber monocoque, a body fabricated from composite materials, and a base price of $1 million, affordability became relative. A year later, for 1996, Porsche responded with its 911 GT1, a 911 in name and facial resemblance only. Rules called for a single road-going example to exist for homologation, and Porsche responded with 993 GT1 Straßenversion, but it arrived almost too late to legalize the racer.

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Walter Röhrl shared driving duties at Le Mans in 1993 with Hans Stuck and Hurley Haywood in the 911 Turbo S Le Mans GT, the 911 S LM. An accident during the 79th lap forced their retirement. *Porsche Archiv*

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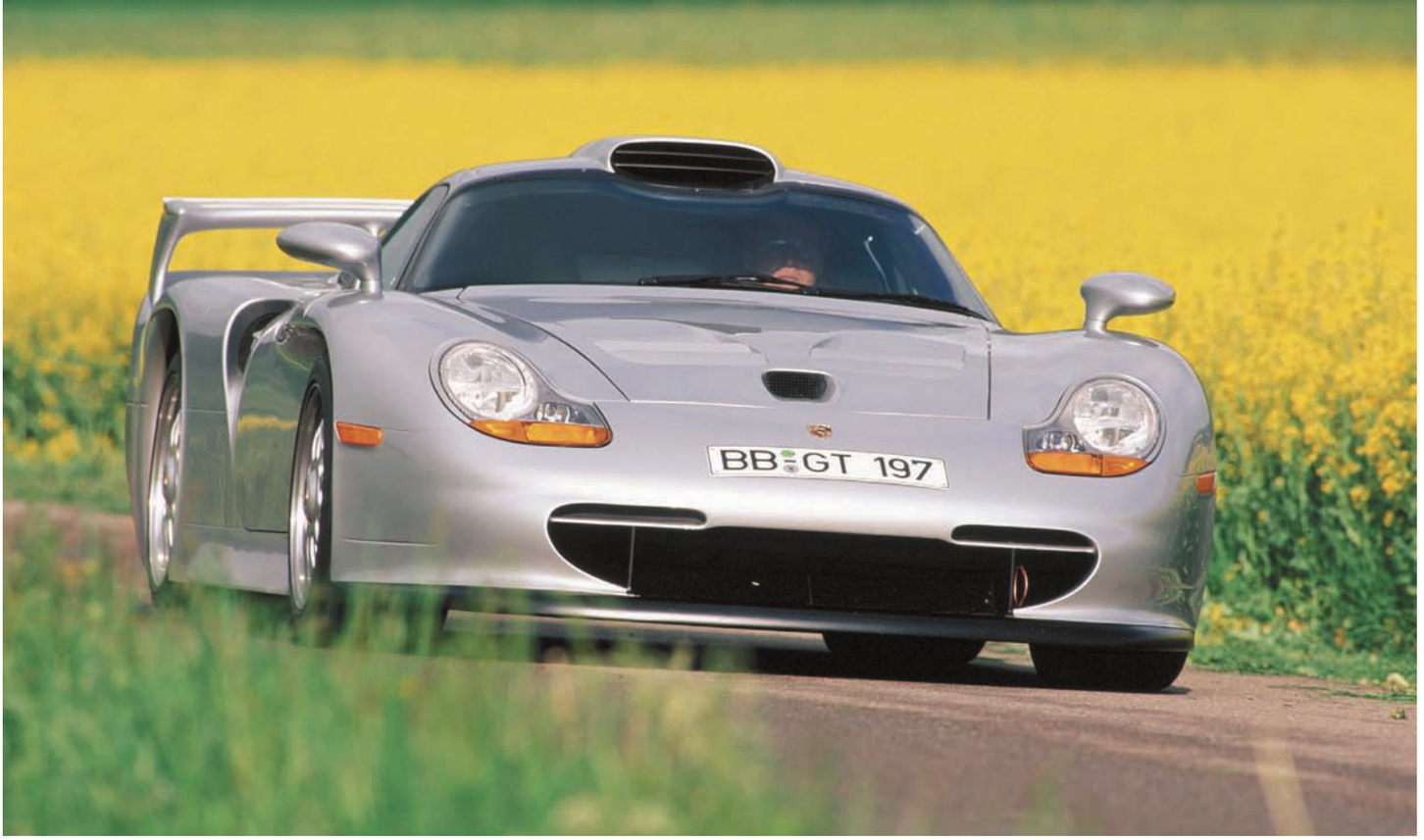
The 1994 Carrera RSR3.8 entered the pits at Le Mans. Raymond Bellm, Harry Nuttall, and Charlie Rickett started 25th on the grid in GT2 class but a mechanical failure retired them after just 32 laps. *Porsche Archiv*



Regulations for the BPR series required that race car makers produce a single road-going example of their GT1 racer to homologate it for competition. Porsche complied with this 1997 GT1 Strassenversion. *Porsche Archiv*

While Daytona had remained an IMSA event in 1995, Barth got the chance at the last minute to join Rob Wollek and Dominique Dupuy in the Jack Leconte's 911S LM. Despite handling maladies introduced during a practice session crash, the three finished second overall, 24 laps down. Seven of the 3.8 RSRs completed the race as well. Leconte's Porsche won again at Paul Ricard, at Jarama in Spain, in Japan at Suzuka, and at the season finale in Zuhaï, counting as the first international motor race staged in China.

BPR's international endurance series had been a group of races without championship points in 1994. It had matured in 1995, taking on a new name, the Global Endurance Series, with points attached. Porsches remained popular, and Daytona saw a range of 911s from best-finishing Jochen Rohr's GT2 led by veteran Hurley Haywood (fourth overall) to a half-dozen 3.8 RSRs, and down to a 993 Supercup that finished 24th. When the series reached Europe for the BPR rounds, the McLarens arrived and Porsche settled for a series of seconds, thirds, or sixths throughout the season. Even the arrival of the 911 GT2 Evo in midseason only meant Porsche briefly held pace with other evolutions. During the long series of North American IMSA events and following a rules mashup at Daytona that excluded Porsche's World SportsCar WSC95 entry, Porsches kept to themselves in Supercar contests.

Until Le Mans in 1996, Porsche's 911 GT2 Evo models held up the company honor throughout the BPR European events, though now not only were McLaren F1 GTRs leading them, but also Ferrari F40 GT-E models gave them fits. In France in June, Reinhold Jöst's Le Mans Prototype WSC95 Spyder (that Daytona disallowed 16 months earlier when Tom Walkinshaw entered it) came back, updated and upgraded, and won the 24-hour enduro. Porsche's brand-new 911 GT1s finished in second and third. The factory left its privateer GT2 entrants to contest the rest of the year, though the GT1 belatedly joined the series at Brands Hatch where it won, repeating at Spa and Zuhaï.

This was Porsche's 911 GT2 Rennversion that utilized a much taller wing than earlier versions starting in 1995. By 1998, this car offered racers 485 horsepower from its 3.6-liter RSR engine in a car weighing 2,464 pounds ready to race. *Porsche Archiv*

Nothing succeeds like success, and for Barth, Peter, and Ratel that meant their absorption into the FIA for 1997. Peter left, but the FIA asked Barth and Ratel to stay on. There were many motives for this consolidation, not least dwindling crowds as Formula One in Europe and NASCAR in the States pulled sponsor and spectator audiences away by the tens of thousands. Another factor influenced the FIA/BPR merger. Despite best efforts by BPR's founders, their series became the opposite of its original intentions of racing cars derived from series production. The rules that permitted only a single GT1 road car turned things on their head and Porsche was first violator. Their 911 GT1 was always a full-on race car from which they worked hard to devolve a single road legal variation. The Mercedes-Benz CLK GTR in 1997 put a fine polish on that technique. These unobtainable prototypes marginalized the privateers still supporting GT2 and GT3, but as racing historian Janos Wimpffen explained, most of them "simply wished they could buy customer versions of cars like the 911 GT1 and that the factory teams would go away."

At Daytona and Sebring, the prototype-like WSC cars claimed top honors while fastest among production-based sports cars went to 911 GT2s from either Fabian Roock's or Jochen Rohr's teams. World Sports Cars remained a North American series while in Europe the FIA GT championship season debut at Hockenheim witnessed six 911 GT1 cars chasing three McLaren F1 GTRs across the line. This was not a bad Porsche performance considering that five of the six entries were private teams who took delivery of their cars earlier that week. At Silverstone a month later, the factory-entry GT1 came fifth behind three McLarens and a Mercedes CLK. The good news was that Fabian Roock's GT1 followed a factory McLaren across the line for second place and a spot on the podium.

In the race shops at Weissach, mechanics and engineers assembled the customer racing 1997 GT1 models. Engines in these cars developed in excess of 600 horsepower for an automobile weighing just 2,310 pounds. *Porsche Archiv*

Le Mans in June 1997 provided an almost instant replay of the 1996 finish when Jöst's one-year-older WSC95 took overall honors from a McLaren less than a lap behind after 24 hours. Porsche GT1s finished fifth and eighth while the factory car succumbed to fire when a ruptured oil line sprayed the engine and ignited at speed on the Mulsanne. At the Nurburgring four-hour race two weeks later, 911 GT1s finished 8th, 9th, 10th, and 12th behind Mercedes and McLarens. A new factory-entered GT1 Evo gave McLaren and Mercedes a run at Spa, but it still could do no better than third, the car's best finish so far. It never got better than that, although that finishing order happened once again. At season end, Porsche finished in fifth place in manufacturer points.

Into the pits on Saturday evening before the long Le Mans night, GT1 Race number 26 had begun to collect dirt along with miles. The next afternoon, co-drivers Allan McNish, Stephane Ortelli, and Laurent Aiello won the race, completing 352 laps and covering 2,975.8 miles. *Porsche Archiv*

Customer racing staff assembled 911 GT3 Cup cars. These 360 horsepower cars weighed 2,464 pounds and Porsche assembled just 30 of the 1998 Cup cars. *Porsche Archiv*

Weissach engineer Roland Kussmaul anticipated better results from the 30 Supercup cars he developed in January 1998, cars officially named the GT3 Cup. Similar to the 964 and 993 versions, these 996 editions were stripped and lightened to 2,515 pounds. The new water-cooled engines developed 360 horsepower at 8,000 rpm. Patrick Huisman, who won the series in 1997 in the last of the 993s, repeated again in 1998, and then 1999 and 2000 as well. Jörg Bergmeister took the title in 2001 and Stephane Ortelli snatched it from him in 2002.

Racing year 1998 saw new series emerge and disappear in Europe while power plays for supremacy in the United States confused entrants and spectators whose response was to not support anybody. At Daytona, then part of the SCCA United States Road Racing Championship (USRRC), Gianpiero Moretti's Ferrari 333SP outsped Jochen Rohr's 911 GT1 Evo by eight laps to win. Sebring, part of the IMSA's World Sportscar Championship, saw Moretti repeat, but Dave Maraj's GT1 Evo finished one lap behind and just behind him came Don Panoz in his GTR-1. More importantly, racing year 1998 saw Porsche's 911 GT1-98 appear. It was all-new, Porsche's first carbon-fiber tub. It was much less like a 911 than the previous years' car had been. At Oschersleben near Stuttgart, a race sanctioned as part of the FIA's GT Championship, Porsche debuted the car, though it followed three Mercedes past the checkered flag. One month later at Silverstone for the next FIA event, three new 911 GT1 98s finished second, third, and fifth, interrupted by two Mercedes.

Of course, no matter what any racer says, it is Le Mans that every driver and manufacturer works to win. Against a full complement of GT1 competitors, Porsche had its share of skill and luck, and both factory GT1 98s took top honors as Allan McNish led teammate Jörg Müller (one lap behind) across the finish line in formation. There were no further GT1 98 victories, though McNish accumulated a collection of second, third, and fourth place finishes through the season as he copiloted one or the other factory car. In the end, despite winning Le Mans, it was a frustrating season for Porsche as it finished second in FIA GT1 behind Mercedes entrant AMG.

It is a well-known story what happened inside Weissach soon after. With FIA regulations due to change again, Porsche chose to sit out the 1999 season while it developed a new car for the year 2000, a new open-top sports racer for the Le Mans Prototype-1 category, LMP1.

Accelerating out of Laguna Seca's hairpin turn number 11 during the 2004 ALMS race, Mark Leib and Romain Dumas exchanged duties holding off Corvettes, Ferraris, and Aston Martins. Leib/Dumas won GT class in their GT3 RSR, finishing eighth overall. *Porsche Archiv*

FROM LMP TO SUV? NO, TO C-GT!

In the mid-1990s, Herbert Ampferer had worked for Horst Marchart on a secret project to develop a 3.5-liter V10 for Formula One following the disappointment with the 12-cylinder engine for Footworks Arrows. Then he, as an engine designer, and Norbert Singer supervised GT1 racing operations. Together they achieved Wiedeking's goal to win Le Mans in 1998.

"Then one day, we had to talk to Wiedeking after Le Mans 1998," Ampferer said. "'What's now?' Mr. Wiedeking asked.

"Well, for '99 the time is too short and it's too tight of budget. But for 2000, that would be something. New car, new engine. [New regulations.] The V10 Formula One, the carbon chassis from 98? But 3.5 liters is not enough for Le Mans. And an engine that was designed for two hours or three hours is not good for 24 hours. So you need to do something new," Ampferer added.

"We redesigned it from 3.5 to 5 liters. We took out the pneumatic valves and used standard spring valves. But other considerations on a modern V10 engine, V-angle, torsional vibration of the crankshaft, of cam drive, gearing systems of cam drive, the cams themselves . . . if it works for a Formula One engine for 15,000 revolutions for two hours, it should work for a Le Mans engine, which runs at about 8,000 rpm. So we just took it as it was. Increased the displacement. This was the V10 for Le Mans. Same length because the cylinder bores were the same, the camshaft was the same, but different deck heights because we increased displacement.

"A Formula One engine of the day had a stroke of 40 millimeters. But it has a bore of maybe 95 millimeters. If you increase the stroke up to say, 70 millimeters, you have something like growing from 3.5 to 5 liters.

"But we did not go to Le Mans. The car was ready, but we did not go.

"We talked with Wiedeking. He said, 'Nice car, the race car.' But he asked me: 'What difference does it make if Porsche goes to Le Mans and wins 17 times instead of 16 times. It's another Le Mans win? Who is next to us?'" Ampferer told him it was Ferrari with eight wins.

"He asked me another question: 'What do you think we are as Porsche? Are we the sports car manufacturer in the world?' Back in 2000, there were rumors and stories from other OEMs making supercars. Enzo, McLaren SLR," Ampferer said.

"'We are the sports car manufacturer, and these are sports cars they are talking about. So we need a sports car like that. What do you think? Should we do that instead of Le Mans? Doesn't it make more sense than to go once again to Le Mans?'

"And I had to agree with him. Yes, yes sir. It was hard. Because it was a really good race car."

Test drivers had set lap records at Weissach. Some said that only recently has anything gone faster. "But on the other hand, having something as a vision in front of me, which was a super sports car, was good too," Ampferer said.

The super sports car reached the market in 2004 as the Carrera GT.

Patrick Long, Richard Lietz, and Raymond Narac raced at Le Mans in 2008, driving their day-glow painted GT3 RSR. They retired after an accident in the night. *Porsche Archiv*

With the introduction of the 997 in 2004, Weissach again turned its attention to Cup cars and it turned out 170 of them from late 2005 into 2006. The IMSA GT3 Cup series was the destination for 40 of the cars, while the remainder stayed in Europe for Supercup entrants racing in support of the F1 events and for the national Porsche Cup races across seven nations. These cars delivered 400 horsepower at 7,300 rpm. For the 2008 season, output rose to 420.

For 2009, Porsche cleared a long-anticipated hurdle, increasing displacement on its racing engines to 3,996cc with bore and stroke measuring 102.7x80.4 millimeters. With air restrictors required for FIA events, this four-liter output was 450 horsepower at 7,800 rpm for its most potent GT3 RSR models. Power reached the rear wheels through a six-speed sequential gearbox. Weissach delivered 214 of the 420 horsepower GT3 Cup cars and Cup S versions (for FIA GT3 endurance events) throughout the world. Of this quantity, four went to the SCCA Speed GT Championship in support of the ten-event American Le Mans Series.

»

Pike's Peak veteran and television director/cinematographer Jeff Zwart broke the "Time Attack" class record in his 2010 GT3 Cup car. Zwart has taken seven titles in twelve attempts. *Dave Engelman/ Porsche Cars North America*

Porsche's most startling race car concept, the 911 GT3 R Hybrid, debuted at Nurburgring 24 Hours. The hybrid system used energy collected in braking to spin an "electric flywheel mass battery," which drivers then called on to return equal energy to electric motors inside the front wheels. *Porsche Archiv*

"'We are the sports car manufacturer, and these are sports cars they are talking about. So we need a sports car like that. What do you think? Should we do that instead of Le Mans? Doesn't it make more sense than to go once again to Le Mans?'"

— Herbert Ampferer

At Geneva, Porsche debuted its most complex 911 race car yet, the 911 GT3 R Hybrid. In addition to the four-liter 480-horsepower gasoline-fueled flat six internal combustion engine at the rear, the car also incorporated an electric motor producing 60 kW in each front wheel. Instead of passing this electricity onto heavy storage batteries, the Porsche system spun a flywheel generator up to 40,000 rpm, storing electric energy as kinetic rotation energy. Applying the brakes charged the system. Full acceleration reversed the process and fed the equivalent of roughly 250 horsepower to the front tires. The GT3 R Hybrid had its racing debut at the 24-hour race at Nurburgring, where it led overall for more than eight hours and competed for 22 hours 15 minutes until, ironically, its gas engine failed. Engineers confirmed that the car required one fewer pit stop to cover the same distances than its closest competitors. This gave it significant time advantages.

Throughout the 2009 and 2010 seasons, the more traditional GT3 RSR model won GT2 class in both the American Le Mans Series (ALMS) and the European Le Mans Series (LMS). In 2009, the RSR also won the FIA GT championship in GT2 class, and in 2010, the car claimed the GT2 class victory at the 24 Hour of Le Mans. For the 2011 season, the RSR delivered 455 horsepower at 7,800 rpm and weighed 2,684 pounds.

With the advantage of self-generated electric energy on board, the GT3 R Hybrid needed a pit stop every ten laps while everyone else went in after eight or nine times round the 15.7-mile combined circuit. During the 24 hours, the Hybrid held the lead for eight of them, until something failed in the gas engine and their race ended. *Porsche Archiv*

Porsche revealed that since 1998 it had delivered nearly 2,400 of its 911 GT3 Cup cars. Through 2011 and 2012, Cup cars competed in 19 Porsche-brand series throughout the world as well as GT and other long-distance races. Since 2005, Porsche had manufactured Cup cars on the same Zuffenhausen assembly line as series production automobiles. The Motorsports Center in Flacht near Weissach completed general setup and tested the cars on the circuit. The GT3 R complied with and raced in championships adhering to GT3 regulations while Flacht assembled the 460-horsepower RSR cars for contests following GT2 rules, including ALMS, LMS, the 24 Hours of Le Mans, and the FIA World Endurance Championship. These first-generation 991 Cup cars developed 460 horsepower at 7,500 rpm from the 3.8-liter flat six. With new cars from Ferrari and Corvette, the 50th Anniversay season promised intense competition.

The 2009 GT3 Cup car tested extensively at Weissach before heading out among customers and competitors. It was the first 911 race car to use the new DFI direct fuel injection system. *Porsche Archiv*

At the end of February 2013, Porsche unveiled its GT3 RSR, meant for Le Mans and other classics of endurance. The World Endurance Championship series began at Silverstone in mid-April where the car first met its competitors. *Porsche Presse*

EPILOGUE: ASPIRING TO THE DREAM

"The phenomenon of the 911?" Harm Lagaay asked rhetorically. "Not only is it a sports car in its own right, in its own way, but it is a segment in the automotive world that is extremely attractive. You build a car for that amount of money, you make it unique, you keep it unique, and that's why people drive it. They compare themselves with it, because it's a successful thing."

For all of its 50 years and for most of a decade before it, the Porsche 911 has reflected the strong personalities who influenced this automobile. This started with the efforts of three men. First came Ferry Porsche, with his adamant insistence that his new automobile was a 2+2 sports car. Second was his son F.A. Porsche, who directed and managed the highly talented team that developed the shape and forms that now are part of our automotive language. Third was Ferry's nephew Ferdinand Piëch, whose concept for the engine made it roadworthy and race-ready from the start. With those decision makers and the preferences they fought for, the 911 began its life.

Hundreds of others played significant roles: Ernst Fuhrmann was the car's reluctant champion even as he planned its funeral. Under Fuhrmann's direction, Bott, Singer, Berger, and Brodbeck tamed the car's handling, Then Mezger and Schäffer turbocharged it and made it Ruler of The Race Tracks even as Fuhrmann still hoped to guide the car into oblivion. Then came Peter Schutz, the car's advocate. He saved the 911. His arrival allowed Bott to be the car's enthusiastic innovator. Together they removed its roof. Then, full of faith in the 911s ability to do anything, they put four-wheel-drive under it and took it to the desert where Kussmaul and Ickx and Metge proved the bosses were right.

Later, as water-cooling became essential and inevitable, Horst Marchart devised an idea that perplexed his engineering staff and bedeviled his stylists. This was the concept of two cars with one face. This plan created two new Porsches with flawless pedigree and masses of shared parts and calculable economies. Working with Wendelin Wiedeking, the production manager who became CEO, those two championed the 996 and its similarly-faced 986 Boxster. They and those cars saved the company; sales proceeds and favorable exchange rates replaced accountant's red pencils with black. While Marchart advanced on the next water-cooled 911, Wiedeking advanced on Volkswagen. Soon after Marchart retired and Wiedeking was told to go, it was Volkswagen executives who looked on proudly as Porsche debuted its newest 911 technological tour de force.

The 50-year evolution from 901 to 991 was incremental. The differences sometimes were clearest in the details which, aggregated, have established the 911's identity. Aspiring to association with those traits and characteristics has been a potent motivator for engineers, designers, and customers alike. As Peter Schutz and subsequent Porsche officers discovered, for the company to prosper, that aspiration must thrive. Schutz expressed it as a kind of mission statement during an interview in 2004: "Porsche," he said, "is in the business of selling memberships in the dream."

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