

Bosch on Board

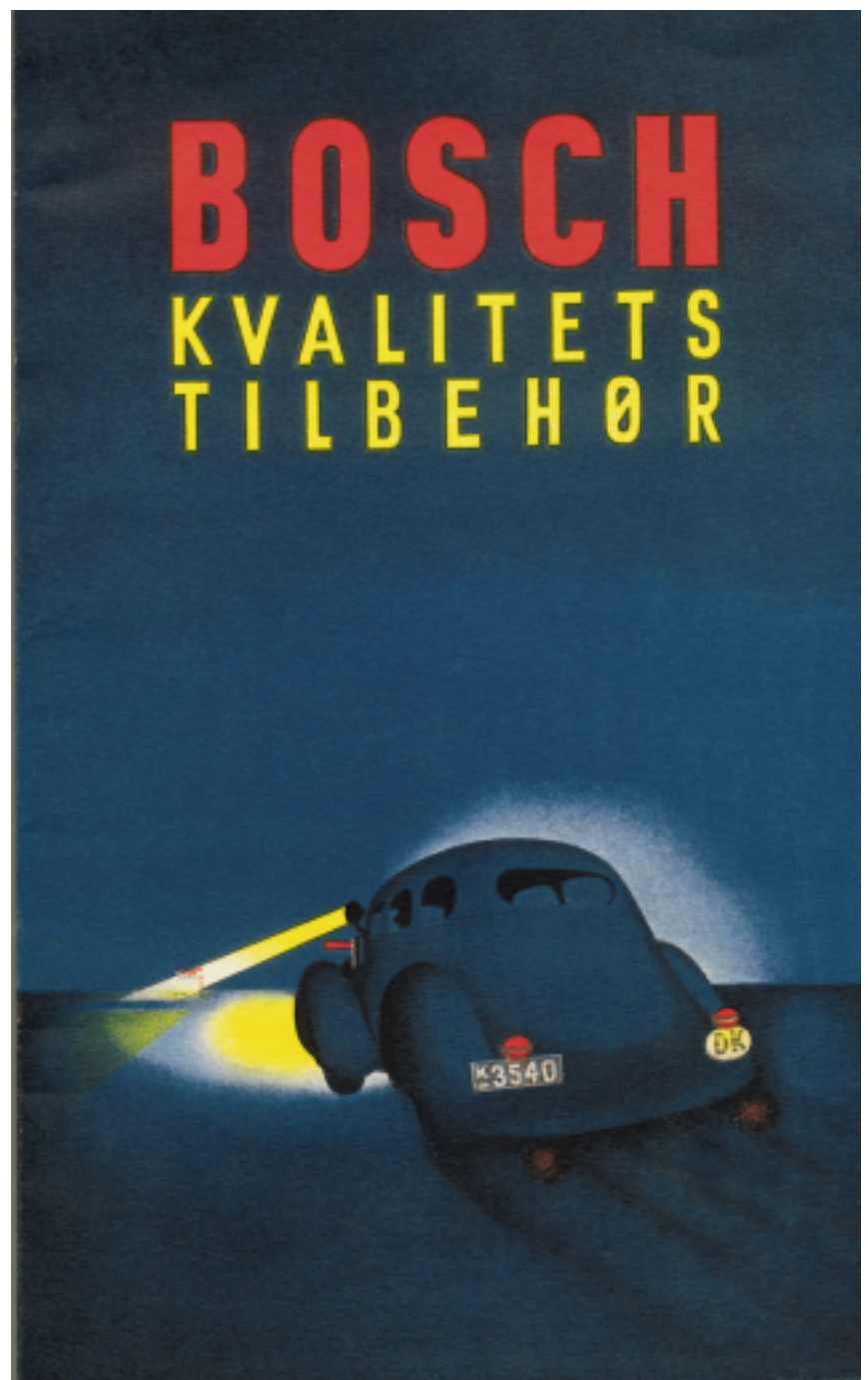
First Agency in Scandinavia

Think Tank in the Bonnet

Sales of Bosch Motronic begins

Ahead of the Competition

Technical Centres in
Schwieberdingen and Feuerbach





Leafing through the present new issue of the Bosch History Magazine, the reader will note the strong emphasis on topics with an international connection. The establishment of the first agencies in Italy and Scandinavia in 1904 as well as the start-up of production in Brazil and Australia in 1954 are highlights in our company's hundred years plus of international alignment.

It all began in 1898 with our first branch in Great Britain. The opening of an agency in New York in 1906 and the commencement of production in den USA in 1910 were of particular importance for the further development of our foreign organization. After all, no less than 88 percent of the company's turnover was already being generated abroad as early as 1913.

And the business year 2002 emphatically demonstrates our company's international alignment. In that year, 72 percent of turnover was generated abroad, and our company is, in the meantime, represented by subsidiaries or partner-participation companies on every continent and in over fifty countries. 179 of the 236 Bosch manufacturing facilities are located outside Germany. Far more than half our 225,000 or so employees work abroad. All of them make a considerable contribution to the success of our big Bosch staff family.

Title-page illustration:
Danish motorists soon got to know and to appreciate the "quality accessories" from Bosch, as this brochure from the 1930s shows.

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1904

News of the Year



Photo: Stadt- und Stiftsarchiv Aschaffenburg

First driving school in Aschaffenburg

Increasing automobile traffic on the badly-kept roads of the day often led to serious accidents. In those days, motorists still also needed considerable mechanical skill in order to drive their vehicles safely and to be able to repair the constantly recurring defects. For this reason, Aschaffenburg Technical College founded, in 1904, the first independent "Automobile Driver's School" in Germany. The ten-week course was aimed at "*intelligent men aged at least 17 years old*", to quote one of the school's publicity brochures. For driving a car was, at the turn of the century, still something for men only. At the end of the course, participants received a certificate, not the driving licence that is in such demand by young people today. Driving licences were only introduced in Germany in 1909. ◀

Japanese attack on Port Arthur

The Japanese attack on the Russian fleet in Port Arthur on 8th–9th February started the Russo-Japanese War. Czarist expansion in Northern China and Korea was a provocation to the Japanese Empire, which itself had staked claims on these territories. Surprisingly, for foreign observers, tiny Japan inflicted such sensitive defeats on the gigantic Russian Empire that Czar Nicholas II was only too glad to accept American arbitration and to sign the Peace of Portsmouth on 5th September 1905. ◀

World's Fair and Olympic Games in St. Louis

By staging the World's Fair, St. Louis wished to celebrate the 100th anniversary of the "Louisiana Purchase". Actually, they were a year too late. For it was in 1803 that the USA bought

Louisiana Territory from Napoleon. The framework programme of the World's Fair was provided by the III Olympic Games of modern times. Only around 600 sportsmen participated in the games, while four years previously, in Paris, almost twice as many had been present. A total of some 20 million visitors came to St. Louis to see the attractions of the Fair. ◀

Glenn Miller born

On 1st March 1904, swing musician Glenn Miller was born in Clarinda, Iowa. He played in various orchestras as a trombonist before founding his own band in 1937, without much success at first. He became a world-famous star with the typical "Glenn Miller Sound" (four saxophones and a leading clarinet) and the catchy hit tunes like "In the Mood" or "Moonlight Serenade". After being called up into the US Army, he conducted an army band until his death in an aircraft crash in the night of 15th–16th December 1944. ◀

Entente Cordiale concluded

With the signature of the Entente Cordiale on 8th April 1904, France and Britain settled their long-standing differences concerning their colonial areas in North Africa. As recently as 1898, the two world powers had almost gone to war after a French and British expeditionary corps had clashed in Fashoda on the upper Nile in Sudan. But the Entente Cordiale was only the first step on the road to a permanent partnership which was strengthened even further by the two countries' alliance against Germany in two world wars. ◀

Pavlov awarded Nobel Prize for Medicine

In 1904, the Nobel committee awarded its prize in the field of medicine to the Russian physiologist Ivan Petrovich Pavlov. He became famous because of his experiments with dogs, which led him to make a distinction between unconditioned and conditioned reflexes, thus making research into learning via conditioning possible. ◀

Construction of the Panama Canal begins

"All the money in the world would not suffice for such an undertaking!" This is what the Emperor Carlos V is said to have said in the 16th century about plans to join the Atlantic and the Pacific by means of an artificial waterway. It was only the technical and financial possibilities of the 20th century which enabled this dream to be realized. By the Hay-Bunau-Varilla

Treaty, ratified in 1904, the USA purchased the rights to build and operate the Panama Canal and a ten mile wide Canal Zone. Construction of the 81 kilometre long canal across the Isthmus of Panama took a total of ten years and cost the lives of approximately 40,000 workers. ◀

Renault introduces hydraulic shock absorbers

Good news for all shaken-up motorists: Renault installs hydraulic shock absorbers as standard equipment for the first time in its cars. This finally made driving on the very poorly maintained roads of the day more comfortable and safer for drivers and passengers. ◀

"Keeps hot things hot and cold things cold"

The invention of the thermos flask was a long time in coming. As early as

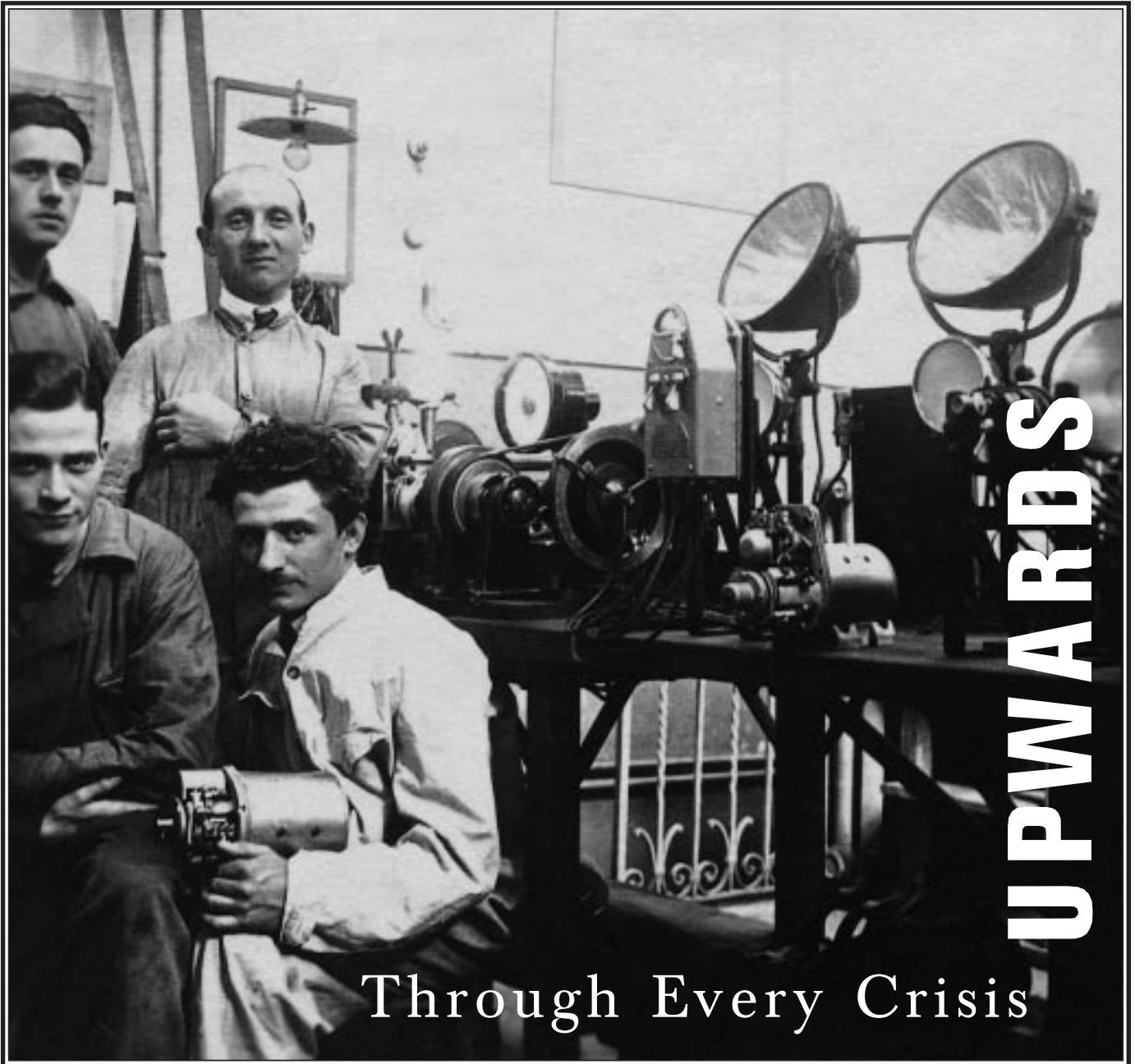
1881, Ferdinand Weinhold developed a double-walled glass container which, when a vacuum was produced between the two walls, prevented the loss of heat of the contents via radiation. Shortly afterwards, James Dewar improved the insulation properties by adding reflecting material to the inside. It was, finally, the Berlin glass instrument manufacturer Reinhold Burger who constructed a bottle with a sturdy, light, metal housing, gave it a tight-fitting lid and provided it with a top-fitting drinking beaker. In 1904, he had the name Thermos Flask, a name with a strong appeal, registered as a trade mark. ◀

Bosch foreign sales organization extended

The year 1904 brought another great step forward for the young Bosch company on the world market. From the summer of 1904, Bosch products could be obtained not only in Scandinavia and Italy but also in Switzerland and Russia. At first distribution was still undertaken by external distribution companies, but a sales office bearing the name Robert Bosch was opened in Geneva as early as 1910. In Zurich the second Swiss branch opened its doors in 1920. Two years later, Bosch moved to a new building in Geneva (see photo). The Russian Czar Nicholas II was able to convince himself of the quality of the Bosch products built into the Mercedes Knight in which he took a ride in 1911. ◀

DS





First Bosch Agency in Italy

When Bosch opened its first agency in Italy 100 years ago, the company was already well known in Europe. Companies representing Bosch had been selling Bosch ignition equipment outside Germany since 1898.

Thus the establishment of an agency in Italy meant, for Bosch, yet another step forward towards the conquest of the world market.

Swift rise and sudden fall

In 1904, Messrs. Dénes & Friedmann, who had been the agency for Bosch in Austria and Hungary since 1899, also took over the representation of Bosch products in Italy, opening a sales office and workshop in Milan. Right from the start, the agency was such a great success that it had to move to larger premises twice within a few years of opening. Finally, Bosch took over the Milan company in 1908. The company continued trading under the new name “Robert Bosch Milano”, and the previous director, Ludwig Winterberg, was confirmed in his post. This phase of dynamic expansion was abruptly halted by the

cheerfully write to a close foreign business acquaintance: *“Business here in the company is excellent ...”*

The golden Twenties and Thirties

From 1922 on, the Italian joint-stock company “Società Anonima per il commercio di materiali Robert Bosch” took over the distribution of Bosch products, also now offering new products in Italy which resulted from diversification outside the sphere of motor-vehicle equipment. It was to Bosch’s advantage that the experienced Ludwig Winterberg was nominated to the post of managing director on the board of administration, bringing the business from his old company with him into the new one. Business expanded to such an extent that, in 1922 and 1923, separate sales offices with installation

Bosch and Marelli products for Italy and its extensive North African colonies.

Another loss and another new start

As a result of the Second World War, Bosch lost its agency in Italy for the second time. Although this expropriation was only rescinded in 1954, Bosch managed, by acquiring the company Scintilla AG, to establish itself in Italy again as early as 1947. Three years later, new licence and distribution agreements were signed between Bosch and MABO-Marelli. Finally, in 1959, Robert Bosch S.p.A. was reestablished in Milan. As a result, the general agency for Bosch products in Italy passed from MABO to Robert Bosch S.p.A.

Despite having lost its agency in Italy twice, the 100-year history of



The new building at the corner of Via Melzi and Via Londonio in Milan was constructed in 1924 to meet the requirements of the new Italian sales company.



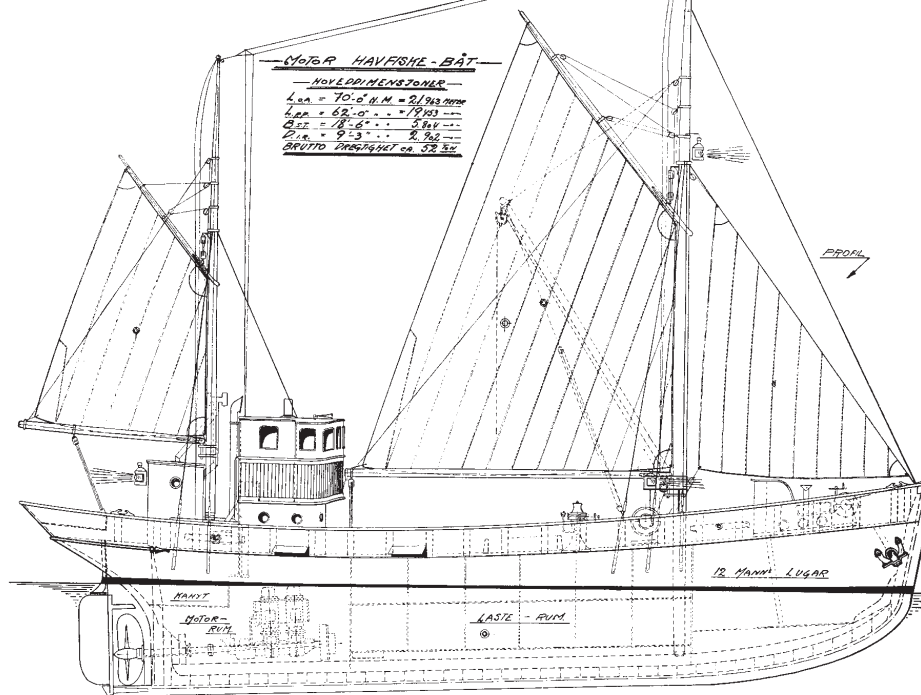
Ludwig Winterberg (1878–1939) was very successful in guiding the fortunes of our Italian agency from 1904 to 1937.

beginning of the First World War, as a consequence of which Bosch lost its agency in Milan. This loss was, however, only of short duration, for Winterberg succeeded in restarting business with Bosch products in 1919 under the old company name. Bosch profited here from the good name which the company had won for itself before the war with the high quality and reliability of its products. Robert Bosch was thus able, in 1921, to

and repair workshops could also be opened in Rome and Turin, and that in 1924 a new move by the Milan agency into an even bigger building became necessary. For Bosch, 1935 brought yet another extension of its Italian business via its merger with the company Fabbrica Italiana Magneti Marelli. The two companies founded the sales company MABO S.A. in Milan, deciding to start up joint production and distribution of

Bosch’s representation in Italy is also, thanks to the company’s close connections in this country, a success story that still continues today. ◀ VD

BOSCH ON BOARD



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P. M. BYE & CO. A.S., OSLO

First Agency in Scandinavia

Among other things, Bosch supplied lighting and ignition apparatus for Scandinavian motorboats.

“Of particular importance for our business in the Scandinavian countries is motor shipping, but this requires special types of ignition apparatus,” reported the Egnell company from Stockholm in 1921. In those days the Scandinavian market was supplied with Bosch accessories not only for the automobile but also for motor boats. Connections to the Northern Lands went right back to the start of the last century: in 1904 Fritz Egnell in Sweden had taken over the agency for Bosch ignition apparatus for the whole of Scandinavia. His company engaged subagents for Sweden, Denmark, Norway and

Finland. In Norway this was Messrs. Kolberg, Caspary & Co. The engineer Kolberg was by no means unknown in the specialized world of the automobile: in 1906 he had put the first taxicab on the streets of Oslo.

Robert Bosch and Fritz Egnell were connected not only through business: there was a close friendship between them. Hunting is what the two men had in common. So Robert Bosch occasionally invited Fritz Egnell to his hunting grounds near Pfronten: stags were the game. In 1921, a separate foreign company was founded in Stockholm: Aktiebolaget ROBO. The name was composed of

the initial letters of Robert Bosch. When supplies from Germany were cut off by the Second World War, a separate factory for Bosch products was set up in Sweden in 1942.

In Helsinki, W. Alftan, A. Röneholm, K. Taxell and W. von Bonsdorff founded the company Oy Alftan AB in 1911. It dealt in machines and machine parts, including motor-vehicle equipment from Bosch. From 1935 on, the Finnish company was the official representative for Bosch products.

The advance of the dynamo

The first independent Danish agency, A/S Magneto, was established in Copenhagen in 1918. The early years were characterized by the automobile's conquest of Denmark's roads. Until 1929, Bosch's main sales in Denmark were ignition parts, generators and electric lighting equipment for cars. Then a Bosch product arrived which particularly pleased Denmark's many cyclists: the Bosch dynamo, which developed into a best-selling product.

In the country of fjords

In Norway Egnell and Kolberg founded A/S Automagnet in 1920. This company took over the distribution of Bosch products in the country of fjords. World War Two ended cooperation here – and also in the other Scandinavian countries.

In the years of reconstruction following 1945, Bosch reestablished its trade connections in the Scandinavian countries once more. From 1962 onwards, the Danish company was called Robert Bosch A/S, Copenhagen. In order to ensure the rapid supply of goods and to guarantee effective after-sales service for its many products, Bosch built up a network of Bosch service points and special workshops throughout the country – even in Godthab on Greenland. In the summer of 1970, the company moved its headquarters to a new building in Ballerup, west of Copenhagen. 1962 saw the establishment of the regional company Robert Bosch Norge A/S (RBNO), which moved, in 1984, into a new building with distribution and customer-service

facilities in Mastemyr outside Oslo. Robert Bosch AB, Stockholm (RBSW) was also given a new headquarters in 1983 in Kista near Stockholm.

The new Northern Europe

In July 1991, Bosch took the business of its Finnish partner under its own wing. In the same year this company was given responsibility for the Estonian market; Latvia and Lithuania followed in 1994. It is from Helsinki that the Russian city of Kaliningrad, the former German city of Königsberg, is looked after. Finland has thus become the gateway to the new Northern Europe.

The commercially independent distribution companies Robert Bosch A/S, Ballerup, Denmark (RBDK), Robert Bosch A/S, Trolleasen, Norway (RBNO) and Robert Bosch AB, Kista, Sweden (RBSW) merged into a regional company, RBSN, in January 1997.

Today some 1,600 employees are responsible for distribution and customer service throughout Scandinavia. ◀ BS



Shop-window decoration with Bosch products at Aktiebolaget ROBO in Stockholm, 1924



Mephisto figure at the stand of our Finnish agency at a trade fair in Helsinki, 1920



A/S Automagnet stand at an exhibition in Kristiania, today's Oslo, 1922

1929

News of the Year

“Black Friday”

It is the embodiment of the Wall Street crash: “Black Friday” 25th October, 1929. Actually, the world economic crisis began two days before that. After a long, steep rise, the record figure of 6.5 million shares were sold on the New York stock exchange the preceding Wednesday, leading to panic selling on the following days. Rumours that the stock exchange was to be closed and that several wellknown financiers had thrown themselves out of windows did nothing to improve the mood among the Wall Street stockjobbers. The beginning of the next week’s trading saw a new wave of panic with massive offloading of shares. Thus began a banking and economic crisis that spread to all industrial nations in view of the close international intermeshing of capital even in those days. ◀



Photo: Scherl/Süddeutscher Verlag-Bilderdienst

The Young Plan

A committee of experts led by the American manager Owen Young submitted, in June 1929, a revised payment plan for Germany which considerably eased the unfulfillable demands for reparations under the Dawes Plan: from then onwards, the State Railways and the Reichsbank were no longer under foreign control, and Foreign Minister Gustav Stresemann achieved from the Allies, in August 1929, a pledge to withdraw their troops from the region west of the Rhine. The burdens weighing Germany down were, however, still heavy. Repayments amounted to some 2,000 million Reichsmark annually, and were to be paid right up until 1988. ◀

Biggest German automaker in American hands

In 1929, 8,000 workers at Opel factories made 42,771 cars, earning for Opel a market share of 37.5 per cent in Germany. All the more astonishing is the fact that the takeover of the Opel Works in Rüsselsheim by General Motors was not a hostile one but was, rather, instigated by the Opel heirs. In the course of 1928, General Motors had found that the assembly and sale of vehicles in Germany was becoming increasingly unprofitable due to the massive rise in import duties. By taking over the Opel Works, General Motors gained access to the German market. ◀

Geneva Convention signed

After four weeks of discussion, representatives of 36 countries signed the “Geneva Convention for Improving the

Lot of the Wounded and Sick in the Field and the Treatment of Prisoners of War” on 27th July 1929. This was just one of a long list of conventions agreed on since 1864 in order to make warfare less inhuman. ◀

Automobile industry loses two of its Grand Old Men

1929 saw the deaths of two pioneer engineers of the automobile – Wilhelm Maybach (born 1846) and Carl Friedrich Benz (born 1844). Maybach had designed and built automobiles, internal-combustion engines and numerous components. Together with Count Zeppelin he founded the Maybach-Motoren-Werke in Friedrichshafen in 1909. The founder of the Mannheim company Benz & Cie., Carl Benz, made pioneering contributions to the development of the automobile. The trip made by his wife Berta in 1886 in a three-wheeled vehicle of his construction powered by a four-stroke internal combustion engine with electrical ignition is today counted as the hour when the automobile industry was born. ◀

Do X

After eighteen months in the building, the “Do X” flying boat constructed by Claude Dornier took off on its maiden flight on 12th July 1929. In the course of a trip round the world covering 43,500 kilometres, this luxurious giant could be admired in Lisbon, New York and Rio de Janeiro, among other places. Yet despite the innovative technology involved, the time was not yet ripe for large passenger airliners. Only a total of three were actually built. ◀

First Oscars awarded in Hollywood

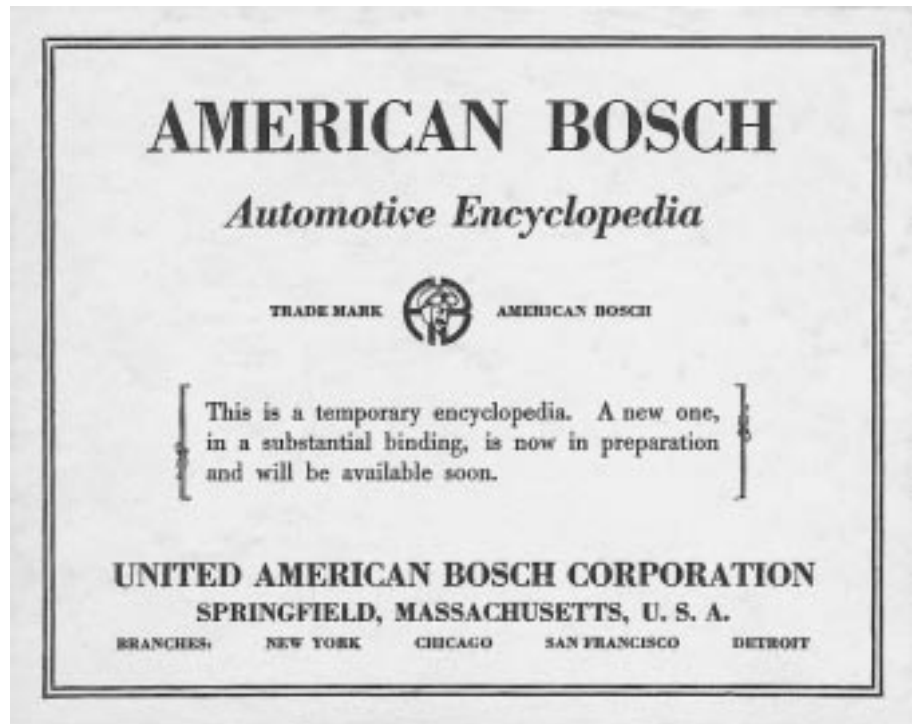
Actually, the correct name for the “Oscars”, the prizes awarded every year since 1929 to individuals and categories in the movie industry, is “Academy Award”. The main prize is awarded for the category “Best Film” to the producer. The winners are presented with a symbolic gold statuette the nickname of which gave these much-coveted awards the designation “Oscar”. ◀

Thomas Mann awarded Nobel Prize for Literature

Thomas Mann was awarded the Nobel Prize for Literature for his novel “Buddenbrooks”, published in 1901, which depicts the decay of a patrician family in Lübeck. Characteristic of his epic style is the ironic observation of his characters, which is based on differentiated psychology. ◀

“I kiss your hand, Madame”

A year after the tenor Richard Tauber had had a smash hit with the popular song “*Ich küsse Ihre Hand, Madame*”, the feature film of the same name, starring Harry Liedtke and Marlene Dietrich was premiered on 10th January 1929. This drama of the passionate affair between the beautiful Laurence and an impoverished Count stands, in motion-picture history, right on the dividing line between silent and sound pictures: originally filmed as a silent movie, it was provided with an inserted sound sequence dubbed by Richard Tauber. ◀



Peace treaty within the Bosch company

It was the thorn in the side of Bosch's foreign trade: in 1917, Bosch's American subsidiary, the “Bosch Magneto Co” had first been placed under sequestration administration then, after the war, sold lock, stock and barrel to an American company. Now the “American Bosch Magneto Corporation” pathetically advertised itself: “*I am an American*”. This was not enough, however, to guarantee success. Old customers complained about the inadequate quality of the new company's products and the firm's lack of generosity in business matters. When peace was restored between the USA and Germany in 1921, only 200 of the original staff of 2,000 were still employed. Favourable conditions for Bosch to risk a new

start. The same year saw the establishment of the “Robert Bosch Magneto Company”, to which the sole rights to manufacture and distribute Bosch products were transferred. Logically, this inevitably led to a conflict between the two competitors. After numerous court cases, a settlement out of court was finally agreed in 1929, the so-called “peace treaty”: the original company in Stuttgart was permitted to use the name “Robert Bosch” in North America unchallenged, while everywhere else in the world, the brief designation “Bosch” was to be its exclusive property. In return, A.B.M.C. received the sole rights to the name “Bosch” in North America, but had to use the name “American Bosch” in all other countries. In 1930, the two companies merged to form the United American Bosch Corporation. ◀ KW

BOSCH AND TELEVISION

The Development of the “Cinema for Slipper-Wearers”

Television made her a star in the 1950s: Hilde Nocker of the Hessische Rundfunk (Hesse Broadcasting Corporation) was supposed, like all the other female announcers, to entice viewers to stay glued to their screens by means of a seductive smile. Here she poses for the photographer in front of a studio camera made by Fernseh GmbH, a Bosch subsidiary which – founded in 1929 – decisively determined TV technology in Germany for almost six decades. A welcome opportunity for the Bosch History Magazine to take a short look at the history of today’s ubiquitous “cinema for slipper-wearers”.

Images taken apart mechanically

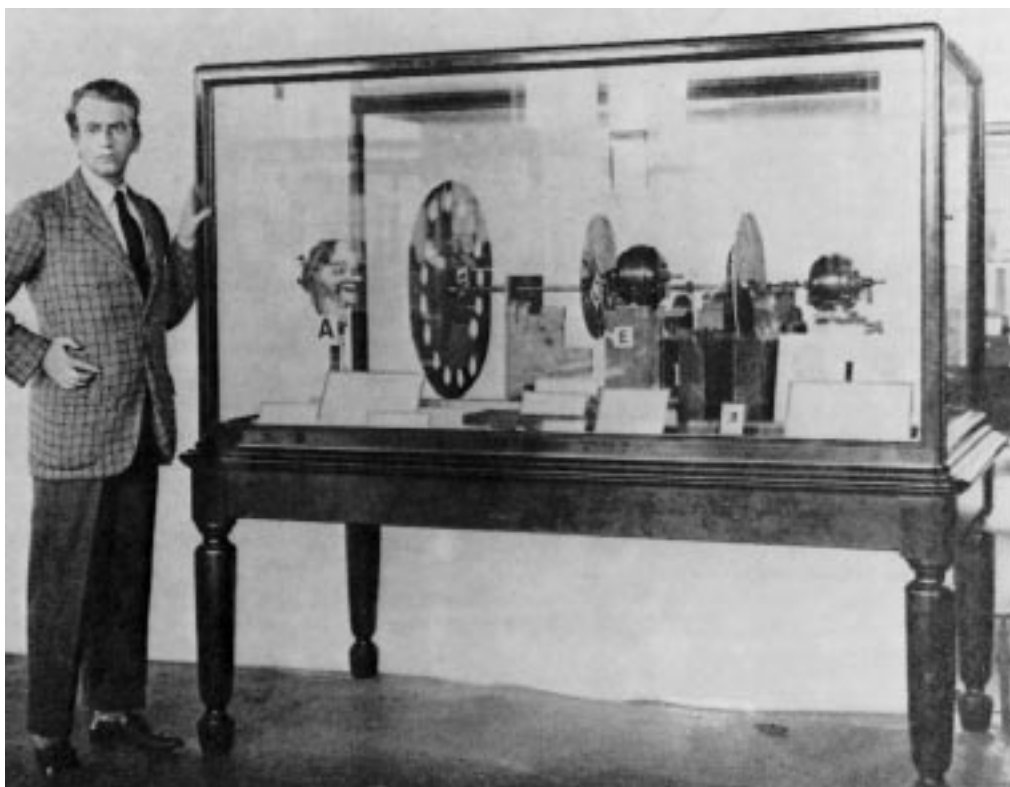
The principle of television is older than many people may think. As early as 1884 the German engineer Paul Nipkow developed an electric image scanner which made it possible to transfer images of objects electrically. To do this, Nipkow used a disk which was later named after him. The disk had holes a certain distance apart which were arranged like a spiral from the outside of the disk to the inside. The Nipkow disk revolves between the object to be depicted and a photoelectric selenium cell. One after the other, the separate parts of the image are exposed through the holes to the selenium cell. This modulates an electrical current which feeds a light bulb at the receiver. As the bulb glows brighter or dimmer, the light from it is projected through

the holes of a second, synchronized Nipkow disk onto a screen on which the image of the object is shown.

Over forty years later, the Scotsman John Logie Baird was also experimenting with a Nipkow disk. In 1925/26 he succeeded in transmitting the image of a face for the first time. Admittedly, Baird used the head of a ventriloquist's dummy at first, as the object to be depicted had to be illuminated at close range by a very powerful spotlight in order to achieve an image that was bright enough in contrast. Using a human face was quite out of the question. Only after he had modified the light source for sending the image did he succeed in persuading an office messenger-boy to read a short text for an experimental broadcast. Later Baird had the idea of placing the person whose image was to be

broadcast in a darkened cubicle, a "black box", in order to exclude the disruptive ambient light.

It was only when, in February 1928, Baird finally even succeeded in transmitting a television image via transatlantic cable from London to New York that industrial companies began to get interested in the subject. On 3rd July 1929, several partners had the company "Fernseh AG" (Bosch abbreviation "FESE") entered in the Berlin Commercial Register. The purpose of the company was, above all *"the manufacture and distribution of television equipment of every kind"*. The partners were Baird Television Ltd. of London, Zeiss Ikon of Dresden, D.S. Loewe of Berlin and



The "Fernseh 30" receiver, presented at the 1929 Radio Show, never went into series production. This apparatus for the reception of 30-line images only permitted vague recognition of the objects depicted.

The British TV pioneer John Logie Baird, a partner in FESE for several years from 1929 onwards, beside one of his pieces of equipment with which, in 1925 and 1926, he broadcast images of the ventriloquist's dummy "Bill" (in the box on the left) in a 3.8 x 5 centimetre format and "often out of focus", as eye witnesses of the day reported.



FESE equipment like this permitted viewers in Germany, in public "TV rooms", to watch broadcasts of the sporting events of the Olympic Games in Berlin in 1936. The vertical cathode-ray tube provided, according to press reports, an "optically satisfactory" 441-line image sized 40 centimetres from top right-hand to bottom left-hand corner. Sound was transmitted via a built-in Blaupunkt "Gross Super 5W77". A similar receiver with a 50-centimetre screen was also available.

Robert Bosch AG of Stuttgart. The success of the new company was, because of the technical limitations of the day, very modest at first. After all, the Nipkow disk only permitted the transmission of images of low resolution at the very slow rate of 12 1/2 images per second of 30 lines each, not enough for practical use.

Olympia "live": Berlin 1936

The breakthrough was finally achieved with a high-vacuum picture tube developed by FESE in co-operation with the University of Hamburg, which was first shown at the 1933 Radio Show. A new era of image reproduction had begun. But the problem of illumination during scanning still had to be solved. So far live sessions from the "black box" or the scanning of developed slides or film were the only possibilities. Outside broadcasts were theoretically possible but required illumination of around 50,000 lux in order to make

the objects or people stand out against the background of ambient light. Here, too, the first solution came from FESE: the so-called intermediate film process.

This process entailed the exposure, development, fixing, drying and scanning of a film in one operation. Using a hot-air drying technique, the timelag between filming a scene and broadcasting it was a mere 85 seconds. The cameras for the intermediate film process were developed by FESE in its own design office. A reflex camera operated by a single cameraman was able to record image and sound simultaneously. It already had a revolving head with four lenses of different focal lengths. While the lens was being changed, a lenschange symbol was automatically displayed, and aperture and focus were coupled, obviating the need to make adjustments after a change of lens.

The years up to 1936 saw the transition from mechanical to fully-electronic television. At the receiver

end, cathode-ray tubes with image diameters of 30, 40 and 50 centimetres were available. At the recording end, special tubes and, later, the so-called Ikonoskop cameras were employed. Thus, by 1936, all preconditions for live broadcasts with electronic television had been fulfilled. All events at the Olympic Games in Berlin could be recorded, processed at a production studio and passed on to the VHF transmitters. By 1939, all the other partners of Bosch had withdrawn from the Fernseh AG, and the company status was changed from that of a share company to one with limited liability, like the parent company Bosch.

"Olympics in colour": Munich 1972

Although World War II interrupted the development both of German television and of FESE, it could not stop either. Germany had, of course, a long way to go to catch up with



Outside broadcasts of sports events: in the 1950s, the cameraman still had to record events from the roof of the outside-broadcast van outside the stadium.

In 1972, broadcasting technology had already been fully integrated into the stadiums, as here below the roof of the Olympic Stadium in Munich. FESE equipment was always used in those days.



Photo: Gessner

England, France and the USA, where the development of television had been taken up again immediately after 1945. Nevertheless, it was possible to resume regular television broadcasting in the Federal Republic of Germany, with the approval of the Allies, at Christmas 1952. Now located in Darmstadt, FESE had, in the meantime, specialized entirely on the development and manufacture of cameras and studio equipment, handing the TV receiver side of the business over to another Bosch subsidiary, Blaupunkt.

Despite some initial resistance, the continued rise of TV as a medium appears, in retrospect, inexorable. In the early days there was much discussion about possible health risks and the destruction of family life by television. But soon the programmes of the 1950s and 1960s developed into magnetic attractions for the viewers. When certain crime thrillers were on the air in the evenings, Germany's streets were empty. Large-

scale sports events, now televised on a worldwide basis – also in colour from 1967 in the Federal Republic – marked this progress. With the growth of television in Germany, FESE also grew. The company did, after all, supply almost all the studio and broadcasting equipment for the Olympic Games in Munich in 1972. The early 1980s, however, marked a turning-point. Increasing foreign competition, not least from the Far East, finally led, in 1986, to the amalgamation of the company, which had been known as Robert Bosch Fernseh Anlagen GmbH since 1972, in a joint enterprise with Philips known

as Broadcast Television Systems (BTS), from which Bosch later withdrew completely. Thus ended almost six decades of television at Bosch. ◀ RB

1954

News of the Year

Decisive turn in the war in Indo-China

The end of French colonial rule in Indo-China is inseparably associated with the name Dien Bien Phu. This place in the north of Vietnam was captured by French troops in March 1953 in order to cut off supplies to the Vietminh. But the Communist led Vietminh, fighting for the independence of Vietnam, succeeded in reconquering the last French stronghold in Indo-China on 7th May 1954. The French troops, financially supported by the USA, withdrew south of the 17th parallel. The war in Indo-China is generally considered to have been the first phase of the Vietnam War, which lasted from 1957 to 1975. ◀

First atomic power station in the USSR

In June 1954, the world's first atomic reactor began to generate power at Obninsk, Russia. For the first time, atomic energy thus began to make a contribution to the electrical energy supply of an entire country. The real innovation was the commercial operation of the reactor. A similar project in den USA failed in 1951 because its power capacity was too low. ◀

Outbreak of war in Algeria

The insurrection triggered off by the Algerian "Front de Libération Nationale" on 1st November 1954 began a tough fight for independence that was to shake the colonial power France politically deeply to the core. The conflict, which smouldered on for years, even led to a military putsch in France in 1958, which saw the replacement of the Fourth by the Fifth

Republic. In 1962, the two parties to the conflict finally agreed, by the "Treaty of Evian", to grant Algeria its independence. ◀

Germany becomes world football champion

"...and Rahn could try a shot from the background ... Rahn shoots... Goal! Goal! Goal...!" Virtually every German football fan could recite the legendary words of commentator Herbert Zimmermann on 4th July 1954. With a 3:2 victory over the highly favoured Hungarians, the German team of national trainer Sepp Herberger achieved the almost incredible. Germany had won the final of the World Cup. From the start it looked as a victory for Hungary, which was already leading 2:0 in the 9th minute was inevitable. But with goals by Max Morlok (11th minute) and Helmuth Rahn (18th and 84th minutes) the tide turned,

sealing the success of the German team. This was the first time since the end of World War II that a German team had taken part in the World Cup. The triumph in Berne's Wankdorf Stadium created a kind of new identification feeling for the young Federal Republic of Germany. ◀

"Rock around the Clock"

In 1954, a young band named "Bill Haley and the Comets" took the charts by storm. "Rock around the Clock" marked the beginning of a new direction in music that matched the mood of the moment. For the young people of the 1950s, "Rock and Roll" created a new zest for life at a time when it seemed important for the young to distance themselves from their parents' generation, which they considered to be ultra-bourgeois; priggish and stuffy. ◀



Photo: dpa / Süddeutscher Verlag-Bilderdienst

First ADAC repair vehicle

A breakdown at night in the middle of nowhere, and nobody anywhere near who could get the car started again. From 1954 onwards, this German driver's nightmare was a thing of the past. With 60 motor-cycle and sidecar combinations, the German automobile club ADAC began to patrol the roads of Germany. Soon these trained motor mechanics had earned for themselves the popular nickname "Angels of the Road". ◀

Alcohol test for motorists

Safety in motorized traffic was the driving force behind the invention of US policeman Robert Borkenstein. His "Breathalyser" of 1954 was the world's first portable alcohol-test device which uses the driver's breath to measure the amount of alcohol in parts per thousand in his or her blood. ◀

Maiden flight of the Starfighter

The interceptor-fighter F-104 "Starfighter" built by the company Lockheed, took off successfully for the first time on 7th February 1954. The aircraft were less successful for the German Air Force in the years between 1961 and 1987. 269 of 916 fighters were lost. In the early years, in particular, they crashed with monotonous – if tragic – regularity. ◀

J.W. Backus develops FORTRAN

The new programming language FORTRAN (Formula Translator) made it possible for scientists to operate data-processing installations without the help of computer programmers. ◀



First post-war meeting of Bosch foreign representatives in Stuttgart

Exactly 25 years after the last meeting, a conference of Bosch foreign representatives took place in Stuttgart in May 1954. Bosch had succeeded in regaining a foothold in many countries after the Second World War. In some cases the company reactivated old business contacts, in others staff members were sent from Bosch headquarters to break new ground. The Bosch director responsible, Karl Müller, thanked all the representatives present for their tireless commitment to the company. ◀

Bosch acquires factory site in Leinfelden

Lack of space at Stuttgart headquarters was already proving to be a big problem for Bosch in the mid 1950s. The purchase of factory sites in the country surrounding the Swabian

metropolis offered a way out of this dilemma. Bosch thus acquired a site in Leinfelden in 1954, where, today, the Electric Power Tools Division mainly carries out research and development work. ◀

Start of Bosch production in India

1954 marked the beginning of a new phase in Bosch's foreign activities. The company started up production in a number of countries. It began with the company founded by Bosch in India in 1951 MICO (Motor Industries Co. Ltd). At a new factory in Bangalore, the company began to manufacture spark plugs and diesel injection pumps under licence from Bosch. In the following years and decades, further factories were founded in Nashik, Naganathapura and Jaipur. MICO also became active in the fields of development aid and medicine at the Bangalore and Nashik locations. ◀

CS

**BOSCH PRODUCTION
IN BRAZIL**

**Qualidade
*do Brasil***



Even in the early 1960s, Bosch services were available at 50 locations in the south and north-east of Brazil. Today there are well over 600.



The Primavera Third World Aid Association was founded by Bosch staff in 1990 in order to provide educational and medical services at day centres to children and young people from slums in Brazil and India. Thanks to its help, a primitive kindergarten, for example, expanded within ten years into the “Centro Promocional Tia Illeide” education centre for children in a slum area on the outskirts of Campinas.

The red roof of the headquarters of Robert Bosch Ltda. in Campinas, Brazil (RBLA) not only shelters everything connected with the enterprises of RBLA. From here, Bosch has also gradually extended its presence in Brazil with the establishment of factories. It was not just a case of coming to grips with the country’s gigantic size, its 8.5 million square kilometres making it 18 times bigger than the Federal Republic of Germany. The varying climatic zones and cultures as well as the eventful political and economic history of the country had to be taken into account. Today, Brazil is one of the largest regional companies within the Bosch Group.

It all began with “Bombas Bosch”

On 16th November 1954, Robert Bosch do Brasil Ltda. was founded in Sao Paulo. First of all, the company set up a factory for manufacturing diesel injection pumps in Campinas. There were good reasons for opening production facilities in Brazil, as

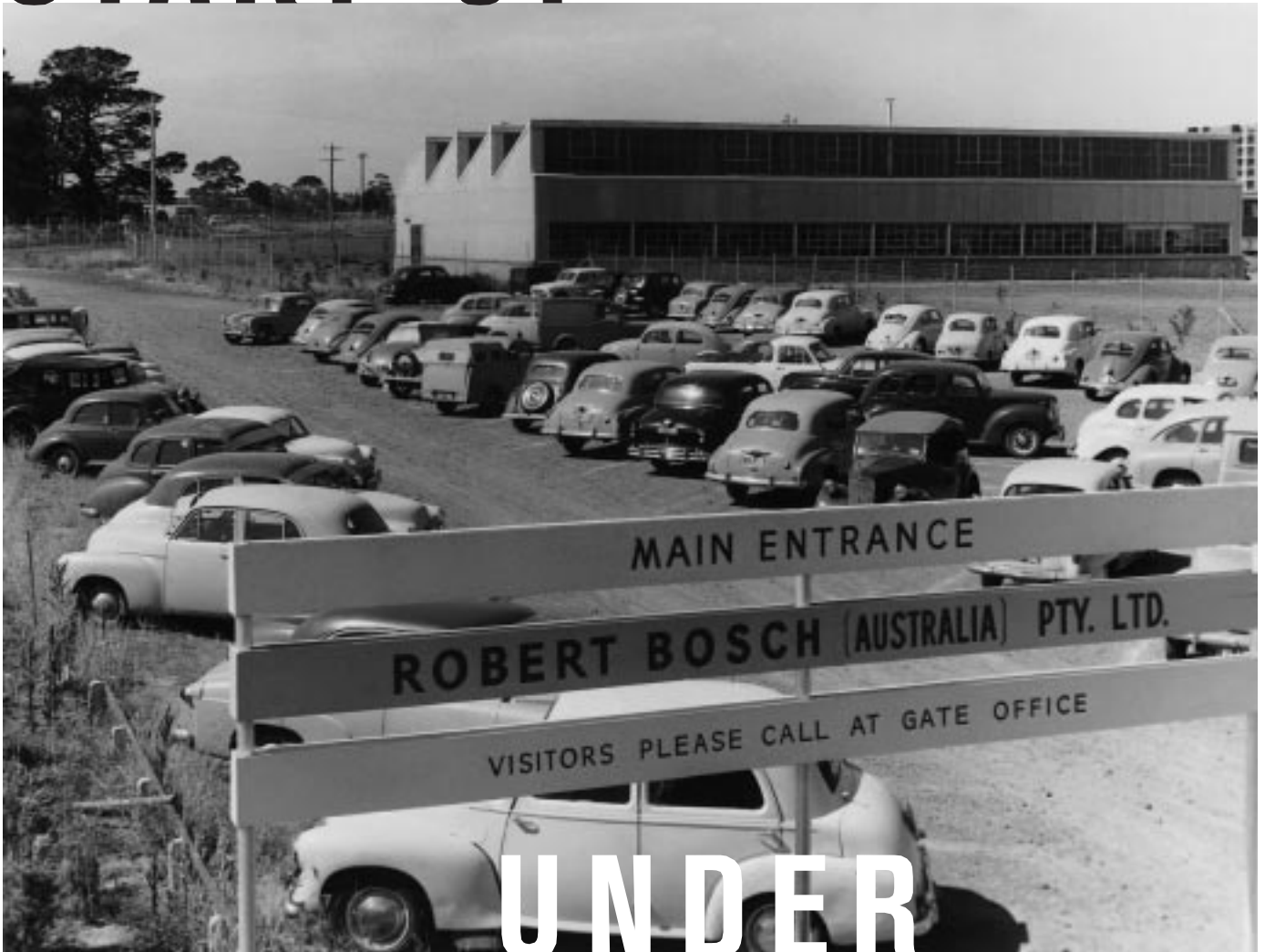
the country had an advantageous economic and social infrastructure. The German automobile industry had already set up shop here, so it certainly made sense to supply on-the-spot customers direct with the equipment they needed to build their vehicles. Bosch diesel injection pumps had also been well known in Brazil even before the Second World War under the name “Bombas Bosch”. So what could be more sensible than to set up a production facility for injection pumps on the Brazilian market itself?

In the meantime, the development of the automobile industry during the 1950s was meteoric. Soon the factory’s production capacity was no longer sufficient, particularly as it had become necessary to widen the range of products. So RBLA moved its headquarters to Campinas in 1957, where the factory was gradually expanded until it is, today, the largest industrial complex of Bosch in Brazil. The setting up of a second factory in Aratu to manufacture spark plugs and ignition coils in 1967 also gave Bosch

a presence in the tropical north-east of Brazil. Bosch acquired an additional production facility in 1975, in the European-style town of Curitiba in the south of Brazil, which concentrates on the manufacture of diesel injection pumps and diesel systems. Bosch finally penetrated right into the heart of the Amazon region in the 1980s, founding a factory for building car radios in the former rubber metropolis of Manaus. Due to the enormous distances and the difficulties of access involved, the accessory components and the finished radios had to be flown in and out. After ten years, Bosch sold off this facility once more.

Today, Bosch employs a staff of over 9,000 in its production facilities in Brazil, and the name “Bosch” is as well known as in its country of origin, Germany. ◀ VD

START-UP



UNDER DOWN

BOSCH STARTS PRODUCTION IN AUSTRALIA

In a country mainly associated all over the world with kangaroos, the success story of the Bosch company began fifty years ago. With resourceful employees from many countries, our Australian regional company has distinguished itself by its powers of innovation, particularly over the past two decades. And it all began with the decision, made in the summer of 1954, to set up a factory in Clayton.

When the new factory in Clayton started production, the name Bosch had long been a household word for Australians. At the beginning of the 20th century, the young Stuttgart company already had agency agreements with Messrs. A.E. Kemsley & Co. Pty. Ltd., and was represented in Melbourne and Sydney. In 1922 August Hoette, managing director of a company called Pyrox Pty. Ltd., founded the Robert Bosch Supply & Service Co. Pty. Ltd. in Melbourne. Up to the Second World War, business with Bosch products flourished, and a branch was also opened in Sydney.

Licences and co-operation

Hoette's company Pyrox continued to play an important role for the business aspirations of Bosch in Australia. The automobile market was booming in a country where distances have a different dimension than in Europe. After the war, the licence agreements between Bosch and Pyrox concluded

Spark-plug packaging from the 1930s



in the 1930s were resumed virtually unchanged. While the manufacture of Bosch spark plugs under the name Pyrox Licence Bosch had been agreed on in 1930, Bosch came to an agreement with Pyrox in 1949 concerning the manufacture of diesel injection systems. Cooperation between the two companies on the fifth continent became ever closer.

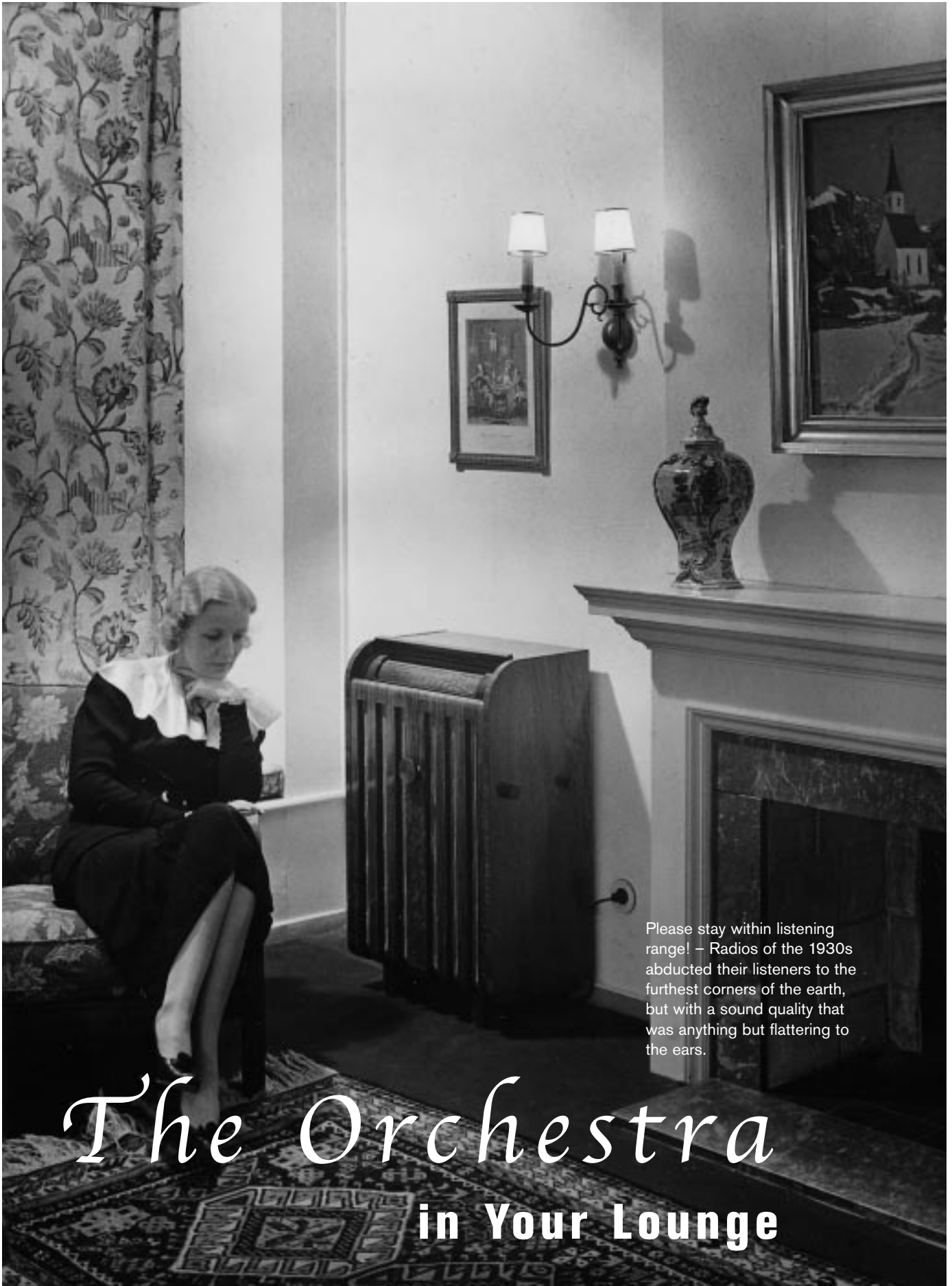
Production begins

28th January 1954 saw the culmination of this development. The two companies founded the joint enterprise Pyrox Industries Pty. Ltd. and began to build a factory in Clayton near Melbourne. Two years later, Bosch took over a majority holding in Pyrox Industries, renaming the company Robert Bosch (Australia) Pty. Ltd. The constantly growing product range could now be sold under the Bosch brand name. In addition to motor-vehicle equipment, electric power tools and Junkers gas boilers for hot water were soon

brought into the production programme. Spatial expansion also began. Perth was finally, in 1979, the last of Australia's big cities in which a sales office was opened.

Innovations and premieres

In the 1980s, RBAU expanded its distribution and production. In the field of research and development, too, pioneer work was done, as the example of electronic vehicle security systems shows. In this sector, Robert Bosch (Australia) Pty. Ltd. was the first regional company within the entire Bosch Group to take over worldwide responsibility for a product in 1993. This comprised development, manufacture and distribution. Only three years later, the new product sector Bodywork Electronics was set up in Clayton, which also took over worldwide responsibility within the Bosch Group. ◀ CS



Please stay within listening range! – Radios of the 1930s abducted their listeners to the furthest corners of the earth, but with a sound quality that was anything but flattering to the ears.

The Orchestra in Your Lounge

3-D Radios from Blaupunkt

“Last but not least, the excellent sound quality can be attributed to the magnificent combinations of loudspeakers which, in our Riviera and Florida models, achieve the peak of perfection in the Blaupunkt 3-D Sound Spatial Acoustics System.”



Even though we may smile to ourselves at the above claims today, they bear witness to an innovation with which Blaupunkt brought philharmonic dimensions into many a home in 1954: a spatial impression of sound when listening to music and a forerunner of today's standards in entertainment electronics.

The principle was simple and effective: sound openings vaguely reminiscent to the gills of a fish were fitted to the sides of the radios. There were additional loudspeakers behind these openings. Development staff at

Blaupunkt hoped that these would succeed in eliminating one deficit of radios of the day: until then, the sound had come from a single loudspeaker, destroying the impression of breadth which an actual orchestra, for instance, can generate.

Two ears hear stereophonically

The idea was to play a trick on human hearing ability. The two ears of a human being enable him or her to locate a sound source with great precision. If loudspeakers emit sound



Top: Advertising with an armchair.

The lady on the right is already enjoying three-dimensional “stereo sound”

Left: Demonstration of the “Riviera” model with 3-D sound fascinates the lady and the gentleman.

in various directions, it is possible to create the illusion of space. The first opinion of the staff magazine Bosch-Zünder was, however, cautious: “To judge from the response, ... it [the new sound technology] can be seen as an important step forward which is worth much further thought.” Well, you could put it like that ...

Looking back

Blaupunkt had marketed its first radio receiver, called a “detector” in those days, as early as 1924. For the early wireless sets, a pair of headphones was still needed, but models from 1927 onwards were supplemented by a loudspeaker, voluminous monsters with names such as “Plastic” that looked more like a mantelpiece of imitation marble. From about 1930 onwards, almost all radios had an integrated loudspeaker. All wireless sets, however, still suffered from the poor transmission quality of medium, long and short waves which, to present-day ears sounds rather like radio music coming from a telephone receiver. Ultra short-wave (or VHF = very high frequency) broadcasts

solved this problem when transmissions began in 1949. With the help of VHF radios, listeners were able to appreciate a quality of sound that laid the foundation stone for the reception quality of today's analog radio broadcasts.

Sound from every side

The "spatial sound series" from Blaupunkt utilized these new technical possibilities from 1954 onwards for new dimensions in sound. Many buzzwords were flying around in Blaupunkt brochures of the following years, promising heavenly sound quality here on earth: "Concert Quiet", "Super High Fidelity Spatial Sound System", "Concert Hall" and, last but not least, the magic word

"Stereo". Behind all this were the efforts to achieve natural sound quality, something which, of course, the first 3-D radios of 1954 were still far from achieving. Theoretically the sound quality was certainly good: diffusion virtually from every side of the radio produced a certain degree of plasticity that was further enhanced by reflection of the sound from the opposite walls. There were also knobs to regulate the amplification of bass and treble pitch. But the proximity of the loudspeakers to one another and the fact that they were mounted on one and the same housing did not create a really sustained illusion of breadth and space. Thus the "3-D Sound Spatial Acoustics" model, which Blaupunkt rechristened from 1955 onwards as "Super High



Blaupunkt drawing of 1960. It demonstrates to the reader how stereophony works.



A new concept in 1955, today a DIN standard: High Fidelity. All Blaupunkt radios with "3-D sound" technology were permitted this designation.

Blaupunkt

Riviera **3-D**

SON STEREPHONIQUE
 7 TUBES (9 FONCTIONS), 7 CIRCUITS, 7 TOUCHES DE PRESSION.
 ETALEMENT DE L'ECHELLE DES ONDES COURTES, REGULATEUR
 DE LA LARGEUR DE BANDE A FREQUENCES MOYENNES.
 ANTENNE GONIOMETRIQUE EN FERRITE BLAUPUNKT, EQUIPE
 DU SYSTEME A SON PLASTIQUE 3 D

Fr. 7600.-

BLAUPUNKT

Blue Spot Point Blue Photo Acust Radio Acust

Other countries, other customs: French-language brochures were already using the term “stereophony” in 1955. What was meant was the “3-D sound” with extra loudspeakers and not broadcasting on two channels.

Fidelity” was followed by a further step: stereophony. Music was recorded via two microphones placed in different positions. When a radio programme was broadcast in stereo, a stereo radio received two slightly different recordings that were played through two loudspeakers on the left-hand and right-hand side of the receiver.

Stereophonic sound to date

But the medley of refinements was by no means exhausted yet. Blaupunkt models such as the top-of-the-range “New York” of 1958 had no fewer than nine loudspeakers and a device for generating an echo effect. This effect was generated by an additional loudspeaker coupled to a 16(!)-metre-long, spirally-wound plastic tube inside the radio. The Blaupunkt brochure euphorically claimed: “*The miraculous sound quality is quite beyond*

description.” The stereo concept was first realized in radiograms from 1958 onwards. Because of their generous width of up to 150 centi-metres, they were particularly suited to the stereo principle.

The further the two loudspeakers with the different signals were from each other, the more spacious the effect of the sound on the listeners. The logical further development was the separation of the loudspeakers from the amplifier. The speakers could thus be placed anywhere in a room, further enhancing the illusion of stereophonic sound. This version was available from Blaupunkt from 1963 onwards. Later developments such as Dolby Surround have meanwhile used their sophisticated sound architecture to bring the listener right into the midst of the music or the soundtrack of a film. The basic idea, in the meantime, is already 50 years old. ◀ DK



Cost aspect: five months' wages or half a very small passenger car. The “New York” model justified its cost in terms of sophisticated technology, impressive dimensions and full sound range.

1979

News of the Year



Photo: AP/Süddeutscher Verlag-Bilderdienst

Coup in Persia

Early in 1979, Iran was shaken by serious political riots. On 16th January, revolutionary Islamic elements forced Shah Reza Pahlevi to leave the country. In view of the uncertain situation, Bosch also ordered its staff back to Germany. In the course of the year, the revolutionary troops took over power in the country. Subsequently, a strict Islamic regime was established by the leader, Ayatollah Khomeini, who returned to Iran from exile. ◀

Accident at Harrisburg atomic power station

The town of Harrisburg in the US state of Pennsylvania became a symbol of the risks involved in even the peaceful utilization of atomic energy. On 28th March, the cooling system at the atomic power station Three Mile Island, located close to the town, collapsed after only three months in operation. For several days there was danger of an explosion releasing radioactivity, and 200,000 people were evacuated. ◀

NATO double resolution and SALT II signed

As a reaction to the stationing of Soviet SS 20 missiles in Europe, NATO resolved, in December 1979, to station nuclear medium-range missiles (Pershing II) over here, too. At the same time, an offer of disarmament negotiations was made to the Soviet Union. Although the SALT II Strategic Arms Limitation Talks held in June of this year raised hopes, the negotiations got bogged down. NATO began to station Pershing II missiles in Europe over the following years. ◀

First direct elections to European Parliament

From 7th to 10th June 1979, citizens of the European Community went to the polls to elect the European Parliament in a direct vote for the first time. The Belgians were the keenest voters, with a participation in the election of 88 percent, while the Eurosceptics in Britain brought up the rear with a mere 31 percent. Germany, with 66 percent, was somewhere in the middle. The Socialists, with 112 seats, formed the strongest group in the 410-seat European Parliament. ◀

New environmental consciousness in Germany

Environmental catastrophes like the oil-rig catastrophe off the coast of Mexico, which led to one of the worst cases of maritime pollution, or the first smog alarm in Germany heightened people's environmental consciousness. The first World Climate Conference held in Geneva in February was a first step towards doing something about the increasing destruction of

the environment. This meeting of experts concentrated on the way climate is influenced by human civilisation. The extent to which the Germans were preoccupied with this subject is shown by the rise of a new political movement pledged to protect the environment. In the state elections in Bremen in October 1979, the "Bremen Green List" was the first Green party to be represented in a German state parliament. ◀

Soviet troops march into Afghanistan

The Soviet invasion of Afghanistan opened a new chapter in the East-West conflict. After a military putsch in 1978, this politically unsettled country had signed an assistance pact with the USSR. Allegedly called in to help the government, Soviet troops marched into Afghanistan in 1979. The USA immediately reacted by stopping deliveries of wheat to the Soviet Union. The Communist regime, however, received hardly any support from the Afghan population. In 1988, agreement was reached between the USA, Pakistan, Afghanistan and the USSR for the withdrawal of Soviet troops. ◀

Margaret Thatcher becomes Prime Minister of Britain

On 3rd May 1979, Margaret Thatcher became the first woman to take office as Britain's Prime Minister. Born in 1925, the lawyer with the nickname "The Iron Lady" pursued a restrictive economic policy with big cut-backs in social services. This led, in turn, to strikes and protests from the population. But her consistent stance in foreign policy, as in the case of the

Falklands Conflict, increased her popularity with many of her compatriots. In 1990 she resigned after having, despite a degree of scepticism, joined her American, Soviet and French colleagues in promoting the reunification of Germany. ◀

Nobel Peace Prize for Mother Teresa

For her unselfish commitment towards the poorest of the poor in the slums of Calcutta, the nun Mother Teresa was awarded the Nobel Peace Prize. Born in Macedonia in 1910, Maria Teresa Bojaxhvi became a nun of the Loreto Order at the age of 18 and was sent to India by her Order in 1928. As a teacher she witnessed the misery on the streets and requested permission to be allowed to live among the poor outside the Order. Her own Order, founded in 1950 and bearing the name "Congregation of the Missionaries of Charity", looked after the poor and the sick. She declined to attend the gala dinner in her honour after the prize-giving ceremony, asking for the costs it would have incurred to be paid out to her in order to be passed on to the poor. ◀

Akio Morita invents the walkman

An idea which the founder of Sony, Akio Morita, turned into a reality developed into an unexpectedly successful best-selling product. In the 1970s, business with ever-smaller portable radios with ever-better sound was booming. Morita fitted a headset to one of these radios, and the "walkman" was born. The mini cassette recorder was popularized via a curious marketing strategy. Sony sent the recorders to a number of prom-

inent people who would be seen using them in public as frequently as possible. The plan worked, as we all know today. ◀

First VHS video recorder from Blaupunkt

At the International Radio Show (IFA) in Berlin at the end of August this year, Blaupunkt presented a novelty. The distribution of VHS television recording equipment, better known nowadays simply as video recorders, proved to be an important market decision for the company. Over the previous years, several systems had been tested, and VHS (Video Home System) had proved to be the most popular. The first recorders distributed by Blaupunkt were made by the Japanese company Matsushita. ◀

Distribution centre in Karlsruhe opened

"From Karlsruhe to the world" was the headline in the company magazine Bosch-Zünder on 24th March 1979. The company's central warehouse had moved from the Stuttgart suburb of Feuerbach to a 30 hectare site in Karlsruhe. By virtue of its progressive warehousing technology, the new building with a price tag of over 100 million DM was one of the most modern distribution centres in the whole of Europe. The move caused little social hardship among the staff. Most of those employed at Feuerbach were able to carry on working there in other functions, and 500 new jobs were created in Karlsruhe. ◀

Margarete Bosch dies


On 30th September 1979, the woman who had spent 15 years at the side of Robert Bosch passed away. The successful entrepreneur had married the daughter of a forester in 1927. It was his second marriage. A year later their son Robert was born, and daughter Eva followed in 1931. In his biography of Bosch, Theodor Heuss writes of Margarete: *"In many respects, his wife also became his co-worker [...] mediating, above all, between her husband and the new generation growing up within the company to take over the tasks of leadership. The Board of Management was also grateful for the subsequent easing of tensions."* After the death of Robert Bosch, his widow kept her close company connections, actively participating in the social commitment that had been so dear to her husband's heart. ◀

CS



Think Tank under the Bonnet

Sales of Bosch Motronic begins

A black and white photograph of a person's hand holding a small, square electronic control unit (ECU) with a grid of pins on one side and two circular terminals on the other. The background is a soft-focus image of a hand, suggesting the scale and precision of the technology.

and, on the other, an increase in performance, at least for motor-racing applications. Bosch produced his first ignition systems for motor vehicles in 1897. These were magneto ignition devices which, at that time, was the only operationally reliable and technically mature method of igniting the fuel-air mixture. Due to its lower costs, battery ignition came to the fore in the 1920s, an ignition coil inducing the necessary high-voltage current to generate the ignition spark. This system was fed via a battery charged with the required energy by a dynamo driven by the engine. These two lines of development came together in the “Motronic” project which Bosch had pursued from 1973 on.

In August 1979, the first automobiles with Bosch Motronic were in the dealers’ showrooms. This date marks the beginning of a new era in engine control from Bosch: Motronic combined the control of ignition and gasoline injection in one central control unit.

From two traditions

Ignition and gasoline injection have always been among the core competencies of Bosch. First used to increase the performance of aircraft engines, Bosch gasoline injection systems were offered for two-stroke engines from 1952 onwards and later also for four-stroke engines, starting in 1954 with the legendary “gull-wing” Mercedes 300 SL. The main considerations here were, on the one hand, savings in fuel consumption

Jetronic + Ignition = Motronic

Electronic ignition and gasoline injection systems had reached series-production maturity at Bosch in the second half of the 1960s. They were designed in such a way that the formation of the mixture and its ignition was ideally geared to numerous criteria such as engine temperature and gas setting. The Jetronic electronic gasoline injection system – on the market since 1967 – ensured that only the absolutely necessary amount of mixture reached the combustion chamber. This resulted in lower consumption and better emission values. It had, above all, been the strict US environment regulations that had forced the pace of the development of this system. The ideal matching of the amount of mixture to the fuel requirements also



Modern times: the 60 components of an analog circuit from the mid 1980s have already shrunk to an integrated circuit the size of an eyeball! This considerably reduces the number of error sources and ensures greater functional security.

led, as an additional benefit, to improved engine performance.

Electronic components also ironed out some ignition wrinkles. Components subject to a high degree of wear, such as distributor contact points, were done away with. At the same time, the electronics permitted a matching of important factors such as the moment of ignition to the requirements of operation: is the engine cold or warm? Is the driver accelerating heavily? Is the car being moved evenly? The heart of the Motronic system is an electronic control unit consisting of a micro-

processor and a memory. The memory contains a work program with data for determining the injection amount and the moment of ignition.

How Motronic works

Sensors provide the microprocessor with information on the amount of intake air, engine speed, crankshaft position as well as the intake-air and engine temperatures for every injection and ignition operation – i.e. over 6,000 times per minute. The structure of the program can be graphically presented in a three-dimensional data map vaguely reminiscent of a mountain range and permitting any desired combination of ignition and injection data.

The sensors are, basically, the air-flow meter, the speed sensors and the temperature sensors. By comparing the program data, the processor calculates the individual requirements for the next injection and ignition operation. Thus the timing of the moment of ignition and the amount injected are, for instance, quite different in the cases of a cold engine to which strong acceleration is applied and a warm engine subjected to even acceleration. For the part-system “ignition” alone, the program data memory stores 4,096 different possible individual moments of ignition.

As long-lived as the engine

The system is matched to the vehicle’s entire useful life. So in addition to the basic data, other variables must also be taken into account. The most important variable is the condition of

the only part in the entire system that is subject to wear: the spark plug. Depending on the degree of electrode erosion, the Motronic must react with corrective interventions that have been previously stored.

Start of series production

When series production commenced in August 1979, Motronic was able to lead with one of the decisive trump cards of electronic systems. Presented for the first time in the BMW 732i, it was, right from the start, absolutely maintenance-free – apart from the spark plugs – and its sturdiness and load capacity were matched to the

entire vehicle life. Not without reason had Bosch manufactured many electronic components in its own Reutlingen factory since 1970, for motor-vehicle components are subjected to different loads than in more solid equipment such as mainframe computers or in entertainment electronics. They had to withstand Siberian temperatures of minus 40 degrees Celsius as well as engine temperatures of over 100 degrees Celsius over long periods. They also had to withstand vibrations from the engine and hard bumps caused by poor road conditions.

In order to achieve the desired operating reliability required before series production could commence,



The technical centre at Schwieberdingen near Stuttgart was and is the "Think Tank" for the further development of modern engine control units. The photo shows the digital Engine Control Unit being matched to a specific car model for a test run.

Situationen, in denen die neue BOSCH MOTRONIC kostbares Benzin spart.

Wintereinsatz
Die Bosch Motronic ist ein intelligentes System, das die Motorleistung bei niedrigen Temperaturen optimiert. Durch die elektronische Steuerung des Ventilschiebers und der Ventildrehmomente wird die Ventilluftmenge bei kaltem Motor automatisch erhöht, was zu einer schnelleren Erwärmung des Motors führt. Dies spart Benzin und reduziert die Abgasemissionen.

Überlauf
Die Bosch Motronic erkennt, wenn der Motor überdreht wird, und reduziert automatisch die Ventilluftmenge. Dies verhindert einen Leistungsanstieg und spart Benzin.

Stadtverkehr
Die Bosch Motronic optimiert die Ventilluftmenge bei niedrigen Drehmomenten, was zu einer Reduzierung des Kraftstoffverbrauchs führt. Dies spart Benzin und reduziert die Abgasemissionen.

Volllastbetrieb
Die Bosch Motronic optimiert die Ventilluftmenge bei hohen Drehmomenten, was zu einer Erhöhung der Motorleistung führt. Dies spart Benzin und reduziert die Abgasemissionen.

BOSCH

Motronic in every situation: The four situations winter operation, overrun, city driving and full-load operation best show the Motronic's advantages.

test vehicles with Bosch Motronic prototypes covered half a million kilometres. The efficiency of the system persuaded BMW to use Motronic in its own Formula I racing car, with fair success: Nelson Piquet became 1983 world champion in a Brabham BMW with Bosch Motronic.

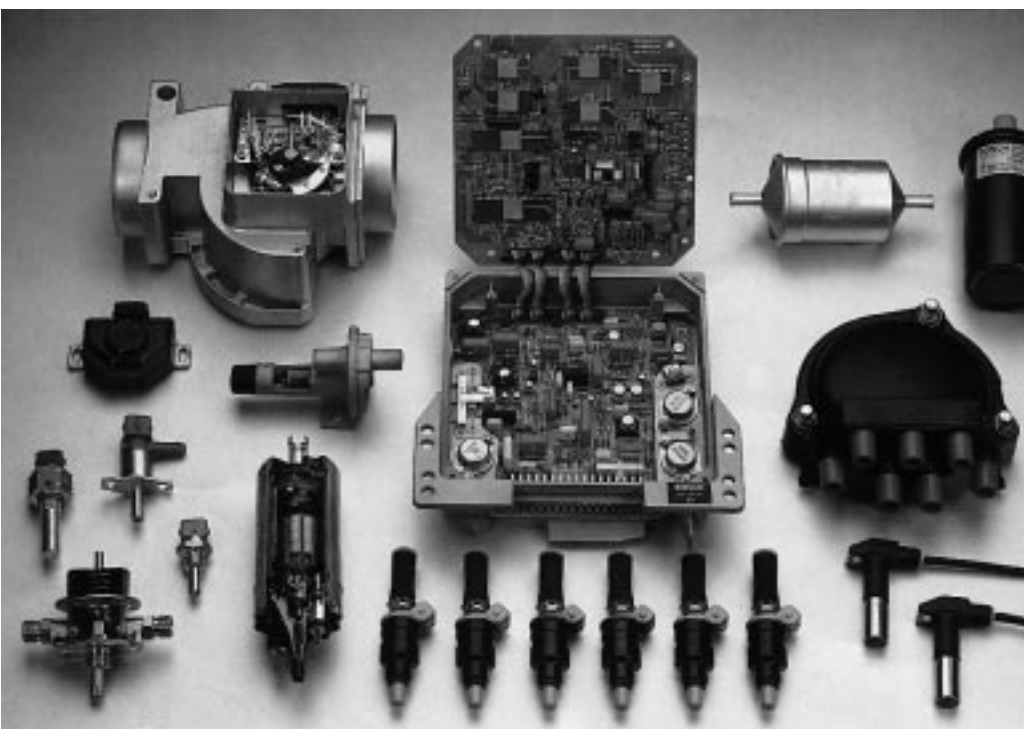
Safety and variability

Right from the beginning, the system also had other strongpoints that are important for everyday motoring. As it combines the functions ignition and injection, a single control unit is sufficient. The existing sensors can be used for determining both the

injection amount and the moment of ignition. This saves components, excludes sources of error and increases the functional security and everyday reliability of Motronic by comparison with traditional, separate systems. Should the electronic control unit fail, however, limp-home functions are brought into play, permitting provisional operation of the vehicle. In addition, Bosch has integrated a self-diagnosis program into the Motronic, which ensures internal error correction.

Outlook

In order to make further Motronic developments possible, Bosch engineers were already working on extensions that would make it compatible with other functions even before series production of the first version began. Attention ranged from the incorporation of lambda regulation for the catalytic converter right up to combinability with electronic transmission-shift control, which went into series production at Bosch for the first time in 1983. ◀ DK



The components of the first-generation Bosch Motronic. The heart of the new system was the control unit that can be seen in the middle.



The pioneer vehicle: in August 1979, the flagship of BMW, the 700 series, was the first car to be offered with Bosch Motronic. Testers praised the unusually smooth running of this straight-six car.

“*A*n important precondition for the deepening and broadening our research and development work is the question of space,” said Hans L. Merkle in 1964. The kind of space needed, however, was just not available at the old Stuttgart Works. Quite apart from the needs of the company’s main administration and the basic research department, there was no more room for the further growth of development departments, in particular, in the centre of Stuttgart. The sectors Main Administration and Research moved to Schillerhöhe, and the adminis-

tration of the Autoelectrics Group moved to Schwieberdingen in 1969. This marked a continuation of the development begun by Robert Bosch himself back in 1909. As he had already decided, a few years after setting up business in the west of Stuttgart, that the size of the site would hinder the development of the company, he had set up a factory in Feuerbach, now a suburb of Stuttgart but then a separate municipality. The foundation of what was to become the Technical Centre for Diesel Injection (TZD) in Stuttgart-

AHEAD THE COMPETITION



The big fan on the climate test-bench of the Technical Centre Gasoline Injection in Schwieberdingen supplies the necessary head-wind.

Technical Centres in Schwieberdingen and Feuerbach

Feuerbach was Building 380, dating from 1961. When it was set up in 1979, the development centre, with its many experimental rooms for the adaptation of injection equipment, for nozzle development and for long-term testing, had a staff of 210. In direct contact with production, they were working on the further development of inline fuelinjection and distribution

diesel injection equipment, production, applications and technical sales, employing a staff of over 1,800. As well as in Feuerbach, diesel components have been manufactured in India and in Brazil since 1979, and there was a small development with engine-testing field in Chicago. In France, Bosch had an engine-testing field in Paris. Later additions were the



Photo left:
Two staff members preparing an exhaust-gas test on a diesel engine on the Feuerbach engine-testing field, 2000

Photo right:
View of the building of the Technical Centre Diesel Injection at the Feuerbach factory, 1983

pumps, and on injection nozzles for cars and trucks. In those days, Feuerbach was still the home of the department which developed injection components for heavy engines for ships and locomotives. Diesel passenger cars played a very subordinate role in 1979: just five percent of all cars in Western Europe were equipped with diesel engines. But the foundation for the consequent boom in diesel-engined cars had already been laid: in co-operation with Audi, Bosch was developing components for automobile engines with direct diesel injection.

On a victorious course with diesel and gasoline

In the 1990s, the Common Rail System and the Unit Injector System from Bosch brought the breakthrough for diesel-engined cars. In the meantime, 40 percent of all newly registered vehicles in Western Europe are diesel-engined. The main tasks of today's Technical Centre Bosch Diesel Systems are in the further development of high-pressure injection systems and their components. At the moment, Feuerbach is the home of the administration of Bosch Diesel Systems, the development of

development locations in Venisseux in France, Bamberg and Homburg, Linz, Vienna, Hallein, Bursa, Grand Rapids (USA) as well as the development in Charleston, near the factory.

The development facility in Chicago moved to Detroit. New development centres are those in Japan and in Brazil (Curitiba instead of Campinas) together with Bari in Italy. The latest member of the development family is Jihlava with the development, close to the factory, of Common Rail components. In 2003, Bosch started series production of the third generation of the Common Rail, but development staff are already working on the fourth Common Rail generation. The Diesel Systems Division (DS) is thus well prepared for the future.

First of all, the Technical Centre Autoelectrics was set up in Schwieberdingen in 1969, followed by the Technical Centre Hydraulics in 1970. Then, in 1979, the Technical Centre Gasoline Injection (TZB) – by analogy with Feuerbach – started work. This is where all work on the further development of gasoline injection is concentrated. Two buildings were at that time available to a staff of 220. One of them was mainly

reserved for development and sales, while the technical installations such as climate test-bench, low-temperature chamber and component test-benches were accommodated in the other. The Technical Centre Gasoline Injection co-operates today with its counterparts in France, Japan, Korea and China. In the meantime, a staff of 790 are hard at work in the Feuerbach “innovation forge” – mainly mechanics, electricians and engineers – developing and applying control systems for gasoline engines such as Motronic and direct gasoline injection (BDE) in order to use these innovations to stay ahead of the competition.

A look into the future

For the coming years, too, Bosch has all the preconditions to stay ahead of competition anywhere in the world: Construction of a new development centre for motor-vehicle technology in Abstatt continues apace. Staff were already able to move into the first buildings by the middle of 2003. When the others are finished, Bosch will be employing a staff of around 2,000 there. ◀ BS

2005 – A Preview



Bosch plant in Paris, 1905

1905

First Bosch foreign production facility in Paris
Bauer company founded

1930

Bosch begins to manufacture radio parts

1955

Bosch electro-tester for customer-service workshops

1980

Bosch develops electronic triggering systems for airbags and belt tensioners



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A reproduction, reduced in size, of a
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enclosed inside this magazine.



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