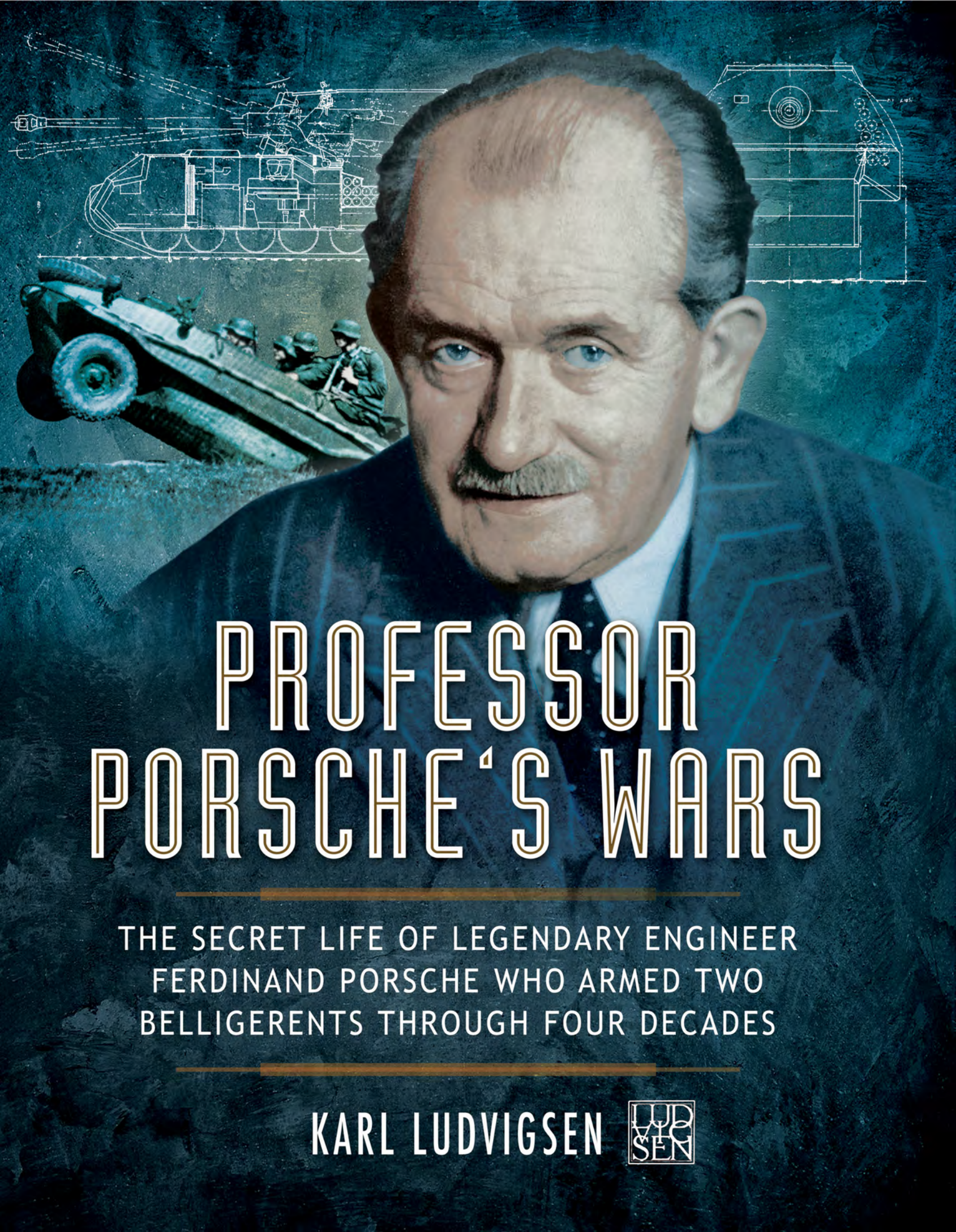

PROFESSOR PORSCHE'S WARS

THE SECRET LIFE OF LEGENDARY ENGINEER FERDINAND PORSCHE WHO ARMED TWO BELLIGERENTS THROUGH FOUR DECADES

KARL LUDVIGSEN

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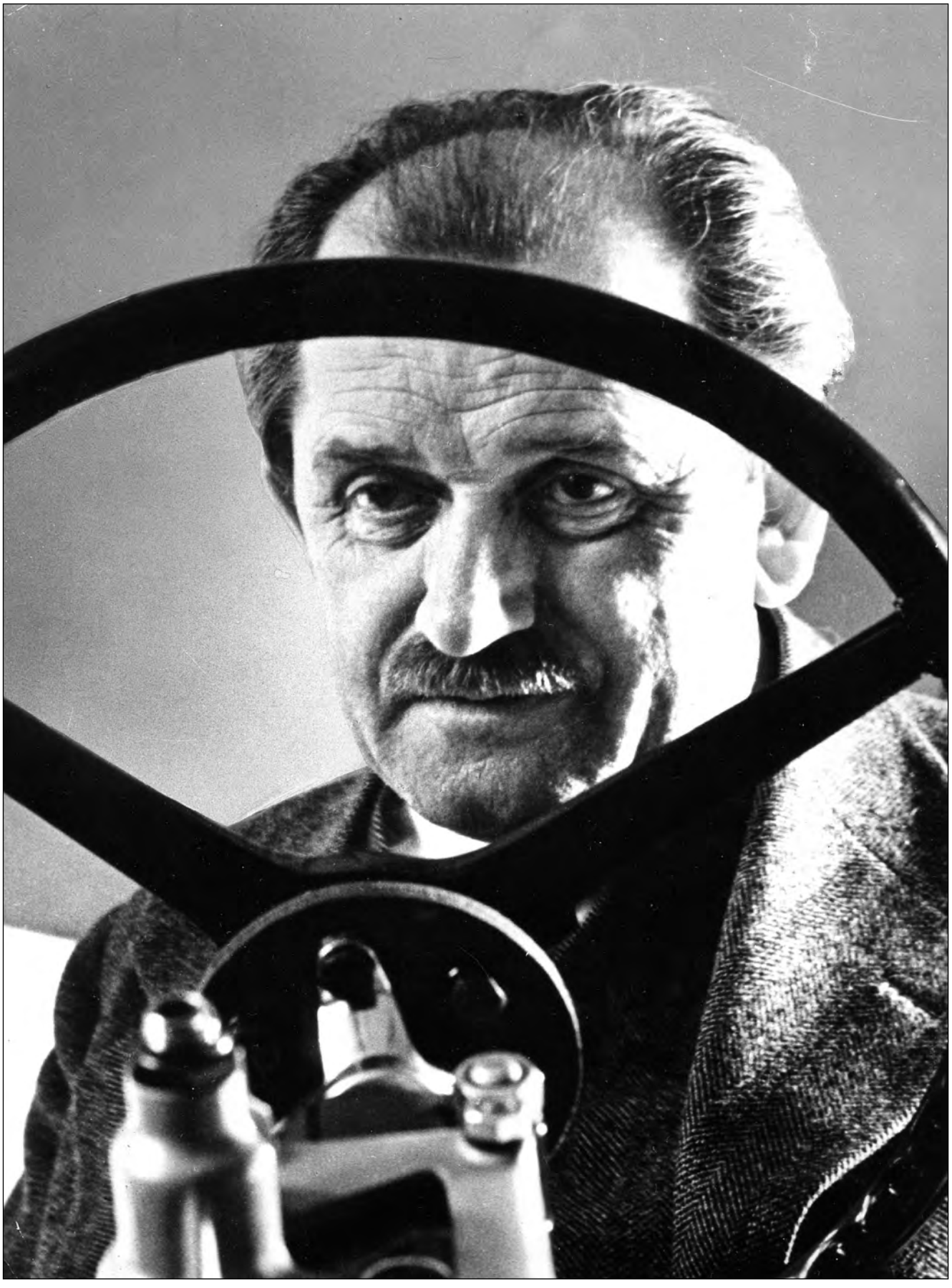

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Karl Ludvigsen

Pen & Sword
MILITARY

First published in Great Britain in 2014
and reprinted in 2015 by
PEN & SWORD MILITARY
an imprint of
Pen and Sword Books Ltd
47 Church Street
Barnsley
South Yorkshire S70 2AS

ISBN 978 1 78303 019 4

A CIP record for this book is available from the British Library.

Printed and bound in India by Replika Press Pvt. Ltd.

Typeset in Sabon by
CHIC GRAPHICS

Pen & Sword Books Ltd incorporates the imprints of
Pen & Sword Archaeology, Atlas, Aviation, Battleground, Discovery, Family History, History, Maritime, Military, Naval, Politics, Railways, Select, Social History, Transport, True Crime, and Claymore Press, Frontline Books, Leo Cooper, Praetorian Press, Remember When, Seaforth Publishing and Wharncliffe

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Dean Batchelor
and
L. Scott Bailey
who backed my first explorations
into the world of Porsche

INTRODUCTION

When I asked Ernst Piëch where his grandfather was based during the Second World War his answer surprised me: 'Well, mainly in sleeping cars in trains between Stuttgart, Berlin and Vienna. He more or less slept in the train and worked during the day. Sometimes he stayed in a hotel, but he was more and more on trains than in hotels. He was very, very busy.'

I knew anecdotally that Ferdinand Porsche was well occupied during the Second World War but this was a fresh perspective from a man who knew. Thanks to Ernst Piëch, Porsche's oldest grandson, I had a good grasp of Porsche's work in the First World War. He backed research into this period that led to my book *Porsche – Genesis of Genius*, published by Bentley. This covers the Porsche career from the earliest days to the establishment of his own engineering company at the beginning of the 1930s.

Also for Bentley Publishing I researched some aspects of the pre-war and wartime activities of Porsche and his designers when they were evacuated from Stuttgart to the Austrian town of Gmünd for safekeeping. In spite of these ructions they and their leader, the Professor, kept most of their many platters spinning. Porsche's son Ferry played a progressively more important role.

In the course of these researches I learned much that has hitherto been inadequately recorded about one of the most prolific and productive engineers ever to tread the world's stage. Ferdinand Porsche is known for his cars, especially the Volkswagen, the Auto Union racing cars and, at the end of his career, the first Porsches. Knowledgeable readers will also be aware of the cars he designed for Lohner, Austro Daimler, Mercedes, Mercedes-Benz, Steyr and Wanderer, among which are some of the most respected automobiles of all time.

His career as a designer and builder of automobiles marks Ferdinand Porsche as one of the most creative and forward-thinking of his ilk. His achievements in that field are rivalled by very few. Yet Porsche had another vocation altogether, one that ranks virtually as a secret career. His work for the military in and between both world wars is little known and poorly understood. This remains the case although his contributions to military technology were astonishingly significant and pathbreaking. Often – and this is one reason for the dearth of attribution to Porsche – they only bore fruit after he left the company for which he was working.

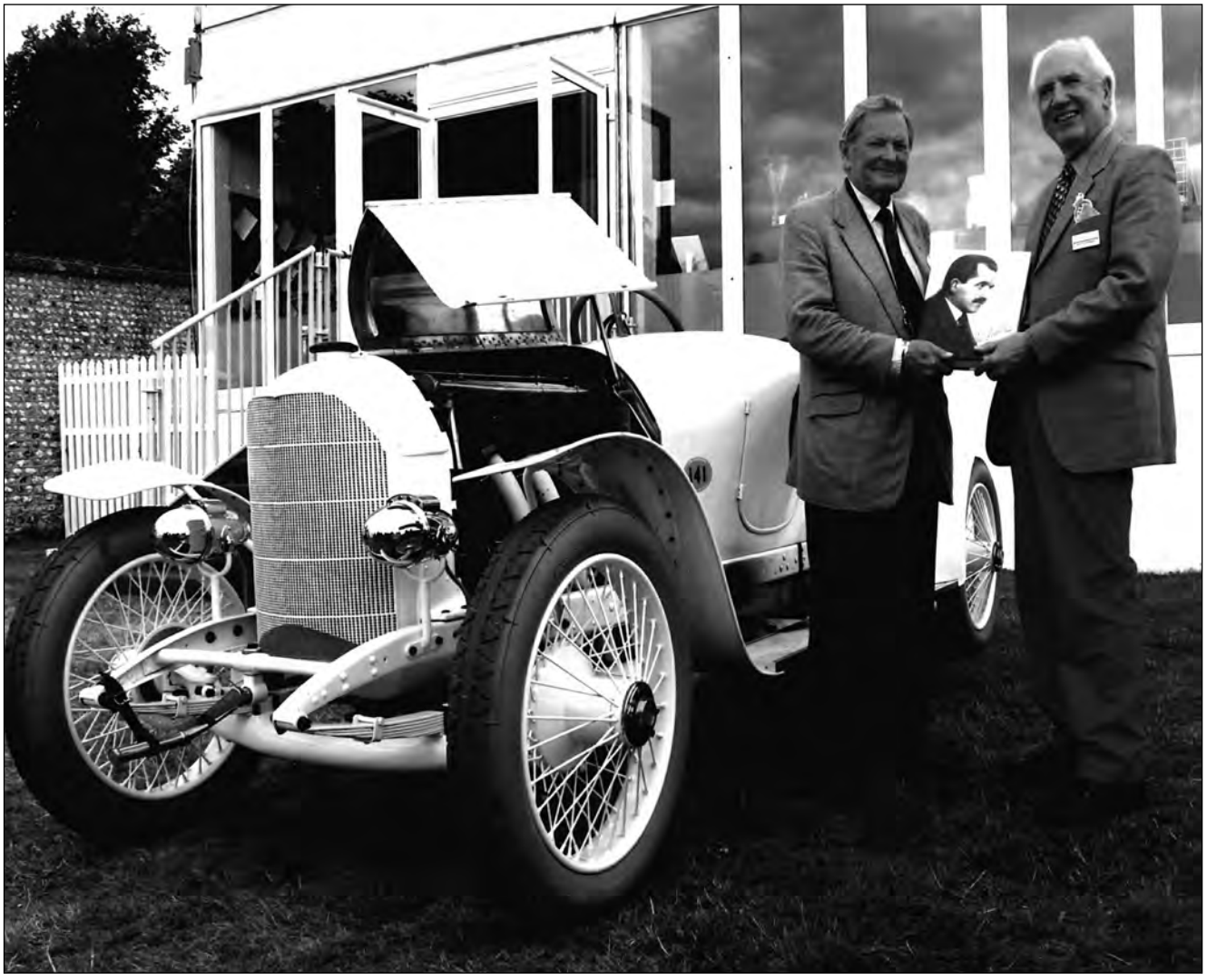
No member of the Porsche/Piëch dynasty has done more than his oldest grandson to keep alive the memory of Ferdinand Porsche and his work. His career and its consequences are subjects of the contents of a remarkable museum, fahr(T)raum, opened in 2013 at Mattsee, Austria, by the Family Piëch-Nordhoff. They do not exaggerate by saying of its exhibits and displays

that 'All of them are the work of an unrivalled visionary and pioneer of his time and beyond.'

In our conversations Ernst Piëch has brought to life the events of his grandfather's later years. 'My grandfather was very, very open with me,' said Piëch. 'He'd take me to every discussion. He said, "Look, this is top secret but you should see it." At that time I knew a lot of things which were absolutely top secret.

'We were driving at St Valentin with a tank chassis on the test track,' Piëch continued, 'up a slope of 45 degrees. When we were half-way up grandfather said "Stop" so I stopped. Then he said "Start again" and it didn't start. It just sprayed stones behind us. Then he said "Stop again" and then "Can't you use a softer clutch?" They made some changes and then it went up. But in a tank, at 45 degrees, with both of us in the tank – it was quite something.'

Ernst Piëch viewed at close range the techniques that made and kept Ferdinand Porsche a leader in his field when working under two diametrically different ideologies in two world wars. 'What I found brilliant,' he said, 'and



The author, right, and Ernst Piëch present their book on the early work of Ferdinand Porsche next to Piëch's superbly restored 1910 Prince Heinrich Austro Daimler racing car.

so different to the other engineers, was that my grandfather was very fair to other ideas.

'After the war,' Piëch continued, 'we went to an automobile show in Paris. We were standing in front of a car – a very famous car – and he said, "Look at this. They have a brilliant idea how to do it." He was quite without any jealousy. He really said, "This is just brilliant." Throughout his life he kept a big team together in this way by accepting other ideas and combining ideas to achieve a good result.'

As well, Porsche was daring. Although he sometimes gazed sideways at the work of others, Porsche was happiest when creating from first principles. This implied risk but he knew that without risk no gains could be achieved. His daring showed in his willingness not only to test-drive his creations but also to race them in open competition. He shared this trait with only a few leading engineers in the early days of the auto. Porsche continued personally test-driving his creations right through the Second World War to the first sports cars that bore his name in 1948.

Burnished by his daring was Porsche's confidence. As this record shows, he was not one to shrink from a challenge. Backed by his first-class team, he was confident of being able to cope with any requirement. Without pomp or artifice he manifested this confidence in his dealings with his colleagues and, most importantly, with his customers. They could only be impressed by the clarity, logic and passion with which Porsche set out his stall. No one would have picked this short, often dumpy, balding and moustachioed hard-core engineer as a superb salesman, but his record shows that Ferdinand Porsche's confidence helped make him one of the very best.

I am tempted to make the claim on his behalf that Ferdinand Porsche surpasses all other engineers in the depth and breadth of his contributions to military technology when taken over the entire scope of the years from 1914 to 1945. Challengers doubtless exist; the reader is encouraged to identify them. But they will have to go some to match the achievements of Porsche, who exploited in both world wars the Mixte drive system that he first invented in 1901. That alone is a distinctive hallmark of the life and work of this phenomenally creative engineer and outstanding personality.

Karl Ludvigsen
Hawkedon, Suffolk
April 2014

Reviewing maps of the manoeuvres in Austria-Hungary's Sárvár region, Crown Prince Franz Ferdinand was seated next to his driver Ferdinand Porsche in the latter's latest creation, which drove its front wheels through hub motors.

CHAPTER 1

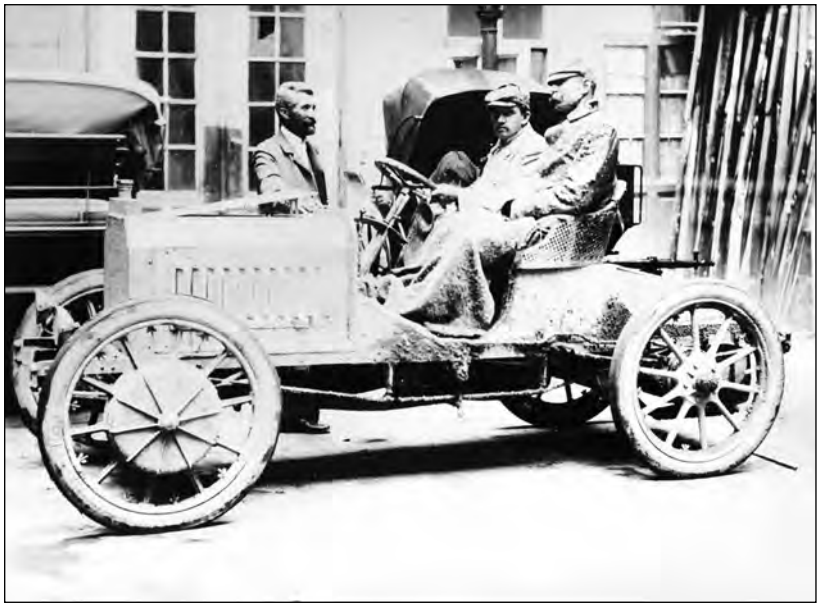
PORSCHE MEETS THE MILITARY

September of 1902 found the armed forces of Austria-Hungary staging their autumn manoeuvres. They marshalled near Sárvár in the west of Hungary, close to its border with Austria, where foothills and the Rába River, winding its way north to the Danube at Györ, offered challenging countryside. Commanding the Western Army was Archduke Franz Ferdinand, heir-apparent to the Habsburg throne and Royal Prince of Hungary and Bohemia.

Important though traditional horse-drawn cavalry was to the Archduke and his noble colleagues, Franz Ferdinand wanted to be seen as welcoming the motor vehicle to his armies. Accordingly he was chauffeured on the manoeuvres by a reserve infantryman in the Imperial and Royal Deutschmeister Regiment, who in fact had designed the radical new car in which they rode. This was Ferdinand Porsche, just turned 27, at the wheel of his Lohner-Porsche.

Porsche's creation was radical, driven through its front wheels by electric motors. Their power came from an engine-driven generator that gave great flexibility to what the engineer called his 'Mixte' power train. This all-Austrian innovation was welcomed on parade by the high and mighty. They came no higher and mightier than Crown Prince Franz Ferdinand, who settled comfortably into the Lohner-Porsche Mixte to be driven, with his retinue, by Porsche from his headquarters to and around their military manoeuvres.

Afterward the Archduke's adjutant wrote to Porsche, saying 'how satisfied His Most Serene Highness was in every respect' with the services of both man and machine. Naturally enough, Porsche had worn the uniform appropriate to his lowly rank in the reserve. This was part and parcel of his campaign to interest the dual monarchy's military in his company's products. Indeed, the Sárvár manoeuvres launched Porsche's career of more than 40 years in the service of the military. Never more, however, would he see the need to wear a uniform.



A proud Ludwig Lohner caressed the bonnet of the Lohner-Porsche Mixte with which Porsche, at its wheel, won the Large Car Class of 1902's Exelberg hillclimb. Later in the year the same car was used for military manoeuvres, as at left.

Germany's forces staged their own manoeuvres a few months earlier. Their

nation having pioneered horseless carriages, thanks to Gottlieb Daimler and Karl Benz, Germany's General Staff officers took pride in rolling entirely on wheels – bicycles, motorcycles and automobiles. Exploiting a new age of motive power, Germany greeted the new century with a wholehearted commitment to the motorisation of its military.

Neighbouring ally Austria-Hungary could not afford to tarry. Ending almost 350 years of rule by occupiers, Franz Josef I formally established the dual monarchy of Austria-Hungary in July 1867 in response to the strident nationalism of Bismarck's Prussia. He ruled both as emperor of Austria – a title dating from 1806 – and as king of Hungary through a cabinet, common to both, that dealt with finance, defence, an internal customs union and external relations. Franz Josef allied with Germany in 1879 and added Italy, Serbia and Romania as alliance partners by 1883.*

The emperor-king and his kindred Habsburgs had their hands full with the aspirations for independence of their many member states. They ruled through an extensive bureaucracy from their capital in and near Vienna, which thus gained primacy over their empire's other major cities Budapest and Prague. Popular reforms contributed to educational advances and rapid industrialisation. Vienna was the cultural and commercial hub for Austria-Hungary's 50 million citizens, for whom their nobility and military were important sources of pride and a sense of unification.

Leading the charge to give motive power to the dual monarchy was Captain Robert Wolf, heading the army's research and development in his domain at Klosterneuburg on Vienna's north side.† Strikingly open to new ideas, Wolf saw motor vehicles as a means of giving his artillery greater mobility at lower cost. Austria-Hungary was in advance of many other nations in recognising and exploiting the potential of powering its military, though it was a step resisted by traditionalists reluctant to give up the glory and versatility of the horse.

As early as 1897 Wolf ordered a 5-ton truck from Germany's Daimler, dealing through its Vienna agents Bierenz & Hermann. In 1898 he received it, an oak-framed machine with a twin-cylinder 6.0-litre engine giving 10hp. It was named the 'Dromedary', a tradition followed with two more German-built vehicles, the 4-ton 'Hyena' and 3-ton 'Kangaroo'.‡ It was Wolf's idea to fit his trucks with a powered winch whose long cable could be used to extract a heavy vehicle from any situation.

When it came time to order a 2-tonner, Wolf could get it from a home producer. Daimler's Austrian agent became a vehicle maker on 11 August 1899 when the Daimler-Motoren-Kommanditgesellschaft Bierenz, Fischer & Co. was founded. Its lengthy cognomen acknowledged the role in the company of Josef Eduard Bierenz, who had been Gottlieb Daimler's man in Austria since 1890. It also marked participation in the new company by Eduard Fischer, whose family-owned Fischer Brothers machine works was founded in 1848 and had been based in Wiener Neustadt, 26 miles south of Vienna, since 1866. Fischer placed his facilities at the disposal of this pioneering effort to build Daimler-patent cars and trucks for the Austro-Hungarian market.

Initially structured as a partnership, the new company marked time until

* Italy would prove an unreliable ally. It chose neutrality in the early phases of the First World War and then joined the Entente Powers to fight Austria-Hungary.

† Wolf would soon be promoted to Major and later to General.

‡ The naming of its motor vehicles was a custom continued by the Austro-Hungarian military until 1913. The names of various predatory hounds were given to workshop and support vehicles, while tugs were named after large beasts and 2- and 3-tonners after small and domesticated animals.

its designated chief engineer, Gottlieb Daimler's eldest son Paul, was freed of his responsibilities in Stuttgart to move to Wiener Neustadt. The appointment was made by Paul's father before his untimely death in March 1900. In January 1902 young Daimler finally took up his post. Effective 24 June of the same year, the company was reformed as the Österreichische Daimler-Motoren-Gesellschaft, a corporation.

Branded as Daimlers, the new business's products offered little competition to those from the mother company in Stuttgart. Some passenger cars were made, based on Wilhelm Maybach's designs for the Germany company. A Paul Daimler design with a transverse twin-cylinder engine failed to catch the public's fancy. Concentrating on commercial and military vehicles, the company was pleased to receive Robert Wolf's order for a 2-tonner. Delivered in time for the 1902 manoeuvres, this was named *Ilitis* or 'Polecat'.

Ferdinand Porsche's Mixte was a brash interloper among the motor vehicles deployed near Sárvár in the dual monarchy's autumn 1902 exercises. It was a product of another enterprise eager to make its mark in Austria-Hungary's vehicle market. The Royal and Imperial Court Carriage Factory Jakob Lohner & Co. was no callow newcomer to vehicle manufacture. Tracing its origins to 1821, as a coachbuilder Lohner supplied 'by special appointment' the courts of Sweden, Norway and Romania as well as Austria-Hungary from its workshops in Vienna's Floridsdorf. It proudly celebrated its 20,000th carriage in 1890.

A third-generation head of Lohner, at the age of 34 Ludwig Lohner took command of the company on his father's death in 1892. Lohner soon viewed his inheritance as a poisoned chalice, for the market for fine horse-drawn carriages was commencing its decline. Four-figure annual volumes soon contracted to the low three figures – although celebratory 1900 was a good year with 508 carriages.

An engineer by training and young enough to be open to new ideas, Ludwig Lohner was easily seduced by the exciting new world of the motor vehicle. However, it was, wrote Lohner historian Erwin Steinböck, 'a breathtaking leap into cold water', for this new technology was to bring as many risks as opportunities at a time when petrol- and battery-powered vehicles were vying for marketplace supremacy with steam power an outside bet.

A warm personality with a lively sense of humour, seldom without a smile, Ludwig Lohner had an outgoing nature that was an asset when he travelled abroad in 1896 to assess the state of Europe's auto industry. He hoped above all to forge an alliance with Cannstatt's Daimler, but he declined a proposal that would have made Bierenz a partner as well. Nor did he find Rudolf Diesel ready to build auto engines. Experiments with French engines were disappointing.

Finally Lohner decided to explore opportunities for electric cars, whose smooth, silent progress and easy operation seemed a perfect fit with his upper-class clientele. For power Lohner turned to Austria's number one firm in electrical equipment, United Electrical Corporation, formerly Béla Egger &

Company. VEAG, its German acronym, kept its links with Béla Egger because the Hungarian had made a great name in Vienna as Thomas Edison's representative.

With the VEAG's help Ludwig Lohner's own team built its first electric car. Dubbed an Egger-Lohner, it united two great Viennese names. When first tested, in June 1898, 'We were initially unable to climb the gradient on Börsegasse,' recalled one of the VEAG's men who was assisting the trials, 'but after replacing many of the lead fuses we even reached the top of Ringstrasse.

'I was then given the job of strengthening the motor,' the Egger man continued. 'I don't need to say how much pleasure it gave me to undertake this task. After this augmentation we even managed to climb Berggasse and its 10 per cent incline with only one lead fuse. These events explain the mysterious, nocturnal journeys that took place at that time in Vienna's 9th district, which constantly plunged the automobile quarter of the city into turmoil.'

Enter, his coveralls deeply stained as usual, the unprepossessing figure of Ferdinand Porsche. Scarcely 5 feet 6 inches tall, so slender his mother would always worry that he wasn't eating, the 22-year-old Porsche wore his hair medium-length and, like his contemporaries, was growing a moustache. As overseer of test activities at the VEAG it fell to his lot to assist in the trials of the motors they had made for an important customer. This held the potential of significant business for the VEAG, as Ludwig Lohner pointed out in his negotiations with them.

Ferdinand Porsche had been with the VEAG since 1893. It was his university. He had arrived as an 18-year-old trainee whose main duties were cleaning the workshop and greasing the equipment. Fascinated by the potential of electricity, he lost not a moment in exploring the works Béla Egger had founded. In his spare time the youngster audited classes that interested him at Vienna's Technical University. Recognising his potential, Ernst Egger gave Porsche fresh responsibilities that he soon mastered. When Ludwig Lohner arrived with his commission, Ferdinand Porsche was in charge of the VEAG's test laboratories and an assistant in the calculation office.

From his earliest days Porsche was intimate with machinery and making things. Behind the family home at number 38 on the right bank of the Niesse River in Maffersdorf, Bohemia was the tinsmithery owned by his father Adolf. With its staff two-dozen strong, it was an important supplier of plumbing, carpentry and metal products to businesses in the area and in Reichenberg, the city less than 3 miles to the west. The region's economy was uplifted during the nineteenth century by the boom in wool and textiles.

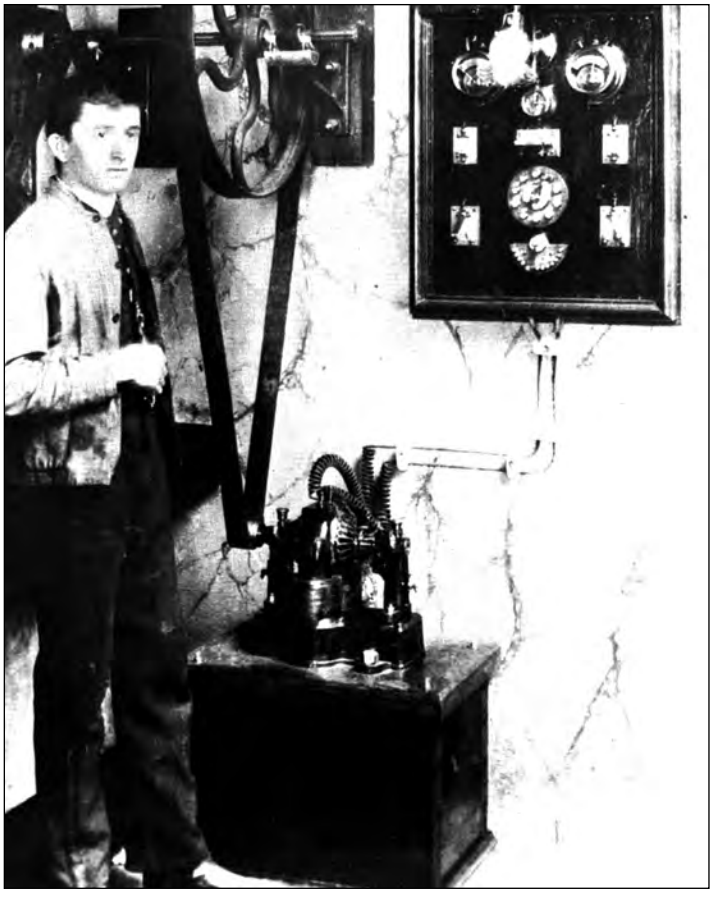
At the empire's northernmost fringe, a scant 10 miles from the border with Germany, Ferdinand Porsche was born on 3 September 1875. He was the second son of Anton and Anna Porsche.* Anton and Anna, née Ehrlich, who had married in 1871, were 30 and 25 respectively at the time of Ferdinand's birth. The newcomer was the third to arrive. Eldest was a brother, Anton, followed by Hedwig. Trailing Ferdinand into the Porsche family were Oscar and Anna in that order. When Anton sadly died after an accident in the workshop's machinery, Ferdinand as the next eldest son was expected to train to take over the management of the tinsmithery.

* His birth was not registered until the 8th. Also born in 1875 were Walter Chrysler, Harry Miller, Alfred P. Sloan Jr., Maurice Ravel, Albert Schweitzer and Rainer Maria Rilke. Born the following year was Charles F. Kettering, an American inventive genius. Bizet's *Carmen* was first performed in 1875 and Mark Twain's *The Adventures of Tom Sawyer* was published the same year.

The Roman Catholic Porsche family could trace its origins to 1672. The name had evolved from 'Borso' centuries earlier, derived from the male name 'Borislav', through 'Boresch' and 'Porse'; in the seventeenth century some were spelling it 'Pursche'. Ferdinand was named after his paternal grandfather, who was a tenant farmer and master tailor. Great-grandfather Antonius mixed carpentry with hydraulic engineering, looking after his region's brooks and canals. Earlier antecedents made their living on the farm. Weavers were among Anna Ehrlich's forebears.

Although the family enjoyed reasonable prosperity, life in the Porsche household was no bed of roses. 'Anton Porsche was a very strict and harsh father and taskmaster,' wrote Porsche biographer Richard von Frankenberg. 'He ran his family in a patriarchal manner.' He reserved the more genial side of his character for his civic activities, serving as vice-mayor of Maffersdorf, an official in the fire department and a member of a banking board. Young Ferdinand learned early that the best policy at home was to keep his head down and get on with his work.

In 1886, while Porsche was an 11-year-old, electricity came to Maffersdorf. First to exploit its labour-saving potential was the textile mill of the Ginzkey brothers, Willy, Ignatz and Alfred, employing 2,000 of the town's almost-6,000 population. Workmen brought from Vienna to electrify Ginzkey's soon got used to the curious youngster under their feet, probing their installations and peppering them with questions.

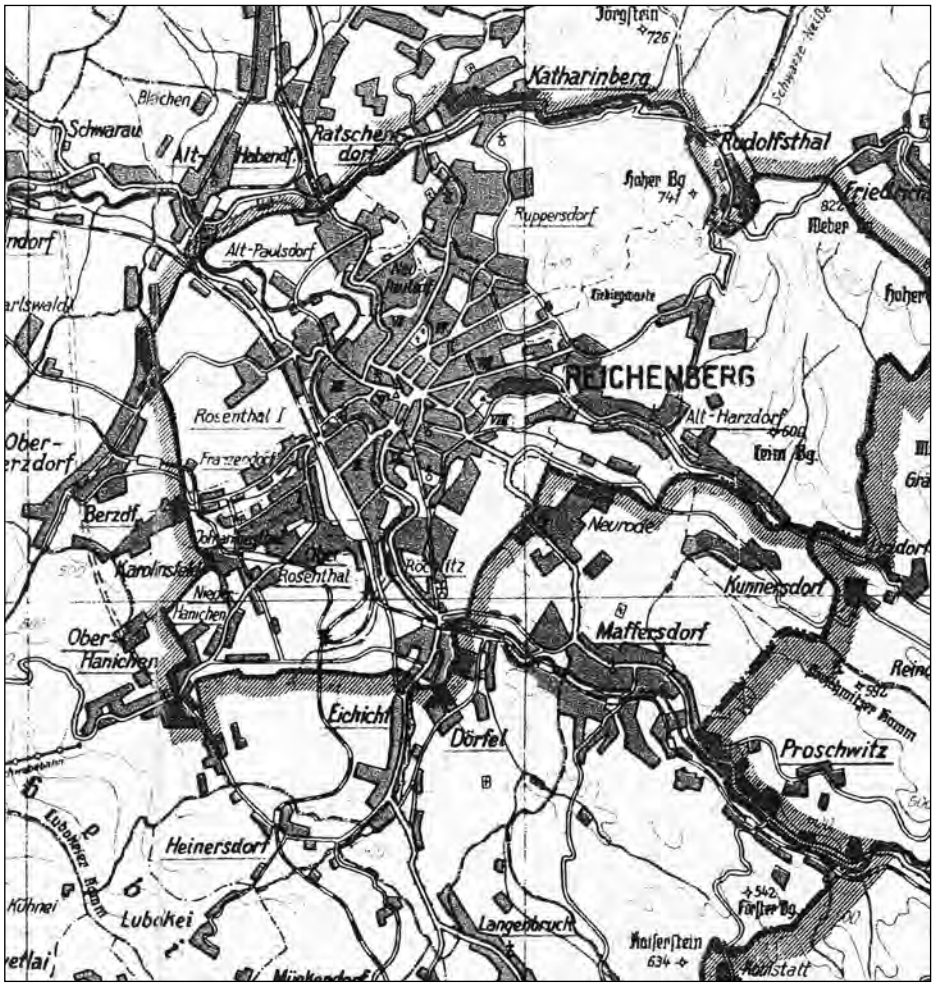


By the age of 13 Ferdinand Porsche had electrified both his home and his family's workshop in Maffersdorf. A shaft from the workshop's machinery drove a high-speed dynamo, its output controlled from a master board.

'Ferdinand was a thinker and a tinkerer,' a classmate recalled. 'Otherwise he was taciturn. He was punctual and orderly. He brightened up in choir practice and joined in cheerfully. In his gymnastics a certain ambition emerged.' His grades were middling but adequate. What fascinated him most was electricity. An enthusiastic skater, he rigged battery-powered electric lamps for his skates. A career in electricity for his son, however, was not on Anton Porsche's agenda. He discouraged such fantasies and prepared the boy for an apprenticeship in tinsmithing.

Thus Anton was all the more enraged when he ventured into the lad's attic hideaway and discovered the crude batteries his son had made in secret to generate his own electricity. Furious, he stomped them into smithereens. To his surprise and dismay the battery acid ravaged his shoes, trouser and shins. That mattered not to Anton, who was sure he had shattered his son's aberrant yearnings.

With acid dripping through her bedroom ceiling, it was time for Anna to intervene. She could see the positive side of Ferdinand's



Young Porsche commuted by rail to evening classes in electrical engineering at Reichenberg, the town of which Maffersdorf is an appendage to the south-east. In the Czech Republic they are Liberec and Vratislavice respectively.

shenanigans to which his father was blind. Anna persuaded Anton that they should allow their youngster to take some evening classes at the Staatsgewerbeschule in Reichenberg. That way he would either be inspired or – as Anton hoped – discouraged from pursuing his rebellion from tinsmithing. Ferdinand commuted after his long days at work to study electrical engineering under Professor Joseph Pechan. To the young Porsche this was the opportunity of a lifetime. He took full advantage of it.

The decisive initiative came from the Ginzkey brothers, who urged that the young Porsche's evident genius be given a chance to flourish. Oscar, not Ferdinand, would have to train to take over the family business. The Ginzkeys were also influential in finding a place in Vienna at Béla Egger's firm for the 18-year-old Porsche. Catching the eye of his superiors at Egger's, as the company was still known, impressing them with his quick comprehension, initiative and problem-solving ability, the slender, unassuming Ferdinand Porsche readily mastered the tasks set him by the foreman in charge of the test department.

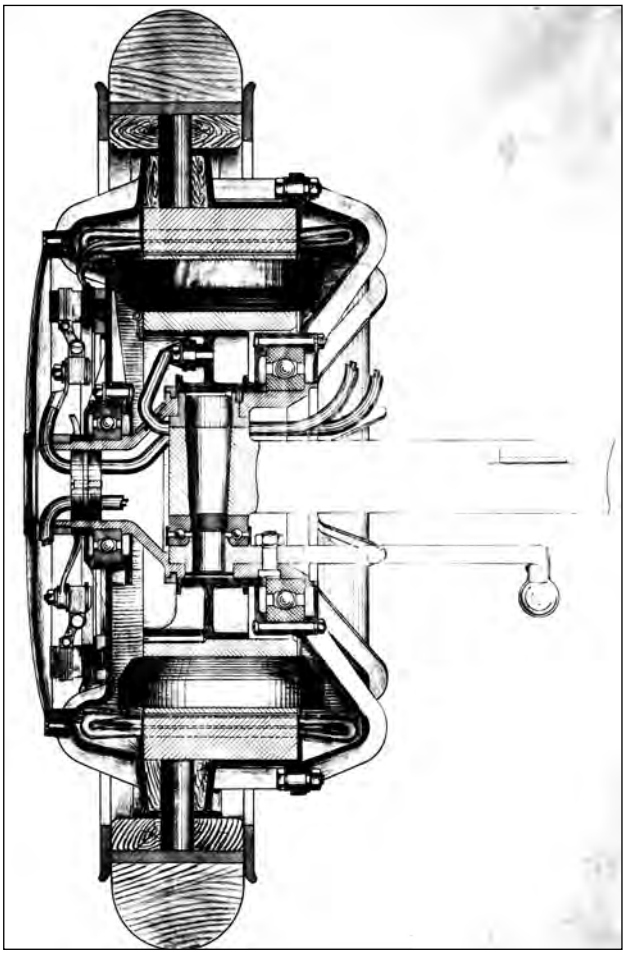
Although electrical engineering was Ferdinand Porsche's profession, he couldn't help being fascinated by the motor vehicle. It was exploding into raucous life all around him in the news if not in actuality. Intrigued by the

potential of wheeled power, Porsche built an electrocycle for his commute to the works from his digs at 30–32 Metzleinsdorferstrasse. Harshly sprung, it often let him down. Nevertheless an eight-sided electric motor flanked its rear wheel, a design he called the 'Octagon'.

Thinking about vehicle design, Ferdinand Porsche was intrigued by the potential of front-wheel drive. He foresaw the movement of engines from the rear, as in most nineteenth-century cars, to the front, where they and their radiators could most easily be cooled. In his mind it followed logically that the front wheels should be driven to create a coherent power train.

Ludwig Lohner had been impressed by the way young Porsche had dealt with the problems thrown up by his first electrics. The Bohemian seemed to have a knack for visualising solutions to knotty problems. In the meantime Porsche had been thinking his own thoughts about the way an electric car should be propelled. It seemed to him sensible that if the motors were at the wheels – 'where they belong', he said – their tractive effort could be applied directly without the weight, bulk and cost of gears and differentials. As well it would be a cinch to provide drive through the steering front wheels, since only electric cables had to link wheels to vehicle.

In a conventional electric motor an armature rotates inside a magnetic field. Constant reversals of polarity of the current in the armature, caused by successive contacts from the brushes delivering power to it, rotate the armature because its changing polarity reacts against that of the magnets that surround it. Ferdinand Porsche's concept was the reverse of this. He chose to hold the magnetic field stationary within the wheel and to make the armature rotate around it and, with it, the wheel rim.



Shown here with hard-rubber tyres for a heavy-vehicle application, Lohner-Porsche wheel motors had commutators on their outer faces where they were accessible for service and immune to vertical motions.

Thus by definition, because wheel and motor rotated together, Porsche's was a low-speed motor. While traction motors of the time were running at 300–500rpm, his would revolve in the 100–200rpm range for car speeds of 15–25mph. To gain power and efficiency under these conditions he provided numerous poles in his magnetic field, as many as 12 or 14 instead of the four in a conventional motor. Around them electromagnetic forces pushed the windings of the armature, and with them the wheel.

Combined with other features, such as an ingenious design for the vital brushes and commutator, this was the essence of the idea that Ferdinand Porsche presented to Ludwig Lohner. Its engaging simplicity appealed to the industrialist. Equally appealing was that these were new conceptions that were patentable. In these early freebooting years of the motor industry, industrialists like Lohner were eager to sequester promising technologies that they could then license at home and abroad. What Daimler, de Dion and others were doing, Lohner could do as well. Into the bargain, here was an indigenous

In the Vienna-Floridsdorf workshop of Jakob Lohner & Co. Ferdinand Porsche found skilled tools and workmen to create a bewildering variety of vehicles driven by his wheel motors, powered both by batteries and by engine-driven dynamos.

Austrian invention for the use of which Lohner would not have to pay royalties to others.

The upshot was that near the end of 1899 Ferdinand Porsche left the VEAG to start working for Ludwig Lohner. At the factory in Floridsdorf, across the Danube in Vienna's north-west quarter, he found 400,000 square feet of workshop space with a large assembly hall and 120 machine tools powered by a traditional steam-driven overhead-belt system. He also found skilled craftsmen who could cope with his demands – although he was about to test their metalworking skills. Porsche still planned to rely for electrical components on the VEAG, but he would make his motor housings and other parts at Floridsdorf.

Granted the opportunity of his young life, the 24-year-old Ferdinand Porsche grasped it with both hands. He set out to design in detail the motors he promised his patron. He and Lohner manufactured their unique powered wheels in three versions, Types I, II and III, before they had sold or even publicly displayed a System Lohner-Porsche vehicle in 1900. This suggested the immense confidence that Porsche's design engendered in Ludwig Lohner. 'Three times we've tried to get to grips with making cars,' Lohner told a friend, 'but this time with the right result.'

Their first Lohner-Porsches were displayed and sold in 1900 as pure electric

cars, finding custom with Vienna's elite as well as its taxi operators. One, equipped with a pair of de Dion engines driving generators that topped up its batteries, was a forerunner of the modern hybrid named the *Semper Vivus* ('Always Alive'). This gave Porsche an idea which he was quick to exploit.

The year 1901 found Porsche at work on his new concept. He hit on a dramatic way to demonstrate the capabilities of his wheel motors and front-wheel drive. Instead of powering them with batteries, he installed a petrol engine to drive a generator that would feed current to the wheels without a battery's intervention. This was not the work of a moment. Knotty problems in controlling the engine, generator and motors waited to be solved. But they had found the right man to solve them.

From the Austrian Daimler company Porsche obtained a 5.5-litre four-cylinder engine. He placed this at the front of a slender channel-steel chassis with solid axles front and rear sprung by semi-elliptic leafs. A straight shaft from the engine passed under the front floor to drive, under the seat, a powerful generator. Under the floorboards at the left was the master controller, which was rotated from one position to the next by the main control lever at the left of the right-hand steering wheel. At the extreme of its travel this lever applied the rear band brakes, cutting out the drive current at the same time and, indeed, short-circuiting the motors so they provided braking of the front wheels.

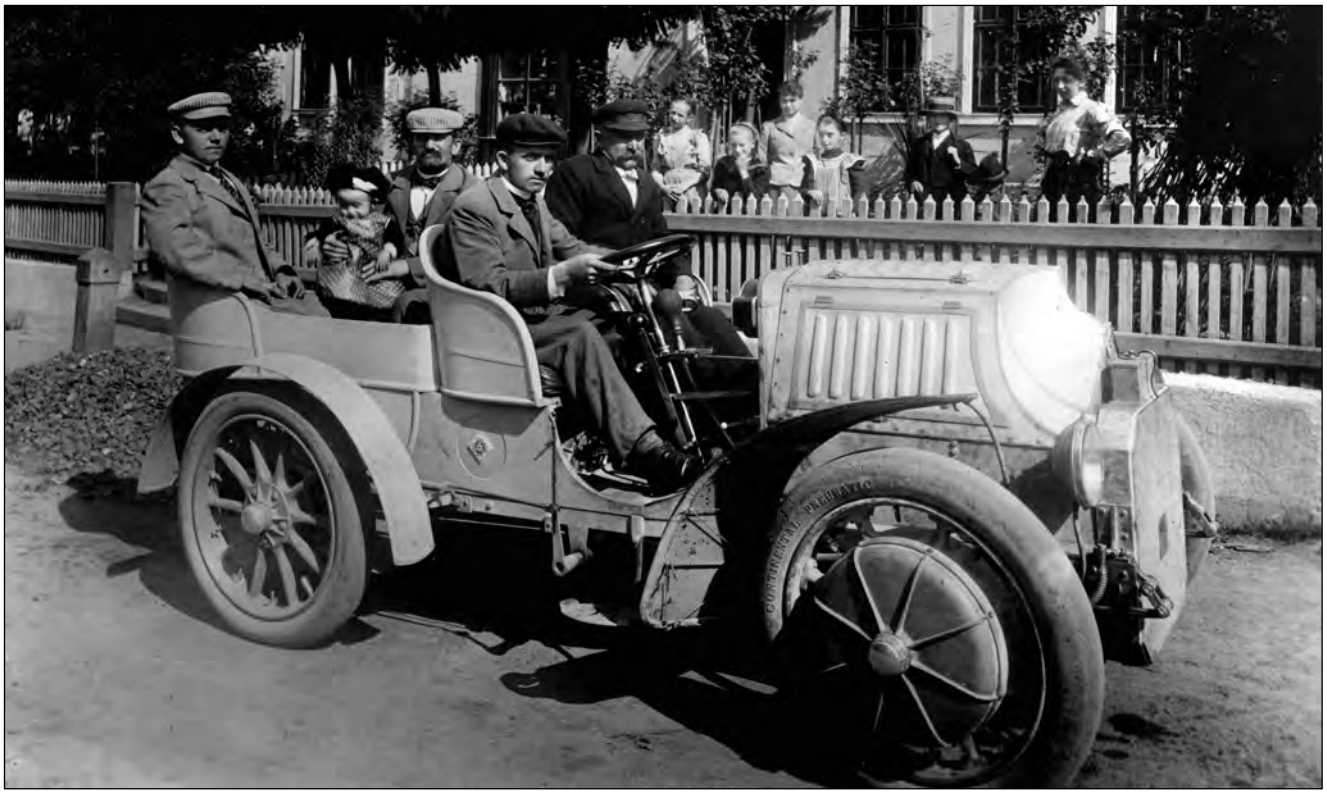
In 1901 Porsche created his first Mixte, a vehicle whose Daimler engine drove a dynamo under its front seats that sent electricity to its front-wheel motors. Its rear tonneau was removable.

Here was a big step forward from the *Semper Vivus* of 1900. Instead of a hybrid, Porsche had a car with an electric transmission. It did have a small battery, but this was only used to power accessories and to start the engine, using the generator as a motor. Starting, a major bugbear of the early cars, especially those with big engines, was a snap with this new species of Lohner-Porsche. To describe it, its creators adopted a French expression, *mixte*, as it was a blend of petrol and electric power trains. 'Mixte' would characterise a new generation of Lohner-built vehicles.*

Working all the hours God sent, as was his wont, Ferdinand Porsche not only designed, built and developed this prototype but also produced four more Mixtes of the same design in 1901. With experience he improved the steering action of his motor wheels for a new generation introduced in 1902. What did Porsche have in mind as a suitable debut for his new concept? Competition, of course, for he had already raced one of his pure electric cars at Vienna's demanding Semmering hill-climb.

His new car's chassis was not unlike the 1901 models, with a cable-braced straight channel-steel frame and a petrol tank low at the extreme rear. Steering gear was improved, following a Mercedes design. A substantial generator was

* In his writings Porsche preferred a German version of the term, Mixt, but Mixte was the public style.



Neighbours gathered to marvel when Ferdinand Porsche drove his first Mixte to Maffersdorf in 1901. Father Anton and brother Oscar were in the tonneau for the 26-year-old's demonstration of his new creation.

Entrepreneur Emil Jellinek bought five of Porsche's lively 1902-model Mixtes but his interest failed to evolve into regular orders. However, he would not forget the precocious Porsche's design talent.

underneath the front seats. Thanks to the use of a more advanced Mercedes 28 HP four-cylinder engine its hood was lower with bevelled edges behind a honeycomb radiator with matching bevels.

More wieldy and better balanced than his 1901 Mixte, Porsche's 1902 model was an appealing package. It could ask for no better public introduction than France's wealthy Côte d'Azur where the Nice Week of motoring competitions was held in March 1902. Two were entered, for Porsche himself

Porsche's stern gaze at his fiancée Aloisia Kaes as she took the wheel of his 1902 Lohner-Porsche was typical, said Ernst Piëch, who experienced the same scrutiny in drives with his grandfather.

and veteran Lorraine Barrow. In terms of sheer speed the new Lohner-Porsches were overmatched by the latest Mercedes, although they had clear advantages in controllability with their 15 forward speeds.

'There is no doubt that the car is extremely quiet,' *The Autocar* reported, 'and runs with every possible variation of speed without gearing of any kind.' The British weekly warned, however, that 'there remains the old objection, that the owner must not only be thoroughly acquainted with his petrol motor, but must also be an electrician.' According to one observer at Biarritz, who saw Lorraine Barrow in difficulty, the Mixte was reluctant to restart on a very steep hill.

Undaunted, Lohner and Porsche presented their new racer at Austria's Exelberg hill-climb in April. In a nature park on Vienna's western fringe, this was a short, sharp climb of 2.6 miles from Neuwaldegg up a 9 per cent gradient on loose surfaces to Exelberg. Taking the wheel himself, the inventor won the large-car class and set a new record for the hill. This was a sensational success that offered rich pickings for Lohner's advertising.

As if to emphasise the versatility of this Lohner-Porsche Mixte, its creators fitted a rear tonneau and flowing wings to make it a four-seater for road use. In this very guise Ferdinand Porsche had driven his Mixte the 70 miles south-east to Sárvár to take part in the dual monarchy's 1902 manoeuvres. Fitting right in, Porsche disguised his youth by flaunting a moustache that rivalled those of some of the royals.

At the close of the military exercises their key participants gathered in Vienna at the Emperor Franz Josef's summer palace for a debriefing. A report

At the close of 1902's manoeuvres young Porsche, here at the wheel, was closely questioned about his versatile Mixte by the elite of Austro-Hungarian aristocracy, up to and including the emperor himself.

Although his successful 1902 demonstration at Sárvár failed to lead to military orders for his Mixte, Porsche kept in touch with Austria-Hungary's officers. In 1903 he explained a more ambitious Mixte with a 70hp Panhard engine.

of 24 September observed that 'the monarch and Archduke Franz Ferdinand spent quite some time conversing with a member of the lowest rank of the Deutschmeister Regiment who looked anything but parade-ready, standing by his automobile. As well the German crown prince joined the group and conversed very deeply with this man. Foreign attachés engaged him in lengthy discussions.'

Here was recognition at the highest level, not only for the 27-year-old engineer's achievements but also for his maturity and aplomb. Illuminated was a character trait that would stand Ferdinand Porsche in good stead in years to come. He possessed *complete confidence*. He manifested this confidence in overcoming the resistance of a dominant father to his chosen career. He showed it in his move to Vienna and Béla Egger at the age of 18 and again – even more so – in his acceptance of the challenge of designing and developing a completely new technology of his own conception at Lohner.

This self-assurance, backed up by Porsche's unequalled knowledge of his own field and interest in many others, was a captivating asset. It enabled him to deal easily with royalty, politicians, the military and his industrial allies. On his ground Porsche was peerless. It also brought his colleagues with him, even into such trackless jungles as the motor-wheel adventure. This seemed to hold vast promise, both for passenger vehicles and for military applications.

CHAPTER 2

POWER TO THE DUAL MONARCHY

To Ludwig Lohner's disappointment the dual monarchy failed to follow up Ferdinand Porsche's successful 1902 demonstration with orders for Lohner-Porsche Mixtes.* Lohner and Porsche would continue to invite members of the military to Floridsdorf to see more powerful Mixtes under development and witness them in action on the company's test circuit. With demand for both Mixtes and electrics modest, however, not least because of their high prices, Ludwig Lohner began streamlining his business and phasing out their production.

Lohner's withdrawal from the motor industry in 1906 coincided with fresh interest taken by diplomat and entrepreneur Emil Jellinek in what he called the 'antiquated' Austro Daimler firm. His description was apt; the Fischer Brothers machine shop had not been transformed into an automobile company of even moderate series-production capabilities. It was ripe for the entrepreneur's attentions.

To meet his aim of dominance of the electric-vehicle market Emil Jellinek funded two new machining and assembly halls for the Austro Daimler works at Wiener Neustadt. They were valuable assets when war broke out.

* Lohner's man in Germany was Dr A. Isbert, with offices in Frankfurt. In 1905 he drove German generals in a handsome Mixte during manoeuvres 'to their fullest satisfaction'. The German army didn't order any either.

The very model of a modern motor magnate, the 35-year-old Porsche posed at his new villa on the grounds of the Austro Daimler works on Pottendorfstrasse in 1910. It would be a triumphant year for him.

Jellinek, famous for his backing of new Daimler models that bore the name of his daughter Mercedes, had seen his personal coffers enhanced in 1905 since the acquisition by German's Daimler of 60 per cent of his interest in the Mercedes brand he had created, now controlled by a Paris company in which he retained a 40 per cent share. For this concession to Daimler he received one million francs, some $195,000 – a fortune at the time. With bank backing as well, Jellinek took control of Austro Daimler.

Wiener Neustadt had to step up to its role in the Jellinek Grand Plan. Two spacious new halls were erected on open land adjacent to the existing buildings, one for vehicle assembly. Lofty and amply skylit, they were of modern steel-reinforced concrete. One hall, for machine tools, was described by a visitor as 'snow white and leaves nothing to be desired in terms of cleanliness and brightness'.*

Nor was the machine park overlooked. Hundreds of new machines were acquired, many from America, including the latest lathes and gearcutters. Emil Jellinek made good on his pledge 'to transform the antiquated Austrian Daimler works in Wiener Neustadt into a modern automobile factory', at least by the standards of the early twentieth century.

With Bierenz out of the picture since the 1902 restructuring and staff on loan from Daimler returning to Germany, Austro Daimler was led in all respects by the charming, technically educated and professionally capable Eduard Fischer. Its engineering was rudderless, however, for in 1905 Paul Daimler was recalled to Stuttgart to assist in design work there; he became the German Daimler company's engineering chief in 1907.

Key players in the pre-war success of Austro Daimler were chief engineer Porsche (right)*, and managing director Eduard Fischer* (centre)*. With Count Heinrich Schönfeld* (left) *they made up the 'Iron Team' of the company's competition drivers.*

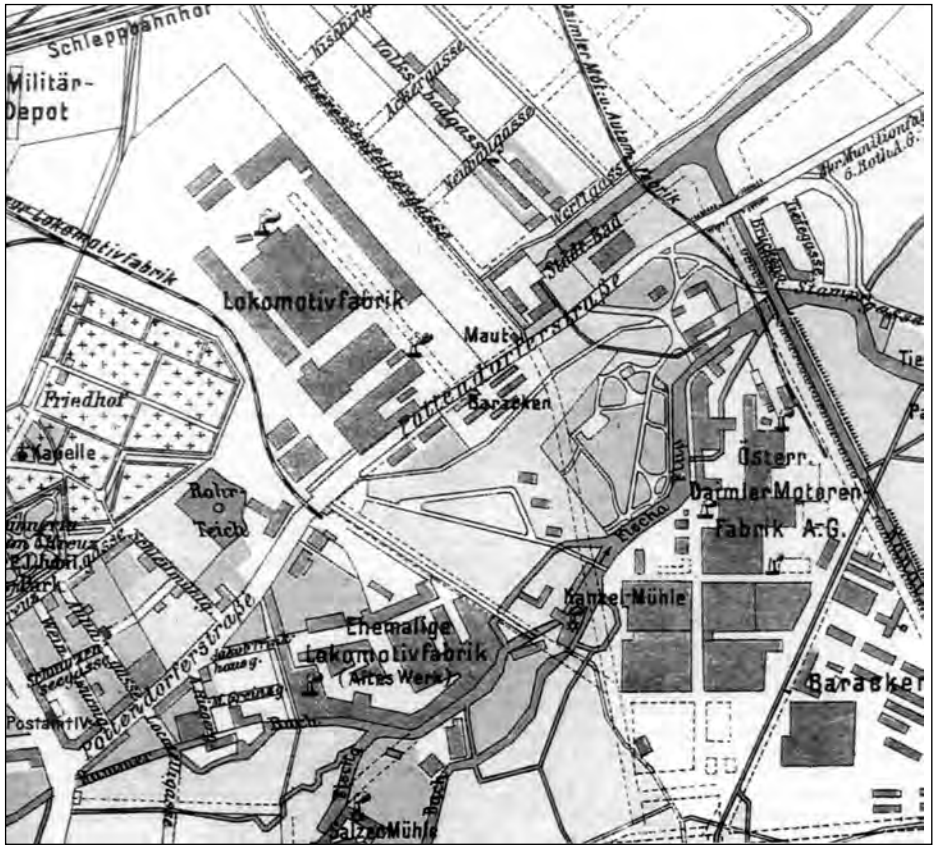
* This hall was the subject of local controversy when, after the concrete forms were removed prematurely, part of it collapsed. The authorities threatened to have it completely torn down and rebuilt, but common sense prevailed and the necessary repairs were made.

The canny Jellinek settled on the man he wanted to take charge of his new expanded factory and its products. This, he decided, was a job for Ferdinand Porsche. The brilliant and confident young engineer who had carved out a distinctive niche with his designs for Lohner was his nominee for the job. Porsche affixed his signature to an Austro Daimler contract on 19 July 1906. Also joining was 24-year-old design engineer Otto Köhler, who was to become a strong right arm for Porsche.

With the help of Lohner's technology and new Porsche designs with rear-mounted motor wheels, Jellinek's aim was two-fold: to dominate the market for electric vehicles and to launch a new auto range named after another of his daughters, Maja. An important advantage was that this new design would liberate the company from the payment of licence fees to Daimler in Stuttgart.

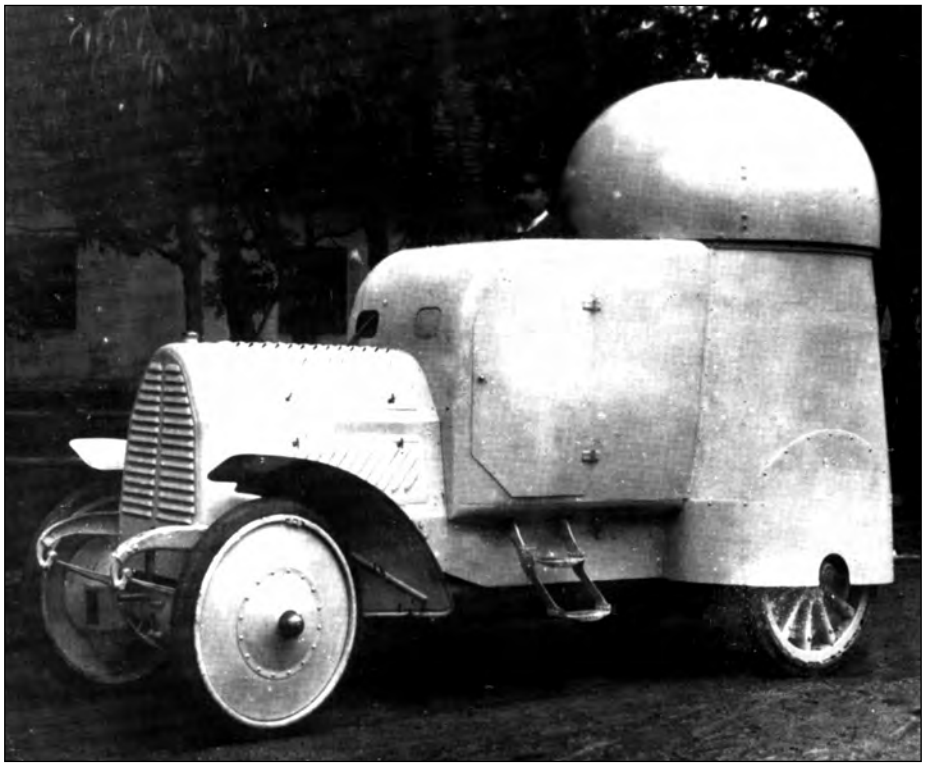
Neither initiative scored success. Electrics had had their day and the Maja of 1907 foundered on a mediocre design – Porsche's first petrol-engined vehicle – and high warranty costs. Before the end of 1907 the venture tumbled into bankruptcy and liquidation. This was the end of his automotive career for the disillusioned Emil Jellinek, who saw his gasoline-engine venture expire along with his hoped-for hegemony in the electric-vehicle market.

Although depressed business conditions contributed heavily to the collapse of both his ventures, Jellinek was quick to place the blame on product problems and on the man he had put in charge of engineering. When in later years Jellinek reminisced about his automotive entrepreneurship, Ferdinand Porsche was among those he denigrated. The talent was there; he had spotted it. But he demanded too much of it too soon.*



In the north-east quarter of Wiener Neustadt the Austro Daimler works was surrounded not only by locomotive factories but also by military installations whose officers often inspected Porsche's latest ideas.

* Emil Jellinek-Mercedes left Nice in 1914 and in 1915 settled with his family in Switzerland, away from the war. A stroke ended his life on 21 January 1918.



Porsche's predecessor at Austro Daimler, Paul Daimler, created an ambitious and ingenious four-wheel-driven armoured car in 1904. However, its 1905 demonstrations failed to win military orders.

By the end of 1908 Eduard Fischer and Ferdinand Porsche found themselves bereft of business partners. The deep-pocketed distributors who promised to buy so many vehicles from their expanded Austro Daimler workshops had melted away. Even worse, they wallowed in the trough of a pan-European business slowdown that discouraged purchase of such luxury items as motorcars. Rescue came at the end of the year in the form of an order for a dozen mortar-towing tugs for an increasingly important customer, the Austro-Hungarian army.

From its founding, Austro Daimler attracted the attention of the dual monarchy's military, not least by virtue of its location. Wiener Neustadt had been the choice of the Austrian Empress Maria Theresa as the site of a military academy, which opened its doors on the town's south-east periphery in 1752 as the first institution of its kind.* Ultimately the Austro Daimler works was surrounded by barracks and training grounds that swarmed with officers and non-coms. They would take full advantage of Austro Daimler's capabilities.

Paul Daimler had already given the military option a good try. In 1904 he and senior engineer Otto Stahl designed and built an armoured car that they hoped would catch the army's fancy at a time of Central European rearmament. This was a dedicated undertaking that included full-time four-wheel drive. Although its 4.4-litre four of 30hp was antiquated, its chassis showed new thinking.

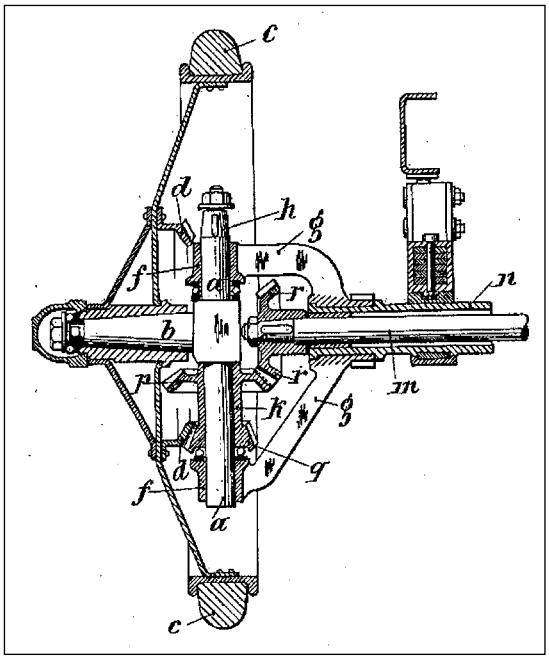
Instead of adapting a conventional transmission to drive all four wheels, Daimler designed an all-indirect four-speed gearbox that took the drive downward through two selectable pinion pairs that gave a choice of ratios for eight forward speeds in total. An advantage of this layout was that a rearward continuation of the mainshaft could be used to drive a generator, winch or other equipment.

* After its 1938 annexation of Austria, Germany installed Erwin Rommel as the Academy's commandant.

Drive to the front and rear wheels was through a differential that could be locked out in difficult going. A similar lockout could bypass the rear differential. Patented by Daimler was a rear axle whose ratio reduction was entirely in a pinion and internal gear at each artillery wheel that allowed the rear wheels to have positive camber, the better to cope with the road surfaces of the day.

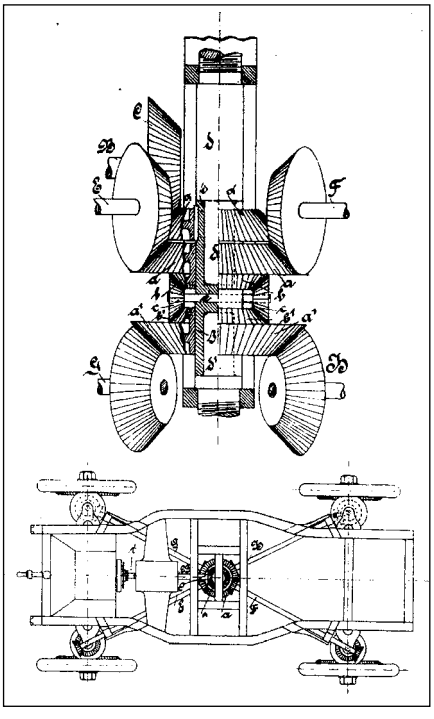
Drive to the front wheels of Paul Daimler's 1904 armoured car was also innovative. To permit the wheels to steer without the use of universal joints, he and Stahl placed a pair of bevel gears at each wheel to turn shafts, around vertical king pins, that then drove ring gears built into the faces of the steel-disc front wheels. Later Daimler patented a more elaborate system of frame-pivoted gears and shafts that gave the front axle more mobility on rough terrain. All the tyres were solid rubber.

Steel shrouded the engine and a two-man driving compartment whose seats could be raised and lowered to allow the crew to be either exposed or concealed behind viewports. At the rear of Daimler's vehicle a rotatable turret housed a water-cooled Maxim machine gun and space for two soldiers and their ammunition. Considered the first turreted armoured car, the final version was armoured to a 3mm thickness with 4mm for the turret. This brought its weight to just over 3 tons.



In his patent Paul Daimler showed how he carried his armoured car's drive to the front wheels through bevel gears, some of which rotated around the vertical king pin. Porsche made use of this practical solution.

Capable of speeds up to 23mph, Paul Daimler's offering was mustered for the German Imperial Army's manoeuvres of 1905. The following year, updated with a pair of Maxims, it featured in the trials of the Austro-Hungarian military. Deputed to demonstrate the machine was a young lieutenant friendly to Austro Daimler, Count Heinrich Schönfeld. As related by historian Martin Pfundner, when Schönfeld fired up its raucous four the racket spooked a nearby horse which reared, dislodging its noble rider. This happened to be a friend and contemporary of the Kaiser, who witnessed the incident. 'Something like that can't be used for military purposes' was the emperor's spontaneous reaction, putting an end to any hope of a career with his army for Paul Daimler's creation. In the wake of Daimler's departure the armoured car was disposed of to the French military, which scrapped it after its evaluations.



Archduke Salvator's patented four-wheel-drive mechanism took power from a central bevel-gear cluster to the machine's four corners. Although powerful, a vehicle built on these lines by Skoda in 1908 failed to satisfy.

A variant of this four-wheel-drive chassis would come to the rescue of Ferdinand Porsche and Eduard Fischer. With its wheelbase stretched from 2,860 to 3,200mm and a bigger 8½-litre engine producing 50bhp at 1,000rpm, it was built as a tug for field artillery. To meet Robert Wolf's requirements it also had an engine-driven cable winch at its nose. 'Its drive ratio', said Otto Stahl of the winch,

Elements of Paul Daimler's 1904 four-wheel-drive system contributed to Austro Daimler's first military tug, the M 06. It was one of the first 1906 projects of Porsche, testing its winch here with Eduard Fischer (right).

In the works courtyard Porsche and Fischer (left) *stood next to one of the dozen M 08 artillery tugs built for the army's Robert Wolf in 1908. With its 'Seals' Austro Daimler was at last gaining traction with the military.*

'was chosen so that the vehicle could attain forward motion almost anywhere.'

Wolf considered this a piece of kit that his Austro-Hungarian forces needed. However, he could only propose, not dispose. He had to convince the dual monarchy's inspector general of artillery, Archduke Leopold Salvator. With a technical background that would lead to an honorary doctorate of engineering from the Vienna Technical Institute, Salvator was an innovator in his own right. In 1907 the Archduke patented a four-wheel-drive system of his own. At its heart in the centre of the chassis was a single complex combining a differential with bevel pinions from which shafts splayed out diagonally to power all four wheels. Using hub-mounted bevel gears akin to those of Paul Daimler, four-wheel steering was another feature.

In 1908 Salvator succeeded in having a sample built as an artillery tug, using a chassis made by Skoda in Pilsen. A feature was a vast steering wheel so that two men could attack it simultaneously – hinting at the problems experienced in handling the 'Lion', as it was named. Although credited with a 12-ton towing

capacity on level ground, this vehicle proved too cumbersome for its 40hp Gräf & Stift engine.*

Predisposed to the merits of four-wheel drive, Salvator was open to the ideas of Robert Wolf. 'Wolf was able to interest Archduke Leopold Salvator so much in this new form of drive,' wrote Otto Stahl, 'that in fact from this time until the end of the war Wiener Neustadt remained the main producer of tugs for artillery weapons for the Austro-Hungarian army.' It would now be up to Porsche to design and produce tugs that could cope with increasingly heavy weaponry.

Ferdinand Porsche's first major project for the military was his M 08 of 1908, given the name *Robbe* or 'Seal'. A four-wheel-drive tug, it was powered by a new 80hp six-cylinder engine of 13,854cc. Following Robert Wolf's philosophy, each of the dozen made had a winch under its nose that could be operated from the driver's seat. Though built for trailer towing, each M 08 had a rear platform for added gear.

One of the vehicles, intended to accompany others in action, mounted a vast winch from a specialist supplier on its rear deck. Carrying some 1,000ft of cable, it could extract another machine and its cargo from any desperate situation. Considered both baulky to handle and too heavy at first, the Seal's four-wheel drive was far from perfected at this early date.

In his designs Porsche had to keep wartime conditions very much in mind, for in 1908 tensions were increasing both inside and outside the empire. Thirty years earlier the Treaty of Berlin had granted Austria-Hungary the right to occupy Bosnia-Herzegovina to the south. It annexed those territories outright in October 1908, attaching them to neither half of the dual monarchy but instead directly to the Habsburgs' central command. This triggered unrest both internal and external, especially displeasing Serbia to the south. Rising temperatures encouraged rearmament by all nations in the region – especially the variegated empire that was at its heart.

By 1910 troops in the field were getting to know the intricacies of the four-wheel-driven M 08 tug, including its impressive 13.9-litre six-cylinder engine developing 80hp.

* In 1914 Salvator would patent a pair of caterpillar-tracked bogies to be carried beneath a vehicle. Driven by chain from the rear wheels, they were to be lowered into position when the going was poor, as in mud or snow.