Annual Report
1998

BOSCH

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BOSCH

Key Figures

Bosch Group Worldwide	1998	1997
Sales	**50,333**	46,851
percentage change versus prior year	**+ 7.4**	+ 13.9
Foreign sales		
as a percentage of sales	**65**	65
Research and development expense	**3,478**	3,257
as a percentage of sales	**6.9**	7.0
Investments in tangible fixed assets	**3,773**	2,905
as a percentage of depreciation	**148**	125
Number of employees		
average for the year	**188,017**	179,719
as of January 1, 1999/1998	**189,537**	180,639
Total assets	**36,343**	34,906
Equity capital	**11,869**	11,377
as a percentage of total assets	**33**	33
Net income for the year	**850**	1,659
Unappropriated earnings		
(Dividends of Robert Bosch GmbH)	**80**	2,209

Values in million DM

Front-page illustration:
We introduced high-pressure injection systems for direct-injection diesel engines. Shown here is the production of Common Rail injectors in our Bamberg plant.

Bosch Group
Business Sectors and Divisions

Automotive Equipment

- ABS and braking systems
- Bodywork electrics
- Mobile communications[1]
- Aftermarket products, after-sales service, test equipment and technology
- Lighting technology
- Fuel-injection technology – diesel
- Semiconductors and control units
- Engine-management systems – gasoline
- On-board electronics
- Starters and alternators

Communications Technology[2]

- Private networks
- Public networks
- Broadband networks
- Terminals
- Aerospace engineering
- Security systems

Consumer Goods

- Power tools
- Thermotechnology
- Household appliances[3]

Capital Goods

- Automation technology
- Packaging machinery

1 Blaupunkt-Werke GmbH (100% Bosch)
2 Bosch Telecom GmbH (100% Bosch) and product groups
3 BSH Bosch und Siemens Hausgeräte GmbH (50% Bosch)

Status as of January 1, 1999

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Supervisory Council

Dr. phil. Dr. rer. oec. h.c.
Marcus Bierich, Stuttgart
Chairman
Former Chairman of the Board of Management of Robert Bosch GmbH

Walter Bauer, Kohlberg
Deputy Chairman
Chairman of the Joint Shop Council of Robert Bosch GmbH as well as of the Combined Shop Council, and Chairman of the Shop Council of the Reutlingen Plant

Dr. jur. Peter Adolff, Stuttgart,
former Member of the Board of Management of Allianz Versicherungs-Aktiengesellschaft

Knut Angstenberger, Stuttgart
Department Manager at the Feuerbach Plant, and Chairman of the Joint Speaker Group of Robert Bosch GmbH and of the Group Speaker Committee

Dr. h.c. Bo Erik Berggren, Stockholm
Deputy Chairman of the Board of Directors of Investor AB

Dr. Ulrich Cartellieri, Frankfurt
Member of the Supervisory Council of Deutsche Bank AG

Dr.-Ing. Wolfgang Eychmüller, Ulm/Donau
Chairman of the Board of Management of Wieland-Werke AG

Ruth Fischer-Pusch, Stuttgart
Trade Unions of the Metal Industry, District Management Baden-Württemberg

Hans-Henning Funk, Hildesheim
Chairman of the Shop Council of the Hildesheim Plant and Member of the Joint Shop Council of Robert Bosch GmbH

Dr. jur. Karl Gutbrod, Stuttgart
Former Member of the Board of Management of Robert Bosch GmbH
Chairman of the Board of Trustees of Robert Bosch Stiftung GmbH

Gudrun Hamacher, Frankfurt
Managing Member of the Board of Directors of the Trade Unions of the Metal Industry

Hans-Joachim Jaquet, Mörfelden-Walldorf
Chairman of the Joint Shop Council of Bosch Telecom GmbH and Chairman of the Shop Council of Bosch Telecom GmbH at Frankfurt

Dieter Klein, Wolfersheim
Chairman of the Shop Council of the Homburg Plant of Robert Bosch GmbH and Member of the Joint Shop Council of Robert Bosch GmbH
as of April 1, 1999

Olaf Kunz, Frankfurt
Managing Director of the Trade Unions of the Metal Industry, Department for Union Policy

Prof. Gero Madelung, Munich
Formerly Technical University Munich
Chair of Aviation Technology

Prof. Dr. rer. nat.
Hans-Joachim Queisser, Stuttgart
Formerly Director at the Max-Planck-Institute for Solid-State Research

Urs B. Rinderknecht, Ennetbaden
Chief Executive of UBS AG

Gerhard Sautter, Erdmannhausen
Chairman of the Shop Council of the Feuerbach Plant, and Deputy Chairman of the Joint Shop Council of Robert Bosch GmbH and the Combined Shop Council

Hans Peter Stihl, Remseck
Chairman of the Board of Management of Andreas Stihl AG & Co

Manfred Wenkemann, Homburg
Chairman of the Shop Council of the Homburg Plant of Robert Bosch GmbH and Member of the Joint Shop Council of Robert Bosch GmbH
until March 31, 1999

Hans Wolff, Bamberg
Chairman of the Shop Council of the Bamberg Plant and Member of the Joint Shop Council of Robert Bosch GmbH

Management

Board of Management

Hermann Scholl
Chairman

Heiner Gutberlet
until December 31, 1998

Rainer Hahn

Claus Dieter Hoffmann
as of July 1, 1998

Robert S. Oswald
as of July 1, 1998

Tilman Todenhöfer

Hubert Zimmerer
until June 30, 1999

Associate Members to the Board of Management

Werner Andexser
until November 26, 1998

Siegfried Dais

Hans Hugendubel
until December 31, 1998

Stephan Rojahn

Gotthard Romberg

Effective July 1, 1999

Board of Management

Hermann Scholl
Chairman

Rainer Hahn

Claus Dieter Hoffmann

Robert S. Oswald

Stephan Rojahn

Gotthard Romberg

Tilman Todenhöfer

Deputy Members of the Board of Management

Bernd Bohr

Wolfgang Chur

Siegfried Dais

Franz Fehrenbach

Supervisory Council Report

In its sessions and using written monthly reports, the Supervisory Council of Robert Bosch GmbH kept itself regularly informed about the progress of business and the company's situation. Business developments, financial situation, investment plans, as well as new technical developments were presented and discussed in detail. Reporting and discussion included all important companies of the Bosch Group.

Schitag Ernst & Young Deutsche Allgemeine Treuhand AG, Stuttgart, audited the accounting and financial statements of Robert Bosch GmbH and the Bosch Group. The auditors in all cases gave their unqualified opinion. The Supervisory Council concurs with the audit findings, and recommends that the shareholders approve the financial statements of Robert Bosch GmbH and follow the proposal of the Board of Management for the disposition of net income.

As of April 21, 1998, Dr. Robert E. Ehret, Jörg A. Henle, and Dr. Wolfgang Hugo left the Supervisory Council as new members were elected. The Council thanks these gentlemen for their long years of work. As of the same date, the shareholders elected Dr. Ulrich Cartellieri, Urs B. Rinderknecht, and Hans Peter Stihl to membership of the Council.

Also as of April 21, 1998, the employee representatives Rudolf Baron and Dietfried Blanarsch left the Supervisory Council. Newly elected were Hans-Joachim Jaquet and Manfred Wenkemann. The latter retired as of March 31, 1999 and as a result left the Supervisory Council. Dieter Klein was appointed as his successor by the Stuttgart court per April 1, 1999. The Council expresses its appreciation for the constructive teamwork of the employee representative members leaving the Council.

As of July 1, 1998, the former associate members of the Board of Management Dr. Claus Dieter Hoffmann and Robert S. Oswald became full members of the Board.

Upon reaching retirement age, Dr. Heiner Gutberlet left the Board of Management of Robert Bosch GmbH as of December 31, 1998. He has meanwhile been elected to the Board of Trustees of the Robert Bosch Stiftung GmbH. Hans Hugendubel took early retirement as of December 31, 1998. Dr. Werner Andexser also left the company. The Council expresses its thanks to these gentlemen for their committed work.

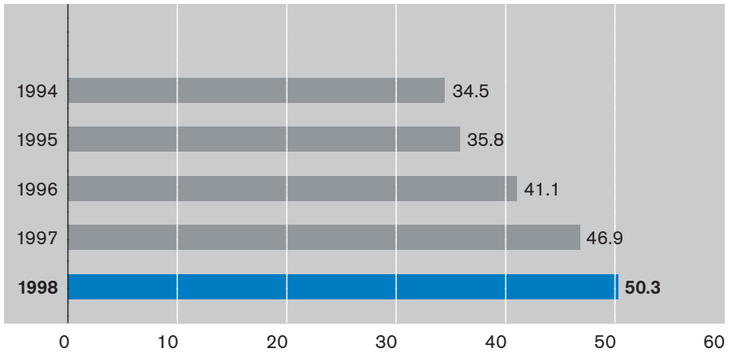
The Supervisory Council of Robert Bosch GmbH, acting on the recommendation of the shareholders, at its meeting of April 13, 1999, appointed the former associate members to the Board of Management Stephan Rojahn and Gotthard Romberg as full members of the Board of Management, and Dr. Siegfried Dais as deputy member, all effective as of July 1, 1999. In addition, the Council, following the recommendation of the shareholders, named Dr. Bernd Bohr, previously in charge of development at the ABS and braking systems division, Wolfgang Chur, previously speaker for the management of the mobile communications division, and Franz Fehrenbach, previously speaker for the management of the diesel fuel-injection technology division, to deputy members of the Board of Management, all effective as of July 1, 1999.

Stuttgart, April 1999
For the Supervisory Council
Dr. Marcus Bierich
Chairman

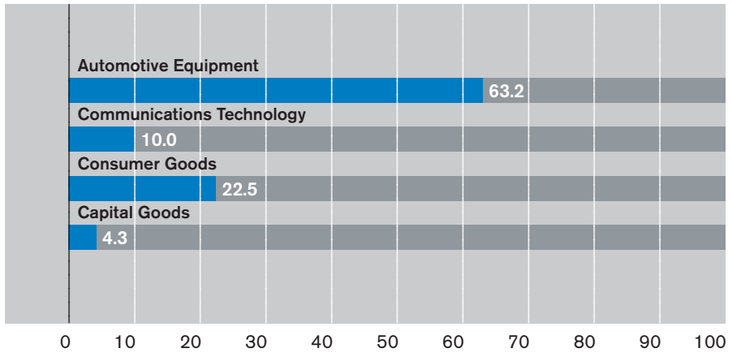
Photo at right:
State-of-the-art automotive electronics by Bosch: Automatic application of computer chips to microhybrids at the Reutlingen plant

Management Report

Sales
(billion DM)
Progress 1994 – 1998



Breakdown of sales
(as a percentage)
by business sectors 1998



Growth of the world economy weakened in 1998 to approximately 2%. Of decisive influence for this was the worsening economic crisis in many countries in East and Southeast Asia and its spread to other countries, especially Brazil and Russia. From the middle of 1998, this also negatively affected the economies in the western industrial nations; economic growth in the USA was still at 3.5%, in the European Union 2.8%.

Business at the Bosch Group in 1998 was on the whole satisfactory. Targeted sales were exceeded despite setbacks in the crisis regions; financial results, however, did not meet our expectations.

Stronger sales growth in the first half year

Consolidated sales of the Bosch Group increased in 1998 by 7.4% to 50.3 billion DM. Growth took place primarily during the first half of the year. Although we experienced a growth rate of 8.9% in the first six months, growth in the second half of the year fell by nearly half of that.

Sales in Germany in 1998 rose by 9.6% to 17.8 billion DM. This increase was – in contrast to prior years – significantly greater than outside Germany; there, sales grew only 6.3% to 32.5 billion DM. The smaller growth in foreign sales was primarily the result of large sales declines in the crisis regions. However, we did well in our important markets of Western Europe and North America with growth rates of 12% and 8.0% respectively. Foreign sales as a portion of total sales, which was 65% in 1997, remained unchanged.

Strong increase in the automotive equipment area

Our growth resulted primarily from the development of the Automotive Equipment Business Sector; its sales grew by 11% to 31.8 billion DM. We participated in the continuing boom in the automobile business in Western Europe, especially in Germany.

Our diesel injection systems business showed particularly strong growth. The rising production of diesel-driven vehicles in Western Europe and the rapidly increasing proportion with high-pressure direct injection again made itself felt in this area. In order to satisfy the brisk demand for the new injection systems which we introduced in recent years, we were forced to put production into high gear earlier than planned. That led to instances of strained employment and delivery situations.

After starting mass production of high-pressure distributor pumps in 1996 and of Common Rail Systems CRS in 1997, in 1998 we commenced full production of the Unit Injector System UIS and of the new electronically controlled radial-piston distributor pump for passenger-car diesel engines with direct fuel injection in 1998.

In the Capital Goods Business Sector – automation technology and packaging machinery – sales increased by 3.2% to 2.2 billion DM. Reduced demands for power tools in the Far East, and aggressive price competition in West European thermotechnology markets, represented the primary reasons for Consumer Goods Business Sector sales increasing by only 2.7% to 11.3 billion DM.

The Communications Technology Business Sector was able to keep its sales with 5.0 billion DM at the level of the previous year. Sales of the public networks division fell primarily as the result of the financial crisis in the Far East, the sluggish release of frequencies for the new radio-relay technologies in Western Europe and delays with major projects in the USA. This was compensated for by the expansion of the mobile-telephone business.

Integration in on-board electronics

In 1998, we continued the further expansion of areas of activity in automotive equipment. We took into account the increasing importance of convenience and information electronics in the automobile and – as of July 1, 1998 – concentrated our activities in body electronics in a new division On-Board Electronics. We thus created the conditions necessary to be able to offer complete systems and software for state-of-the-art vehicle electrical system networks in the future.

We combined the product groups for display systems, locking systems, central electrics including relays, vehicle security systems and convenience electronics. The On-Board Electronics Division, which will involve itself increasingly with integrating components into modules, also includes Robert Bosch Multimedia-Systeme GmbH & Co KG, Hildesheim, and GKR Gesellschaft zur Fahrzeugklimaregelung mbH, Schwieberdingen near Stuttgart. GKR develops and sells electronic controls and control elements for heating and air-conditioning of automobiles; the company was founded in 1989 as a joint venture of Bosch and Behr GmbH & Co, Stuttgart. We acquired our partner's interest as of December 31, 1998.

Commitment to the development of electronic steering systems

Future steering systems require further integration of mechanical, hydraulic and electronic components and therefore close cooperation between a steering specialist and an expert electronics manufacturer. In addition, electronically controlled steering opens the possibility for future integration with vehicle dynamics control ESP (Electronic Stability Program) in order to further increase its effectiveness.

We established a 50–50 joint venture with ZF Friedrichshafen AG, Friedrichshafen, which started operations on January 1, 1999. ZF is contributing its entire passenger car and commercial vehicle steering activities to ZF Lenksysteme GmbH, Schwäbisch Gmünd; this company combines the know-how of both partners, and will supply the automobile industry worldwide with conventional and electric steering systems.

Joint venture for air brakes and lighting technology

Our activities in the areas of air brakes and ABS for commercial vehicles were contributed to Knorr-Bremse Systeme für Nutzfahrzeuge GmbH, Munich. We hold a 20% interest in this company. Other shareholders are Knorr-Bremse AG, Munich, and AlliedSignal Inc, Morristown, New Jersey (USA).

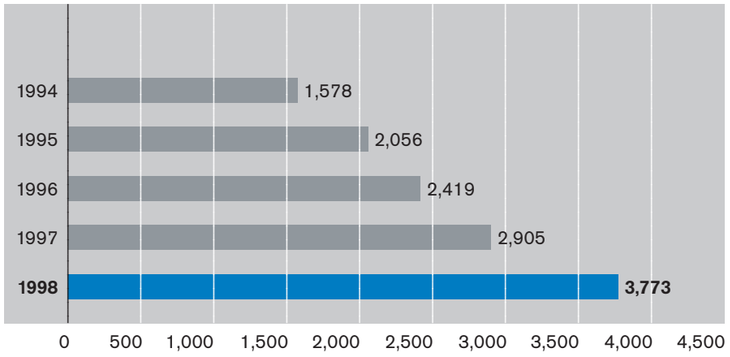
In April of 1999 we founded a joint venture with Magneti Marelli SpA, Milan, in which both companies have combined their worldwide activities in the area of automotive lighting technology.

Vehicle proving grounds in Boxberg completed

After two years of construction we commenced operation in June 1998 of the Boxberg (North Württemberg) testing center with its many test tracks. The proving grounds, with an area of almost 95 hectares, in which we invested about 100 million DM, are of great importance for the development and testing of new and visionary products in automotive technology.

The grounds consist of several track modules and are enclosed by a three-lane oval, three kilometers long. The installation serves primarily the further development of electronic steering and control systems – from ABS and ESP via engine management to speed control ACC (Adaptive Cruise Control).

Investments in tangible fixed assets
(million DM)
Progress 1994–1998



Further strengthening of presence in world markets

In Korea we operate in total with seven companies at five locations. We produce components for diesel and gasoline injection, antilock braking systems, electronic controllers and small-power motors. We have acquired the shares previously held by our local partner and now own 100% of Korea Automotive Motor Corporation.

We established the wholly-owned subsidiary Robert Bosch India Limited in Bangalore, India. This company offers components for gasoline injection for the India market and develops software for use in the Bosch Group and for others.

In China, we have produced and sold automotive equipment and consumer goods in several joint ventures since 1995. At the end of 1998 we acquired the shares of our former partner in Guangdong Shenzhou Gas Appliances Co Ltd, which manufactures gas-fired boilers near Guangdong. In addition, we set up a company for the sale of aftermarket automotive equipment products in Pudong near Shanghai.

As of the beginning of 1999 we established the holding company Bosch (China) Investment Ltd, Peking. This company will hold the shares in our joint ventures and coordinate purchasing, sales and customer service in China.

In the United States we increased our interests in Diesel Technology, L.P., Wyoming, Michigan from 50% to 85%. This company manufactures high-pressure diesel-injection systems for heavy-duty commercial vehicles. We also started a significant expansion of our Technical Center in Farmington Hills near Detroit, Michigan, which we founded in 1983. The plan also calls for a future concentration of application engineering and sales of braking and antilock braking systems for the American automobile industry at this location.

In 1998 we founded Robert Bosch Electronics Manufacturing Ltd, Hatvan in Hungary and commenced building a plant there for the production of electronic control units for automotive equipment. In Turkey we acquired the shares of our Turkish partner with whom we had operated a 50–50 joint venture for the manufacture of gas-fired heaters in Manisa near Izmir.

Product partner at World Exhibition EXPO 2000

We will participate in the World Exhibition EXPO 2000 in Hanover as product partner for traffic telematics and mobile telephones. We also cooperate with the City of Hanover and its transportation departments in future projects: using the new digital radio transmission method DAB/DMB we created a passenger information system for mobile reception of timetables and other multi-media information in 144 urban trains, as well as a system for dynamic timetable data at bus stops.

Further globalization of purchasing

The entire worldwide purchasing volume of the Bosch Group, including services, merchandise and capital goods, climbed in 1998 to 26.7 (1997: 24.2) billion DM. About 56% of what we buy comes from outside Germany, half of it from America and Asia.

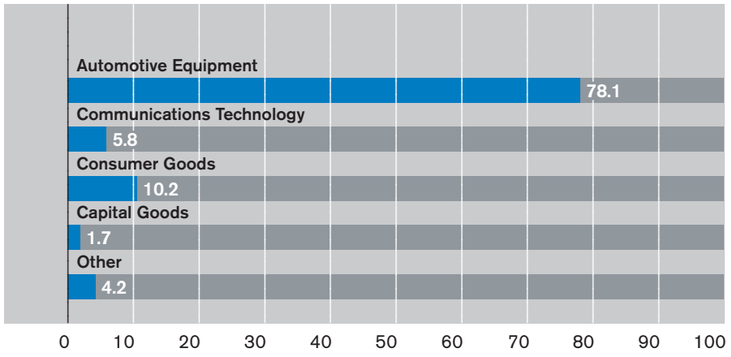
Greater networking intensified the cooperation among our purchasing departments domestically and abroad. This allows us to concentrate our global purchasing still more and to utilize the most efficient procurement markets. In addition, we especially support mid-sized suppliers who are willing to establish production near our foreign plants.

Earlier involvement of suppliers in product development

To lower manufacturing costs further, we involve our suppliers in product development at an earlier stage. More and more we set up simultaneous engineering teams with suppliers in the earliest phase of the process, allowing them to contribute their development know-how and ideas for cost reduction.

Photo at right:
Demand for our injection systems for direct-injection diesel engines grows rapidly. Production, as here in our main plant in Stuttgart-Feuerbach, requires the highest degree of precision.

Investments in tangible fixed assets
(as a percentage)
by business sectors 1998



We also started a program which should lead to further improvement in the quality of purchased parts. To guarantee perfect performance on the part of our suppliers, we developed a uniform system providing for the agreement on quality goals.

Our rating system to encourage efficiency in our suppliers was intensified and expanded to include suppliers of machinery and equipment, as well as shippers.

Rightsizing worldwide logistics

We combined our more important international air and sea freight orders and entrusted efficient logistics suppliers with their performance. In Germany we now use local transportation firms almost exclusively for the movement of purchased parts.

Preparation for Y2K

To deal with the changeover to the next millennium we have introduced the needed measures in our data processing systems in all areas; they will be completed on time. In addition, we have begun with extensive support for our suppliers; included is an assessment of the Y2K capabilities at approximately 1,500 suppliers by third-party experts.

Measures to improve quality

In order to improve workflows and processes, we conducted self-assessments of our methods and processes. The basis for this was the model of the European Foundation for Quality Management, EFQM, of which we are a charter member. The emphasis was placed on the reorganization of product and process development and project management.

Furthermore, we are working intensively on quality assurance in software for products and test equipment. With the help of a model from Carnegie Mellon University, Pittsburgh, Pennsylvania (USA), we improved our software development processes.

Extensive projects to reduce complexity

As part of our process of continuous improvement (CIP) we expanded our pilot program for the reduction of complexity, which we initiated in 1997 with four projects, to cover all divisions. Many projects work on the simplification of work flows and products while making them even more responsive to the needs of our customers. The focus of these activities is on production, variant management and logistics.

Greater expenditures for research and development

To further strengthen our innovative forces we invested more in research and development. The 1998 increase was 6.8% to 3.5 billion DM. During the past ten years R&D expenditures as a percentage of sales rose from 5.9% in 1989 to 6.9% in 1998.

The focus of our activities is on the electronic stability program ESP, high-pressure injection systems for gasoline and diesel engines, and navigation systems. To cope with these challenges, we increased the number of newly hired engineers and scientists in Germany in 1998 to 1,588 (1997: 1,036). Worldwide, about 15,700 (1997: 14,700) scientists, engineers and technicians work to develop new products, systems and methodology, and to improve the functionality and reliability of existing products.

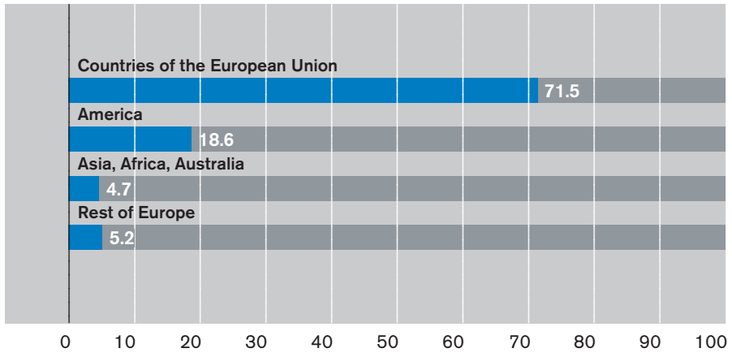
Further increase in investments in tangible fixed assets

We continued our high level of investment activity in 1998. In total, investments in tangible fixed assets increased by 30% to 3.8 billion DM, equivalent to 148% of depreciation.

More than half, 51% (1997: 47%), of these investments were made in Germany. This was essentially the result of the further expansion of production facilities for diesel and gasoline injection systems and ESP. Especially large investments took place in Bamberg, Homburg (Saar), Reutlingen, and Stuttgart-Feuerbach.

The portion for machinery and equipment was 93% (1997: 93%). In land and buildings we invested 274 (1997: 205) million DM.

Investments in tangible fixed assets
(as a percentage)
by regions 1998



In Germany, we started construction work in 1998 on a development facility for ABS in Immenstadt and a lab building with clean rooms for the production of aerospace components in Backnang. We also started many construction projects outside Germany (see pages 32 to 35).

The number of employees increased worldwide

Increased sales had a positive effect on employment. On annual average, the number of employees worldwide increased in 1998 by 8,298 to 188,017. This increase results primarily from strong growth in automotive equipment business. Thus employment in Germany grew for the second year in a row, in 1998 by 3,767 to 94,415; outside Germany employment rose by 4,531 to 93,602.

Two-phase plan for conversion to the euro

With the start of the European Monetary Union on January 1, 1999, our company too adopted the single-currency euro, even if, for the time being, only in relation to outsiders. Bids and invoices can be denominated in euro. In the second phase from the beginning of the year 2001 we will also use the euro internally. Presuming the legal ramifications have been resolved, we will then also change wage and salary payments to the euro; until then we will only indicate the euro equivalent of such payments as additional information.

Still unsatisfactory profitability

The profits of the Bosch Group in 1998 were unsatisfactory. They were negatively affected by high extra expenditures in the start-up of new products, especially in the diesel area, as well as by sales losses in Asia, South America and Russia. The trend in results in the communications technology area was also unsatisfactory.

Outlook for current year

Bosch will further expand its technical excellence and its worldwide market penetration in 1999. The economic conditions are however worse than a year ago, as a result of continuing crises in foreign areas which are important to the Group, and because of uncertain and less favorable general conditions in Germany. With this in mind, we expect sales to increase less than in the year before.

Automotive Equipment Business Sector

In 1998 motor vehicle production worldwide fell by 2.3 % to 52.7 million units. Western European growth in automobile production however continued, rising 8.1 % in 1998. Production in North America on the other hand rose only slightly, and in Japan it continued to fall.

Our Automotive Equipment Business Sector increased worldwide sales by 11 % to 31.8 billion DM and expanded its international production network further. Mass production of many newly developed products commenced.

Continuing demand for vehicle dynamics control ESP

The demand for our electronic vehicle dynamics control ESP (Electronic Stability Program), which we introduced in 1995 as a worldwide first, continues to grow briskly; in 1998 we equipped more than 400,000 vehicles with this system.

By electronically influencing the braking system and the drivetrain, ESP is able to increase the driving stability of motor vehicles, thus reducing the risk of traffic accidents. Key component of the system is the yaw sensor which reacts immediately the vehicle starts to swerve out of its track. In 1998 we began mass production of a second generation using micromechanics. This new technology made the sensor considerably smaller and lighter.

In 20 years Bosch has delivered 45 million ABS units

Bosch recognized the importance of active driving safety at an early stage, and as a result was able in 1998 to look back at a remarkable milestone. After many years of development work we introduced in 1978 the first worldwide production-ready ABS for passenger cars. Since then we have continually expanded the system's functionality, reduced its size and weight and lowered its cost. Further visionary developments in the area of active safety resulting from the ABS system were traction control TCS and vehicle dynamics control ESP.

The latest version is the ABS 5.7, which went into full production in mid-1998. It was conceived in such a fashion, that it can also serve at the same time as the basic system for ESP.

In total in 1998 we built 9 million ABS. We have thus supplied 45 million systems since its introduction.

Development of passenger-compartment sensing systems

Using the yaw sensor as a base, we developed a sensor which recognizes a threatened rollover of the vehicle. This enables seat-belt tighteners and airbags to be activated in time. In order to further improve the effectiveness of the airbag, we are intensively working on several systems for passenger-compartment sensors which allow for the individual deployment of the airbag as needed for each passenger.

Reasonably priced components for automatic transmissions

For continuously variable transmissions CVT we developed new pushbelts with a long useful life and extended torque range. We now expect a broad application to passenger cars in the lower to middle-class areas. We are working on pushbelts which can handle even greater torque for luxury cars and light commercial vehicles.

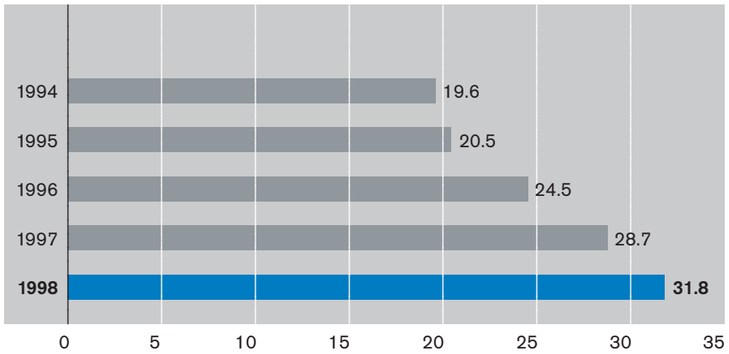
We started full production of a module which combines the electrical and hydraulic functions for the control of conventional automatic transmissions.

Key numbers
Automotive equipment

	1998	1997	
Sales	**31.8**	28.7	billion DM
Investments	**2.9**	2.2	billion DM
R&D Expense	**2.4**	2.3	billion DM

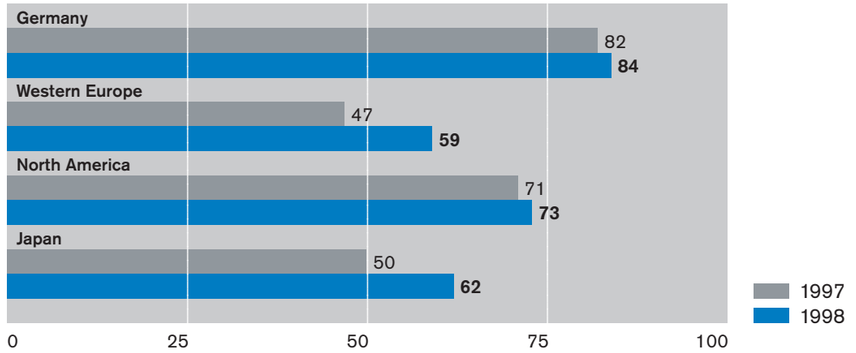
Photo at right:
The yaw sensor is the key component of the vehicle dynamics control ESP (Electronic Stability Program). In 1998, we introduced a micromechanical version to the market. This new technology makes the sensor considerably smaller and lighter.

Sales of automotive equipment
(billion DM)
Progress 1994 – 1998



Automotive market
Percentage[1] of ABS-equipped vehicles as compared to passenger-car production in selected markets 1997/1998

1 Due to a detailed survey procedure, the percentage figures cannot be compared with those prior to 1997.



Taking measurements of a diesel engine in the Stuttgart-Feuerbach plant. In this test room injection components are tested under actual engine operating conditions.

It reduces the space needed for transmissions and increases their reliability.

Increasing number of projects for gasoline direct injection

A fundamental change in the injection technology for gasoline engines is taking place. Manifold injection will more and more be replaced by direct injection. It offers the potential of further lowering fuel consumption by up to 15 % and thus contributes also to a reduction in CO_2 emissions.

The number of projects for the development and use of gasoline direct injection, which we pursue together with car manufacturers all over the world, is growing rapidly. As suppliers of complete systems, we are working on all key components such as high-pressure pumps, high-pressure injectors, control units, and fuel rails with pressure sensor.

Introduction of the planar Lambda sensor

We were the first manufacturer worldwide when we started production of the Lambda sensor in 1976. This sensor made the use of closed-loop-controlled catalytic converters in vehicles possible. In 1998 we introduced a basic new development in the form of a flat and smaller sensor element made of multi-layer ceramics. It has the advantage of still shorter start and reaction times. In contrast to our conventional finger-type sensor – of which we have produced more than 100 million – the new sensor can be used also in lean mixtures. This is especially necessary for future gasoline engines with direct injection, as they are generally operated with a significant surplus of air under actual driving conditions. Through faster control and better diagnosis, this so-called broadband sensor provides the conditions for a further reduction in pollutant emission.

Torque-driven engine control gains acceptance

After having begun mass production of the new engine management system ME7 in 1997, we introduced it to a broad spectrum of markets in 1998. Its electrically-operated throttle valve ETC (electronic throttle control) and the principle – first introduced by us – of coupling the control functions to the torque of the engine, are being more and more generally accepted. The system contributes to significant reductions in pollutant emissions and also enables self-diagnosis of emission-related components.

Start-up of full production of further diesel injection systems

Demand for vehicles with diesel engines continues to increase strongly. In Western Europe, diesel-driven passenger cars continued to take market shares from vehicles with gasoline engines. This development was supported by the introduction of high-pressure injection systems for direct-injection diesel engines on a broad scale. These allow closer adherence to tighter emission limits and contribute to a further significant reduction in fuel consumption. In addition, the new diesel engines with direct injection are quieter than conventional ones and feature a driving experience which resembles that of gasoline engines.

As planned, we started full production of two new injection systems for passenger cars in 1998: an electronically-controlled axial-piston distributor pump which meters fuel with a magnetic valve, and the Unit Injector System UIS which allows injection pressures up to 2,000 bar and pre-injection for quieter engine operation.

In addition, the strong demand for the high-pressure pump VP44, which we introduced in 1996 and for the Common Rail System CRS which has been in production since 1997 is further on the rise. In its second year of production, we already supplied more than 200,000 CRS.

The Unit Injector System UIS and the Unit Pump System UPS, which provide each engine cylinder with its own injection unit, are developing into the preferred injection systems for heavy commercial vehicles. They are more and more replacing the former in-line pumps. Our main plant for these products is our factory in Wyoming, Michigan (USA). Another plant is located in Homburg (Saar). The number of new applications going into full production rose further in 1998.

With the wide spectrum of diesel engine systems we offer, it is possible to supply the optimum injection system for each type of diesel engine. We are thus well prepared for the ever lower limits of allowed emissions.

Liquid-cooled alternator in full production

As a world-first, our British plant in Cardiff commenced full production for two automobile manufacturers of a liquid-cooled alternator for passenger-car on-board electrical networks. The new type of alternator supplies up to 150 amps at 14 volts and is extremely quiet. The special construction allows the elimination of slip rings and carbon brushes, making for an especially long useful life.

In order to lower fuel consumption in vehicles further, we are at work on increasing the efficiency of the proven compact alternator. That will also makes the use of smaller and lighter alternators possible.

Efficient on-board energy networks

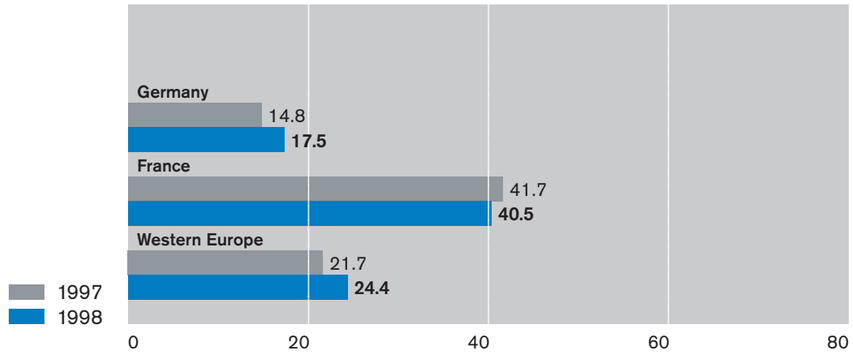
In order to satisfy the rising need for electrical power in motor vehicles, we are developing high-performance alternators and starter-alternators. Compared to conventional starter systems, these units are better able to manage the automatic engine shutoffs used as a further fuel-saving measure when the vehicle stops (start–stop function). We are also working on totally new on-board network concepts, such as a 42 V network which will be required for still broader use of electronic actuators in the vehicle.

For electric drives we are developing electric motors with their respective control and performance electronics.

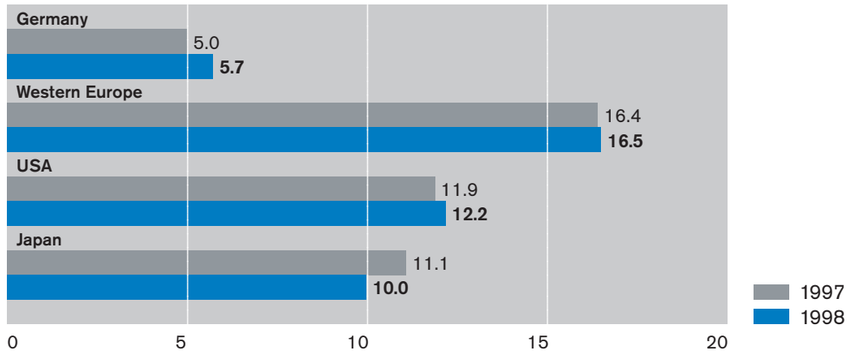
Innovative technology for direct-injection diesel engines: injectors of the new high-pressure injection systems Unit Injector System UIS (left) and Common Rail System CRS (right)

Photo on next double page:
The testing center at Boxberg (North-Württemberg), which opened in June, 1998.

Passenger-car market
Percentage of diesel-engine passenger cars in total new-car registrations
in selected markets 1997/1998



Automotive market
Motor-vehicle production
in selected markets 1997/1998 (in million units)



We developed the electronic driver information system Comand (Cockpit Management and Data System). It includes a dynamic navigation system which changes the selected route to take traffic conditions into account, and also incorporates a number of operator functions.

These electric motors provide flexibility when integrated in the drivetrain and can be used, for instance, in hybrid drives to support the internal-combustion engine.

Lighter motors for wiper equipment

We completed development of a new generation of electric motors for windshield wipers. They are considerably lighter and include the control electronics. This makes it possible to achieve additional functions to improve safety and comfort without taking up more space. On the basis of this power source we developed a dual-motor wiper arrangement, in which each wiper arm is powered separately. The two drives are synchronized electronically. As a result, the connecting rods in the middle of the vehicle, needed for conventional wiper equipment, become superfluous. This brings weight and space benefits.

Simplified control of convenience functions

In 1998 we started full production of a pneumatic control unit. In addition to functions such as doorlocks and folding of rear headrests which already were a reality, it became possible to concentrate on further convenience functions such as a door-closing servomechanism or a massage device integrated in the rear seat. The control logic is integrated with the pump housing to form an assembly.

Brushless drive for engine cooling fan

We developed a brushless direct-current motor for engine cooling fans to the point of production. Its distinctions are short axial installed length, long useful life, and high degree of efficiency. It is available with a power up to 600 watts. The integrated electronics allow for continuous speed control. The cooling output is thus best adjusted to the operating condition of the vehicle engine.

Locking and security systems for vehicles

We developed vehicle locking and security systems which, in addition to the locks themselves, also include sensor systems and electronics which not only check access and driver authorization, but also perform vehicle surveillance. The driver uses a code card or encoded key tag instead of a key. When he approaches the vehicle, the door is automatically unlocked (Passive Entry) and the immobilizer – depending upon the system configuration – is automatically cancelled (Passive Go).

Display systems become more efficient

The display system business in 1998 was characterized by a considerable rise in production volumes of existing products and first full production runs of new models. The functionality of our instruments also increased significantly. Since lower-priced automobiles are also more and more equipped with electronic displays, the driver can be offered additional information over and above the conventional display data. Among the innovations we introduced was a combination instrument with miniature fluorescent lighting for a luxury car model.

First dynamic navigation system in Europe

The demand for vehicle navigation systems based on digital street maps grows strongly. Our subsidiary Blaupunkt-Werke GmbH in 1998 expanded its product range with the first dynamic navigation system in Europe. As a unit which integrates car radio, navigation assistance and telematic functions, it calls in up-to-the-minute traffic data from specialized servers or uses the traffic information aired by radio stations on the Traffic Message Channel (TMC). In this way it can reroute the driver to avoid traffic jams and other traffic obstacles.

The Blaupunkt Travelpilot, a navigation system marketed under our own name, was expanded in 1998 with fleet management functions and sold to manufacturers of commercial vehicles and buses.

New car radios introduced

During the summer of 1998 we introduced a new series of car radio models with fresh and colorful designs into the European aftermarket. For use in new automobiles (original equipment) we developed for the first time a so-called world-radio. It automatically adapts to country-specific reception conditions and at the same time automatically adjusts the optimal sound quality to each type of automobile.

For many passengers, excellent sound quality is gaining in importance. To meet this need, we developed complete sound systems which we supply to car manufacturers for installation in new vehicles.

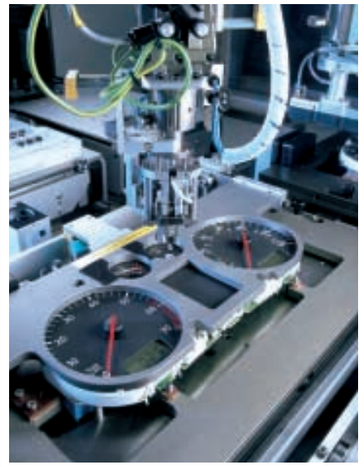
Blaupunkt marketed the first car radio with functions for traffic telematics under the name Gemini. It can be used for calls in case of breakdowns and emergencies and for personal traffic information in Germany, and can be expanded with a function for voice-activation.

Aftermarket business in Europe and North America stronger

We were able to increase our European aftermarket business in automotive equipment, especially outside Germany. In Asia, the economic and financial crisis hurt our business.

In the North American market we were able to further improve our position, especially in wiper blades and spark plugs. Here we began introducing the new surface-gap spark plug with platinum center electrode and four ground electrodes.

The worldwide service organization with about 10,000 Bosch service centers and 100,000 employees in 130 countries supports the further expansion of our aftermarket activities.



Display systems for the driver's compartment are continuously becoming more efficient, even in lower-priced cars. Electronic displays provide the driver with still more data from a combination instrument.

Communications Technology Business Sector

The world market for communications technology products and systems grew further in 1998, especially in data and mobile communications. Development differed, however, according to regions and individual markets. European markets were stagnant. Some of the public and private fixed network technology markets declined.

Sales of the Communications Technology Business Sector in 1998 stayed even with the previous year at 5.0 billion DM. This amount includes for the first time the sales of Bosch Telecom Danmark A/S (Dancall Telecom A/S acquired in 1997).

Change in the market for public networks

Fundamental change has taken place worldwide in the market conditions for public network technology. After completion of the change-over of the telephone network of Deutsche Telekom AG to digital technology, demand for EWSD exchange equipment (Electronic Digital Dial System) decreased considerably. In addition, unresolved regulatory questions led new network operators to postpone or even shelve their purchasing decisions.

The economic crises in important Far Eastern countries as well as in Russia and Brazil led to a decline in demand and the postponement of projects. The increasing number of internet users and the growing use of this medium cause data traffic to grow much more rapidly than telephone traffic. This requires greater transmission capacity of the data networks as well as efficient and flexible solutions for access networks.

Emphasis on transmission and access networks

In view of these changes, which also open up new business perspectives, we shifted the emphasis of our activities to the areas of transmission and access network technology. To this end, we not only introduced refinements to existing products, but also brought brand new products to the market.

The access network system for optical transmission, known as the Bosch Access Network, which we introduced in 1997, went into operation in its first large installations in 1998. An expansion of this system to broadband applications is under common development with our U.S. subsidiary Bosch Telecom Inc.

The proceedings to regulate the frequency allocation for radio access networks in Europe which were completed in the second half of 1998 increased the demand for our Digital Multipoint System (DMS). Different frequency versions are available which have already been installed by several new network operators both inside and outside Germany. Unexpected delays in the awarding of frequencies to network operators in the U.S. led to the postponement of radio project orders.

Our radio-relay systems for short distances were supplemented with additional versions. In doing so we took into account the growing application of synchronous technology (SDH) to access connections in transmission networks as well.

Business with our network management system NSÜ Open was contributed to the Bosch Telecom Software-Systeme GmbH & Co. KG, Backnang, which we established in April 1998. This step also enables us to better reach networks with outside hard and software.

Key numbers
Communications technology

	1998	1997	
Sales	**5.0**	5.0	billion DM
Investments	**220**	142	million DM
R&D Expense	**600**	560	million DM

Photo at right:
Our call center in Magdeburg has created an important position for itself in the growing services market in Germany.

In 1998 we introduced the new GSM 908 mobile phone, a product in the higher-priced range. It is especially small and lightweight. In addition, it has an interface for data communication.

Growth for private network systems

As the West European market for private communication systems as a whole stagnated, demand in Germany weakened. In contrast to this development we were able to expand our position further with the ISDN-exchange equipment Integral 3 and Integral 33. Business with industry-specific solutions for banks and stockbrokers grew further; among other things we received the order for equipping the European Central Bank in Frankfurt. We were able to win over Telecom Italia and other resellers in Europe outside Germany for our small-scale system Integral 3 Duo.

Integration of voice and data communication

Development was brisk in the relatively new market for systems which support the integration of voice and data communication including information processing. Demand in this area is concentrated in CTI-systems (Computer Telephony Integration), in which a telephone call automatically triggers a search for customer information from databases. Complementing data communication with voice communication is also rapidly growing in importance on the internet. In the CTI market we offer products for business call centers. For special applications we can deliver complete solutions with our Referenz 2000, which include customer-specific problem analysis, systems planning and benefit documentation.

Data network business is also growing. Being a systems integrator, we plan and install networks of various sizes all the way up to and including wide-ranging corporate networks using all currently available technologies.

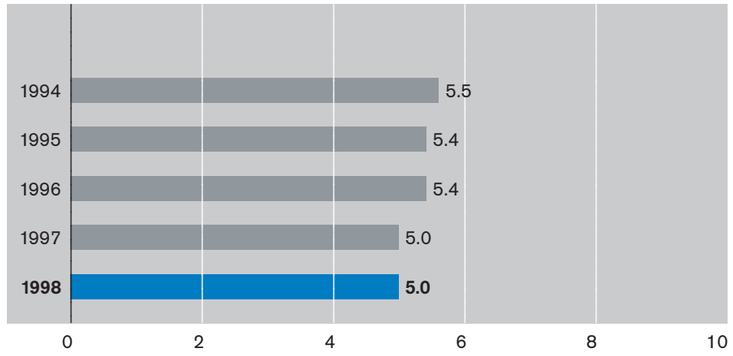
Increasing use is being made of services for the setting up and operation of private communication networks. Our new Business Recovery Center is a good example of such services. It provides the banks in the Frankfurt area with a permanently up-to-date backup for their telecommunications and data communications systems in case these break down. Demand for our Ecotarif software, which in a switching system allows the flexible choice of the most economic network supplier and rates, also shows robust growth.

Expansion of mobile telephone production in Denmark

The market for GSM mobile telephones keeps growing strongly and is characterized by rapid innovation and falling prices. After the acquisition of Dancall Telecom A/S in the spring of 1997, we converted our Danish location Pandrup to become our center for GSM mobile telephones. In October 1998 we started operations there in a new plant. This allowed us to double our sales of GSM mobile telephones.

Our new development World 718 received international acclaim. It is the first mobile telephone with which it is possible to place calls both in the European GSM 900 and the American PCS 1900 networks. Early investments in the GSM dual-band technology propelled us to a significant position for

Sales of communications technology products
(billion DM)
Progress 1994–1998



this in Europe more and more important area. In the fall of 1998 we started production of the GSM 908, a mobile telephone with a volume of only 99 cubic centimeters and a weight of a mere 99 grams, which also features an integrated data communications interface. With this telephone we expanded our product range into the higher-priced category.

Increasing demand for security

For several years now the demand for overall solutions in the application of security technology to building complexes and real estate units has been growing. We have adapted to this development by offering complete systems and operator models which include planning, erection, financing and operation. We received several large orders in 1998. For example, we were chosen to equip the main parliament building and several ministries and parliament annexes in Berlin with security technology.

The basis for our strong position in this field is primarily the technical lead in LSN bus technology (Local Security Network). The miniaturization of LSN technology to chip size makes it possible to electronically monitor even the smallest magnetic contacts. As an innovation, we introduced a fire-gas sensor which stands out due to its very short reaction time and high level of freedom from false alarms.

Growth in satellite technology levels out

The difficult economic situation in the Far East, South America and Russia adversely affected the use of earlier planned satellite services in these areas and delayed the construction of satellite-supported communication networks. This market weakness affected our business too, albeit in milder form. In the medium term we continue to expect a better than average demand for satellite services for mobile and data communications.

For our new generation of compact power supply units for traveling-wave tube amplifiers we received a large initial order from the satellite operator Intelsat. High-performance optical communication channels between satellites in space will play a decisive role in future world-encircling satellite networks. We have intensified our development to secure our technical position in this area.

Difficult environment for traffic management technology

Continuing scarce investment funds in public budgets for traffic guidance and management infrastructure, together with considerable price erosion as a result of idle capacity, characterize the situation in the traffic management technology business. In addition, we foresee that future traffic telematics systems will be based on GSM networks instead of conventional traffic guidance technology. Therefore, as of January 1, 1999, we sold our interest in Signalbau Huber AG, Munich, which operated primarily in the traffic-signal field.

Bosch supplies the equipment for state-of-the-art radio-relay systems for the transmission of sound and pictures. Shown here: antennas on the Berlin TV-tower.

Consumer Goods Business Sector

Invigorating demand in 1998 supported the economic development in Western Europe. In contrast, domestic demand in important markets such as Southeast Asia and Latin America fell. Private consumption in North America continued to grow.

Sales of our Consumer Goods Business Sector increased by 2.7% to 11.3 billion DM. This includes 50% of sales by BSH Bosch und Siemens Hausgeräte GmbH.

Key numbers
Consumer Goods

	1998	1997	
Sales	**11.3**	11.1	billion DM
Investments	**385**	379	million DM
R&D Expense	**294**	268	million DM

Expansion of international position in power tools

After strong growth in previous years, the world market for power tools shrank in 1998. Both quantity and value decreased by 6% to 89 million units and 12 billion DM respectively. An important reason was the economic crisis in Asia, where markets, as a result of declining construction activity, decreased by half within the span of a year. Nevertheless, our power tools division was able to increase its sales further and to expand its world market standing.

Strong position with Bosch, Dremel and Skil brands

In the market for commercial power tools, the Bosch brand makes us one of the worldwide most important producers. With the Skil brand we are above all popular among craftsmen in North America as a supplier of circular saws. For do-it-yourselfers we offer a wide spectrum of products under the Bosch and Skil brand names. This product range is attuned to regional preferences. In the European markets we introduced Dremel-brand multifunction tools with extensive accessories.

Our growth was again strongly characterized by new product introductions. Among these, a fine-cutting saw which surpasses all known compass saws and hacksaws in cutting quality, stands out. This saw is ideally suited for clean, splinter and rip-free sawwork, as well as for precise mitercuts.

In the area of measurement technology we introduced a digital distance meter using laser technology for distances up to 30 meters.

In Europe we produce power tools in Leinfelden, Murrhardt and Sebnitz in Germany, Solothurn and Derendingen in Switzerland and in Breda (Netherlands). Outside Europe we manufacture in Brazil, Mexico, the U.S., China, India and Malaysia.

Guaranteed repair within five days

In June 1998 we introduced a unique service in the industry: we guarantee repairs of power tools in Germany within five workdays. Should we renege on this promise, the repair is made free of charge, even if the warranty period has expired. Active support of our trade partners is essential for this concept to increase customer satisfaction. Already, 1,700 dealers participate in the program.

Universal supplier of accessories for power tools

In the accessory market, which with 13 billion DM exceeds that of power tools themselves, customers rely more and more on suppliers who in addition to tools for a variety of purposes – above all drilling, grinding and sawing – sell an extensive accessory assortment. Our program includes more than 7,000 items and thus takes into account the regionally very diverse requirements. In Europe we manufacture in our German plant in Ravensburg and in St. Niklaus (Switzerland). In the largest market, the United States, we are well-positioned with our joint venture, Vermont American Corporation.

Motor-driven gardening tools are offered by us in the U.K. under the brand names Atco and Qualcast and in other European countries under the name Bosch. They are produced in Stowmarket, U.K. In North America we are represented with the brand Gilmour by way of Vermont American Corporation.

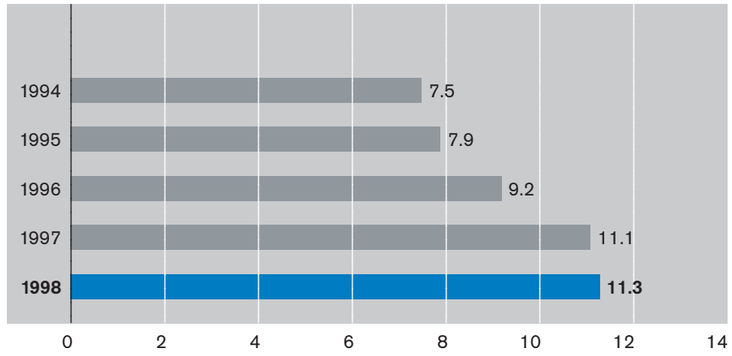
International presence in thermotechnology strengthened

Our thermotechnology division continued to increase its sales in 1998. With a technically high-grade and environmentally friendly equipment program, it became possible for us to expand our status as one of the largest suppliers in the European heating equipment market. The markets in Central and Eastern Europe are growing in particular, while competitive conditions in Western Europe are getting tougher. Business development in Germany was thus negatively affected by weak construction activity and increased competition from foreign competitors.

We expanded our position in the shrinking European market for gas-fired boilers. We consolidated our position in wall-mounted gas-fired heaters. An important contribution was the introduction of a new equipment series of water-cooled ribbed burners for which we had completed development in 1997. In the growing market for equipment maximizing useful heat, which use the condensation of steam for the extraction of additional heating energy and so produce favorable utility and emission values, we also strengthened our position by the introduction of new products. As an innovation we started marketing a flexible device for heating installers which is available in several performance classes and can also be used to heat multi-family buildings.

In 1998 we continued expanding our international presence pointing the way to further growth outside Europe. By establishing our own sales company in Chile we contributed to opening the South American market. The acquisition of the interest of our partner in the Turkish joint venture (see page 10) strengthens our position in the local market and makes further expansion of our international production network possible.

Sales of consumer goods
(billion DM)
Progress 1994–1998



Despite declining markets, we were able to expand our worldwide strong position in power tools with innovative new products.

Innovations involving heating equipment

Innovations in classic heating systems are still possible despite the mature state of the technology. For example, we designed a special burner with high useful heating values which can be used with improved efficiency even when connected to standard chimneys. With the help of sensors and actuators the introduction of adaptive heaters which automatically react to changing gas quality and diverse installation conditions becomes possible.

Worldwide presence in household appliances strengthened

The BSH Bosch und Siemens Hausgeräte GmbH, Munich, in which both Bosch and Siemens hold a 50 % interest continued in 1998 to strengthen its international presence. The company, which manufactures at 30 locations in Europe, North and South America and Asia, acquired household appliance producer Thermador Corporation, Huntington Beach, California, thus expanding its position in the North American market. Thermador is an established supplier of built-in kitchen appliances in the upper price and quality class, primarily ovens, ranges and range hoods. In addition, BSH acquired two producers of small household appliances in Spain and Turkey.

The company strengthened its position in the area of motors for water-systems equipment. It acquired a plant for motors and pumps in Michalovce, Slovakia, and a center for control and sensor-engineering systems in Regensburg from Siemens AG.

Domestic and foreign sales continued to grow

The BSH Group continued its growth in 1998 and increased its worldwide sales by 7.2 % to 10.3 billion DM. A quarter of this growth is attributable to the initial consolidation of new companies.

The sales increase was primarily achieved in foreign business, which showed a dynamic development in the early months of the year, only to be negatively affected in the further course of the year by the economic slowdown in important sales markets. Total sales of BSH outside Germany grew by 10 %. Western European and North American growth rates were especially high. The share of sales made abroad rose from 62 % to 64 %.

Sales in Germany grew by 2 %. Once again, BSH outperformed the otherwise stagnant industry as a whole in the German market. Financial results were lower than the prior year.

Production of gas-fired heaters with Bosch Heatronic electronic controls. They provide for optimal management, simple operation and fast, trouble-free service.

Photo at left:
In 1998 Bosch introduced a fine-cut saw for commercial use as a world innovation.

Capital Goods Business Sector

Against the backdrop of economic resurgence in Western Europe, the willingness to invest increased in 1998. However, demand for capital goods weakened in the second half of the year, particularly in the German mechanical-engineering industry. Sales of our Capital Goods Business Sector continued to rise in 1998 by 3.2% to 2.2 billion DM.

We developed and in 1998 introduced a completely new generation of our proven robot series Turboscara. These swivel-arm robots are particularly robust and efficient.

Key numbers
Capital Goods

	1998	1997	
Sales	**2.2**	2.1	billion DM
Investments	**65**	41	million DM
R&D Expense	**143**	133	million DM

Growth in automation technology equipment

In the area of automation technology we were able to compensate for ebbing export demand with increasing domestic business. In particular the German mechanical-engineering industry provided stimuli. Our Automation Technology division continued to increase order inflow and sales. A row of product innovations contributed thereto.

We complemented our range of pumps for automotive hydraulics with a version which is considerably quieter than earlier models. In addition, we took up full production of a generation of electrohydraulic directional control valves for agricultural and materials-handling technology, which represents another step in their development. It is well-suited for connection to the CAN bus for data communication which is coming into increased use in vehicles.

In the area of industrial hydraulics we developed a digital controller for radial-piston pumps. It is also equipped with an interface to the CAN bus, which has recently also come into use in industrial hydraulics. As a further innovation, we introduced proportional valves with CAN bus interface which are also suitable for integration into safety circuits.

Our valve-mount system for pneumatics was complemented by decentralized controllers with stored programs, and by compact assemblies with greater performance. We expanded our compact-cylinder module by adding further applications.

At the Homburg (Saar) location we commenced operation of a warehouse for the distribution of pneumatic products. By rapid access to individual items and fast disposition, we are able to further increase our flexibility in reacting to customer wishes.

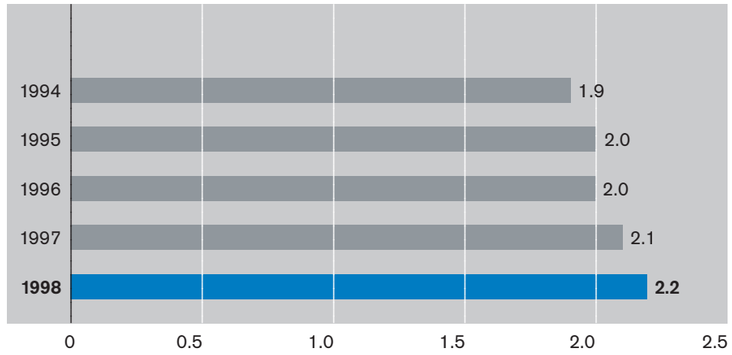
In the area of mechanical base elements and manual work systems we improved our market position. Many new products and program supplements such as elements for equipping clean rooms contributed to this improvement.

We made significant progress in tightening technology for assembly work. Our tightening system 300 can now be operated via PC. In addition it is equipped with an interface to a data bus.

More efficient robots introduced

With the Turboscara SR6 and SR8 we introduced a completely new generation of swivel-arm robots. They distinguish themselves by extra high operating speed, long useful life and open control technology. Part of the product offering is a PC which is especially adapted to industrial requirements and which enables better visualization and data communication, for instance in servicing.

Sales of capital goods
(billion DM)
Progress 1994–1998



Our new, easily programmable robot controllers and control fields based on this industrial PC expanded our product line in the area of industrial control technology. The range of products is complemented by a stored program control (SPC) which can also be run as a software program on the PC.

We expanded our training center at Erbach (Hessen) further. For schooling and training we developed internet-capable learning software. A new introduction in 1998 was our schooling system for apprentices in the newly established apprentice course in mechatronics.

Worldwide renown as supplier of packaging machinery

As one of the largest producers of packaging machinery worldwide, we supply customers in the food, confectionery, pharmaceutical and chemotechnical industries. In Europe, aside from three German plants, we also operate a factory in the Netherlands, and one in the Czech Republic. In addition we produce in the United States, Brazil, India and Japan.

Sales and order inflow of our Packaging Machinery division increased at a stronger pace than the world market as a whole. We thus continued in 1998 to expand our international position. About 85% of sales took place outside Germany.

The product program for the food and confectionery industries was enlarged in the mid-range performance area. For the packaging of bulk materials such as pasta or sugar we introduced modular packing equipment with servo drives and industrial-PC controls. The machine distinguishes itself by rapid adaptation to new formats and by low maintenance and repair costs.

The market responded favorably to the first version of a new series of pouch-filling machines equipped with electronically controlled highly-dynamic servo drives and newly-developed control technology. It is well suited for diverse packaging materials and types and sizes of pouches.

Together with a well-known producer of packaging materials we developed pouch-filling machines which operate aseptically. In one hour, a single machine can fill and close 4,000 liters of long-life milk in one-liter pouches made from tearproof, environmentally friendly foil.

In the area of sterile filling and packaging of liquid pharmaceuticals we again made progress. With large orders for filling and sealing machines whose product handling element is designed as an encapsulated sterile chamber (insulator technology), we were able to gain acceptance for this technology in the West European and Japanese pharmaceutical industries.

Our Brazilian production facility supplies the country's foodstuff industry with pouch-filling machinery.

International Business

Expansion of our business worldwide continued again in 1998. This was especially the case in the automotive equipment business in East European, Latin American and Asian countries. In these regions we also offer automobile manufacturers application engineering, as well as systems and components for automotive equipment from local production. We continued expanding the international integration of our manufacturing in 1998. At several locations we broadened our production program.

In total the Bosch Group has subsidiaries and associated companies in 48 countries. More than 185 manufacturing sites, of which 142 are outside Germany, testify to the international commitment of the company. Worldwide, Bosch participates in 37 joint ventures.

Key numbers
International business

	1998	1997	
Sales	**32.5**	30.7	billion DM
Investments	**1,843**	1,529	million DM
R&D Expense	**946**	827	million DM

In Western Europe, our most important market, growth in 1998 strengthened in most countries. Here and there, as in the U.K., the economy weakened in the course of the year. In Central and Eastern Europe, economic developments were irregular. Our European sales in total continued to grow to 37.0 (1997: 33.4) billion DM.

Centennial of our first foreign venture in the U.K.

Our foreign activities can look back on a long tradition, which we celebrated in 1998 with an anniversary. Our first step onto world markets took place in 1898, 100 years ago. Robert Bosch, the founder of the company, that year set up a representation in the U.K.

With sales of 2.8 billion DM, the U.K. today is our third-largest foreign market after the United States and France. Our work force in the U.K. runs to approximately 3,830 persons. They manufacture automotive alternators, gas-fired boilers and motor-driven gardening tools and sell Bosch Group products.

Our Cardiff plant was again expanded. In 1998 we started here with full production of a liquid-cooled alternator (see page 17).

Strong growth in France and Spain

France is our largest European market outside Germany. There we manufacture products for automotive equipment, private communications technology, thermotechnology and automation technology.

We were able to increase our French sales in 1998 by 16%. The business with the country's car manufacturers grew disproportionally more. Contributions to this trend were increasing demand for diesel vehicles and the growth in equipping new vehicles with ABS. Because of the strong demand for components of diesel injection equipment, our plants at Vénissieux and Rodez were working at full capacity. In Rodez we started the expansion of the diesel production. Here we will invest about 175 million DM by the year 2000 in the production of the Unit Injector System UIS.

In Spain we manufacture products for automotive equipment and for automation technology. The strong growth in Spanish car production led to an increase in our sales of almost 20%.

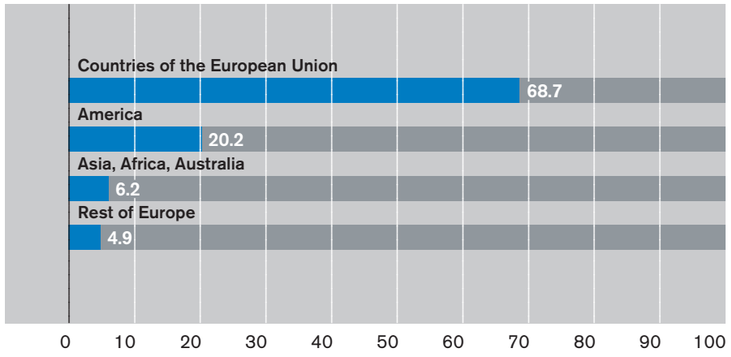
Photo at right:
In China we established together with national partners over the past few years several plants for the manufacture of automotive equipment and consumer goods. In order to secure uniform quality standards worldwide an international exchange of employees is essential.

Employees and production outside Germany

Country	Employees	Automotive equipment	Communications technology	Consumer goods	Capital goods
USA	15,030	■	■	■	■
Brazil	11,430	■	■	■	■
India	10,950	■		■	■
France	10,080	■	■	■	■
Spain	7,180	■		■	■
Mexico	4,560	■		■	
U.K.	3,830	■		■	
Portugal	3,710	■		■	
Malaysia	3,190	■		■	
Switzerland	2,210			■	

Breakdown of sales

(as a percentage)
by regions 1998



In all regions of the world, our internationally integrated manufacturing is supported by a growing network of application engineering centers in which we refine the development of products and adapt them to the needs of vehicle manufacturers.

In Bursa, Turkey, we acquired another parcel of land for the erection of a second plant to accommodate the expansion of our production of automotive equipment.

Expansion of activities in Central and Eastern Europe

In the Central and East European countries, in which we had established our own sales companies during the past seven years, business development varied. In the countries with advanced economic reforms, strong growth continued in Poland and Hungary, but in the Czech Republic gross domestic product decreased. The economic and financial crisis in Russia also increasingly poses problems for its neighbors, Belorussia and the Ukraine.

The strong growth of our business in Central and Eastern Europe slowed. However, we see again middle and long-term growth chances in these countries. That is why we have increased our activities in some parts of this region. In the Bosch Saratov GmbH, Saratov, joint venture which we established with Russian partners in 1996, we commenced production of control units for gasoline injection and ignition.

Continued progress in North America

Strong economic growth in North America continued. The United States, with sales of 6.8 billion DM, constitute the largest market of the Bosch Group outside Germany. We manufacture at 20 locations primarily braking equipment, gasoline injection equipment and power tools. In Anderson, South Carolina, we began production of miniature assemblies of electronic automotive equipment. In Charleston, South Carolina, we started operation of a fourth assembly line for gasoline injection valves of the EV6 type in view of the strong demand for this product in North America. In Palo Alto, California, and in Pittsburgh, Pennsylvania, we began setting up branches for our research and development.

In Mexico, we started with the production of headlamps at our Juarez site. At our Toluca plant, we expanded the facilities for production of electromechanical products for automotive applications.

Our business in South America was negatively influenced by the economic crisis in Brazil. The measures taken by the Brazilian government to reduce the large budget deficit were ineffectual. The attempt to stabilize the currency exchange rate with high interest rates weakened domestic demand considerably. The country's automobile production dropped precipitously. In Argentina we started production of Lambda sensors for the South American market.

Weakness in Southeast Asia

After years of strong economic growth, there was a sharp economic collapse in the countries of East and Southeast Asia. The Japanese economy is in the longest recession since the second world war. Although the economy in Korea showed signs of stabilizing by year-end, the restructuring of industry made only slow progress. In many ASEAN countries, the political unrest in Indonesia added to the weakening of the economic development. Private and public demand diminished strongly, vehicle production decreased considerably. Our sales in this region fell by 46%. In the middle and long term, however, we continue to see good business opportunities.

Expansion of Japanese application-engineering center

In Japan we have started the expansion of our application-engineering center in Yokohama. As part of a capital increase at the beginning of April 1999 we increased our shareholding in Zexel Corp, Tokyo, to 50.04%. We continued to strengthen our position in the Korean market. We acquired the shares of our partner in a joint venture (see also page 10).

In the Chinese market we have been active since 1995 in several production joint ventures for automotive equipment and consumer goods. During the second half of 1996 production was started at United Automotive Electronic Systems Co Ltd, Shanghai. This company meanwhile produces all important components for the engine management of gasoline engines. In 1998, the company took up operation of an application-engineering center. In Pudong, near Shanghai, we established a company to sell aftermarket products for automotive equipment.

Strong growth in Australia

The Australian economy is growing at a rapid pace. This favorable economic development led to a further increase in vehicle production and new automobile registrations. In the Clayton plant we started production of EV6 gasoline injection valves. In addition, we began with the expansion of production for autobody electronics and antilock braking systems.

For more than 40 years we have held a strong position in India in diesel injection equipment. In 1998 we also began application engineering of components for gasoline injection.

Research and Development

Innovative products and processes characterize the Bosch Group as the capable supplier of top-notch technology in large quantities. We are continuously expanding this position.

Bosch is intensively working on videosensorics for motor vehicles. One important use is the Traffic Signal Assistant, which by means of visual or audible signals draws attention to traffic regulations, such as speed limits.

New structuring technology for silicon sensors

We developed a new high-frequency etching method for exact manufacture of micromechanical structures in silicon and an under-etching technology to produce flexible silicon structures. These key technologies form the basis for new space-saving and economically priced yaw sensors. These innovative sensors can be used not only in ESP, but also for detecting the danger of vehicle roll-over, and for vehicle navigation aids.

Rapid start-up assists for diesel engines

The warm-up behavior of glow plugs in their role as start-assist devices determines the time needed for starting diesel engines. In order to shorten the starting time further, we developed glow plugs which reach ignition temperature so fast that the preheating phase can be omitted.

This plug is made of new types of ceramic composites which can be heated to more than 1,000 degrees centigrade in less than two seconds. Even at these high temperatures the materials have a long useful life.

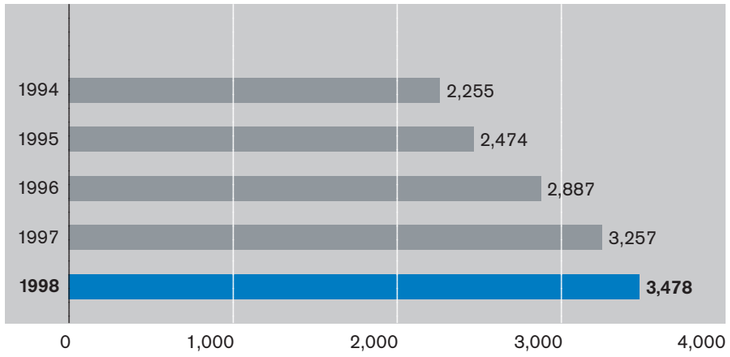
Mechatronics in the motor vehicle

The functions in motor vehicles which at one time were mechanical or hydraulic, such as steering or braking, will be replaced in the future by so-called "By Wire" systems, in which the connections are replaced by sensors and electrically controlled actuators. In this way, active safety can be increased by improved electronic integration of vehicle systems. The displacement of mechanical and hydraulic components is especially favorable in vehicle design.

As part of a European project we tested the basic concepts of this system. They have in common the fact that they recognize and correct errors in order to foster safety. More than ever, it is important that the communication between various components be reliable. This is especially the case for the exchange of information between sensors which register the driver's wishes and the power actuators.

For such systems we tested TTP/C (Time Triggered Protocol for Class C Applications). For safety reasons, it transmits redundant, so to speak double, signals based on time and not on cause. Using a prototype steering system we were able to prove the suitability of the protocol for a "Steer-By-Wire" system.

Total expenditures for research and development[1]
(million DM)
Progress 1994–1998



1 Approximately 11% thereof is spent for corporate research and advanced engineering; the rest for research and development in the business divisions and foreign subsidiaries for product development.

Cutting made environmentally friendly

Cutting in metalworking uses considerable amounts of cooling lubricants. This is unavoidable with conventional tools, but leads to substantial expense in the handling, storing and disposal of these materials.

In a broadly conceived, publicly supported project we were able to make considerable progress with dry machining using wear-resistant coated cutting materials. This method not only allows greater cutting performance compared to wet machining, it also contributes substantially to protection of the environment since it eliminates the use of machining oils and emulsifying concentrates. We started the first pilot applications of this new process.

Reception concept for DAB and FM radio

The broadcasting system of the future is called DAB (Digital Audio Broadcasting). It will replace the current frequency-modulated ultrashort wave broadcasting (FM). At first, however, both systems will exist simultaneously. That is why we developed a reception concept which combines for the first time both DAB and FM functions.

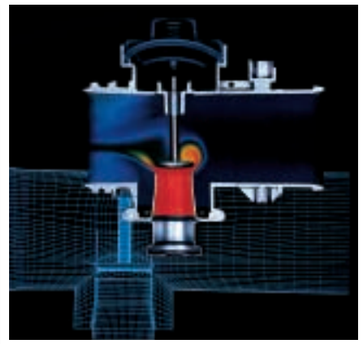
In order to achieve this, we fundamentally reworked our concept for DAB reception, which we had already marketed. We improved the DAB functionality and reduced the power input of the electronics to one-tenth. All functions, from analog and digital conversion, channel and audio encoding, up to the processors and storage were integrated on a single eighty square millimeter chip.

This high degree of integration permits the manufacture of very compact receivers for combined DAB/FM broadcasts for use in car radios and home and portable radio sets.

New electronics architecture for motor vehicles

Well-equipped motor vehicles contain many functions of body and information electronics, such as central power locks, power windows, climate controls, navigation aids and telephones. For future generations of vehicles, we have developed a new electronic systems architecture and demonstrated it in a test vehicle.

Its core is a central computer platform for the various functions of the body and information electronics. The platform is open for the installation of a variety of services such as route searches with traffic-jam avoidance or radio and television reception. It is adaptable with regard to computing power and storage capacity.



Indispensable for our product development are computer simulations. In this way, for instance, insight into flow behavior and temperature dispersion of an exhaust-gas recirculation valve is made possible.

Employees of the Bosch Group

On January 1, 1999, the Bosch Group employed a workforce of 189,537, 8,898 more than a year earlier. Employment in Germany rose by 3,831 to 95,357, of which 3.7 % were apprentices. Employment outside Germany rose by 5,067 to 94,180.

Bosch was one of the first German companies to offer an apprenticeship in mechatronics. In this new career, which unites the knowledge and skill to deal with mechanics and electronics, 44 young people in 1998 started their apprenticeship courses with us.

Labor costs continued to increase

The greater workforce and the contractually mandated raises in wages and salaries led to a further increase in labor costs. They rose worldwide by 8.5 % to approximately 15.6 (1997: 14.4) billion DM, in Germany by 9.5 % to approximately 10.1 billion DM. In the Bosch Group, the costs per employee rose by 3.7 %.

Employee benefit costs in Germany rose to 4.8 (1997: 4.6) billion DM; for each 100 DM pay for work performed, there were 91 DM additional mandatory, contractual and other social contributions.

International deployment of employees

Our worldwide activities lend importance to cooperation across borders in all areas of business. That is why we increasingly support the exchange of employees within the Bosch Group on the basis of our guidelines for international personnel policies. Every employee is encouraged to be open to other cultures and to learn from them.

The number of internationally active employees in the Bosch Group continued to grow in 1998. At the end of the year we employed approximately 1,200 (end of 1997: 1,100) outside their home country. Most of these came from Germany and nearly one-third from other countries.

Information provided on the internet

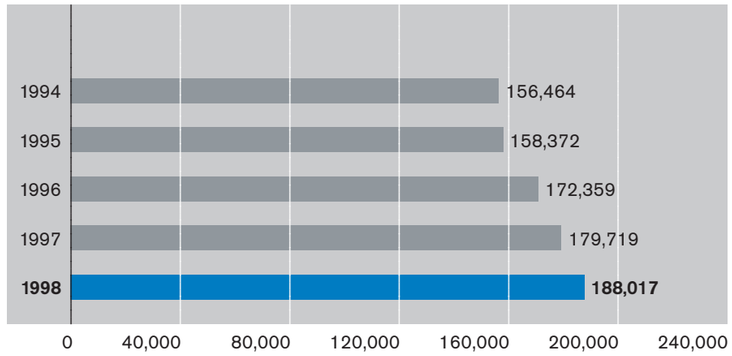
Due to increasing competition for qualified junior employees, we ventured into new directions. We redesigned our personnel wanted advertisements and focused them better on different groups of applicants. We expanded the information provided on the internet by current references to recruiting programs, training opportunities and open positions.

In order to increasingly attract engineers in mechanical engineering and electronics, as well as scientists for our development departments, we demonstrated the development, production and sale of our automotive equipment products to about 800 graduates of institutes of technology and universities during a two-day special seminar at our new testing center in Boxberg. We subsequently took on about 10 % of the participants as employees.

More apprentices hired in Germany

During 1998, the Bosch Group in Germany enrolled 1,115 young people in courses preparing them for technical or commercial careers, or 6 % more than the year before. Thus, on January 1, 1999, there were 3,538 (January 1, 1998: 3,355) apprentices in training. As in prior years, in many plants we trained more apprentices than we needed ourselves, again making a community contribution. We hired 93 % of the apprentices after they completed their training.

Number of employees
(annual averages)
Trend 1994 – 1998



European works council established

On October 27, 1998, the so-called Europa Committee was organized, functioning as the European works council of the company. This body at present consists of 26 employee representatives from 14 countries. It will meet annually with representatives of management.

Reform of company pension plan

We reformed the company pension plan for Bosch Group employees in Germany as of January 1, 1999. In full agreement with the employee representatives we transferred the approximately 70 different pension plans into a single uniform model. The contribution-oriented modular system which was developed for this purpose guarantees a better method of calculation and also offers the employees considerably more transparency. As a basic pension, the company provides contributions for the establishment of individual pension capital accounts. In a further pension provision, employees are given the opportunity to expand on the basic plan by making additional voluntary contributions.

With this reform we proved the company's ability to innovate, also in the case of an instrument which is important from a socio-political and personnel-policy viewpoint.

Labor contract to provide for part-time work for seniors

As of August 1, 1998, the Bosch parent company agreed to provide part-time work for its senior employees on the basis of mandatory legal and contractual labor regulations. The arrangement allows employees over 55 a gradual retirement. At the same time it gives young people a chance to start a career. This agreement contributes to a balanced age and qualification structure of the workforce. We entered into about 400 individual employee retirement-work-time agreements.

Innovation and creativity

In order to strengthen the innovative forces in the Bosch Group, a creativity program for the leadership cadre was started. We thus support our employees in developing new approaches to solutions outside the traditional ways of thinking.

Expression of appreciation to our employees

Our employees continued to face considerable challenges in 1998. Great demand for our products and services and the start of full production of new products led to strained employment situations at many locations. Only with a high degree of readiness to perform and flexibility of our employees was it possible to meet customer needs. We want to thank all employees for their commitment. We also want to express our appreciation to the labor representatives who in the true spirit of cooperation supported the measures needed to secure the competitiveness of the company. This applies especially to the flexible operational work-time arrangements at the plants.

Love of music is the incentive for many employees to participate in the Bosch music groups. Choir and orchestra have a good reputation even among professionals. A traditional event is the Quempas singing in the Stuttgarter Stiftskirche prior to Christmas.

Financial Statements of the Bosch Group Worldwide
Consolidated Balance Sheet as of December 31, 1998

Assets

	Appendix	December 31, 1998 million DM	December 31, 1997 million DM
Fixed assets	(6)		
Intangible fixed assets		**1,657**	1,872
Tangible fixed assets		**9,975**	8,861
Financial investments		**1,071**	1,280
		12,703	12,013
Current assets			
Leased products		**449**	492
Inventories	(7)	**5,989**	5,639
Accounts receivable and other assets	(8)		
Accounts receivable		**7,968**	7,522
Other receivables and assets		**2,106**	1,876
Marketable securities		**5,822**	5,828
Liquid assets		**1,260**	1,484
		23,594	22,841
Deferred expenses		**46**	52
		36,343	34,906

Liabilities

	Appendix	December 31, 1998 million DM	December 31, 1997 million DM
Equity capital	(9)		
Capital stock		**1,800**	1,500
Capital surplus		**4,630**	2,895
Earned surplus		**4,797**	4,228
Unappropriated earnings		**80**	2,209
Minority interests		**562**	545
		11,869	11,377
Accruals with valuation reserve portion	(10)	**67**	55
Accruals			
Accruals for pensions and similar obligations		**6,917**	6,227
Other accruals	(11)	**9,315**	9,596
		16,232	15,823
Liabilities	(12)		
Liabilities with banks		**1,979**	1,713
Accounts payable		**3,557**	3,419
Other liabilities		**2,575**	2,476
		8,111	7,608
Deferred income		**64**	43
		36,343	34,906

Financial Statements of the Bosch Group Worldwide

Consolidated Statement of Income
for the period from January 1 to December 31, 1998

	Appendix	**1998 million DM**	1997 million DM
Sales	(15)	**50,333**	46,851
Changes in finished goods and work-in-progress inventories and other capitalized costs	(16)	**551**	653
Total operating performance		**50,884**	47,504
Other operating income	(17)	**2,753**	3,349
Costs of materials	(18)	**– 23,697**	– 21,835
Personnel costs	(19)	**– 15,575**	– 14,359
Depreciation of intangible and tangible fixed assets		**– 3,265**	– 2,927
Other operating expenses	(17)	**– 9,366**	– 8,926
Income (– loss) from investments	(20)	**22**	– 70
Amortization of financial investments and securities included with current assets		**– 262**	– 186
Interest income, net of expenses	(21)	**306**	245
Income from ordinary business activities		**1,800**	2,795
Taxes on income	(22)	**– 950**	– 1,136
Net income for the year		**850**	1,659
Including profit and loss of minority shareholders	(23)	**66**	105

Financial Statements of the Bosch Group Worldwide

Capital Flow Statement

	1998 million DM	1997 million DM
Net income for the year	**850**	1,659
Depreciation of fixed assets	**3,570**	3,351
Increase in long-term accruals and accruals with valuation reserve portion	**484**	209
Cash flow	**4,904**	5,219
Increase in inventories and leased products	**– 307**	– 802
Increase in receivables	**– 670**	– 872
Decrease in short-term accruals	**– 63**	– 129
Increase in liabilities	**258**	612
Additions to funds from business activities (1)	**4,122**	4,028
Additions to fixed assets	**– 4,488**	– 4,076
Retirements of fixed assets	**242**	126
Application of funds to investment activities (2)	**– 4,246**	– 3,950
Dividends 1997/1996	**– 2,209**	– 68
Increase in capital stock	**300**	
Increase in capital surplus	**1,735**	
Increase in liabilities with banks	**266**	91
Other changes in balance-sheet items	**– 198**	– 208
Change in funds from financial activities (3)	**– 106**	– 185
Change in liquidity (1) + (2) + (3)	**– 230**	– 107
Liquidity at the beginning of the year	**7,312**	7,582
Reclassifications of financial investments		– 163
Liquidity at the end of the year	**7,082**	7,312

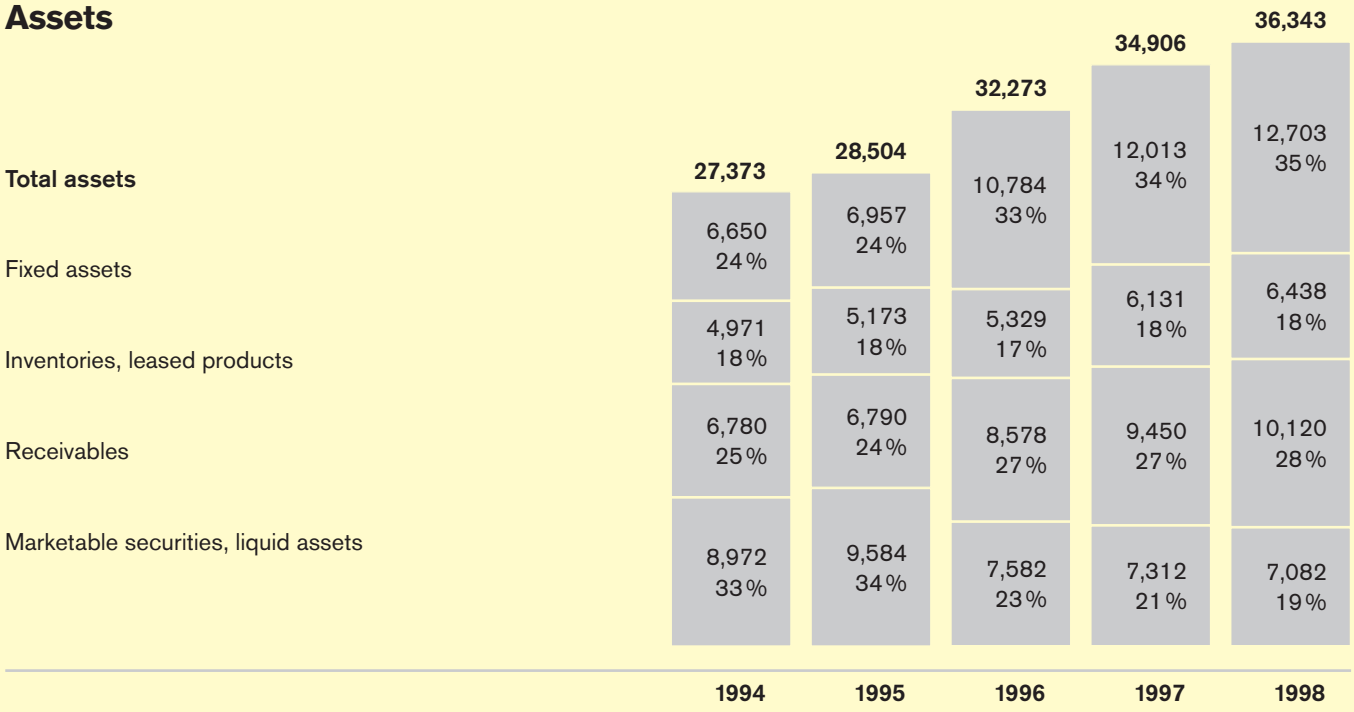
Financial Statements of the Bosch Group Worldwide

1998 Development of Fixed Assets

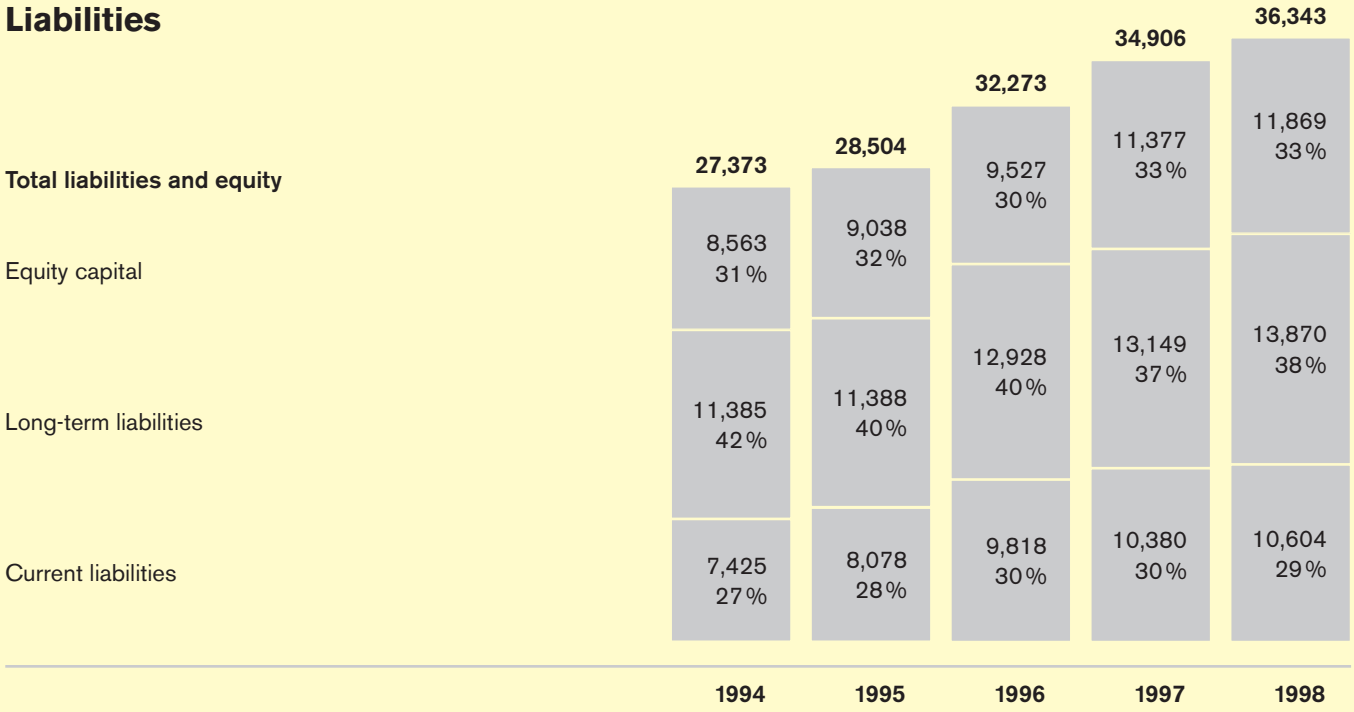
	Cost of acquisition or manufacture									
	Jan. 1, 1998	Changes in the consolidated group	Additions	Transfers	Retirements	Dec. 31, 1998	Depreciation cumulative to Dec. 31, 1998	Net book value as of Dec. 31, 1998	Net book value as of Dec. 31, 1997	Depreciation current year
	million DM	million DM	million DM	million DM	million DM	million DM	million DM	million DM	million DM	million DM
Intangible fixed assets										
Concessions, patents, trademarks and similar rights and assets as well as licenses to such rights and assets	638	2	244	1	158	727	525	202	371	379
Goodwill	2,375	336	3		51	2,663	1,209	1,454	1,500	339
Advance payments	1		2	–1		2	1	1	1	1
	3,014	338	249		209	3,392	1,735	1,657	1,872	719
Tangible fixed assets										
Land, leasehold rights and buildings, including buildings on land owned by others	5,932	87	169	54	89	6,153	3,364	2,789	2,771	216
Production equipment and machinery	12,104	190	1,977	454	605	14,120	9,678	4,442	3,581	1,547
Other equipment, fixtures and furniture	8,844	39	939	163	739	9,246	7,340	1,906	1,634	781
Advance payments and construction in progress	862	1	688	–671	30	850	12	838	875	2
	27,742	317	3,773		1,463	30,369	20,394	9,975	8,861	2,546
Financial investments										
Investments in affiliated companies	543	–276	232	74	2	571	453	118	321	204
Loans to affiliated companies	78		70			148	5	143	89	4
Investments in associated companies	1,105	–23	58	–10	62	1,068	509	559	636	64
Other financial investments	373		85	–64	4	390	225	165	153	33
Other loans	80		21		14	87	1	86	81	
	2,179	–299	466		82	2,264	1,193	1,071	1,280	305
Total fixed assets	32,935	356	4,488		1,754	36,025	23,322	12,703	12,013	3,570

Financial Statements of the Bosch Group Worldwide
Balance Sheet Structure 1994–1998

Assets



Liabilities



Values in million DM

Financial Statements of the Bosch Group Worldwide
Appendix 1998

(1) General remarks

The consolidated statements of the Bosch Group Worldwide conform to the regulations of the Commercial Code.
In order to ensure better understanding of these financial statements, we combined a number of individual balance sheet and statement of income items into key groupings. These items are stated separately in this Appendix. Required comments for individual items are also contained in this Appendix. The consolidated statement of income follows the format of the total cost method.

(2) Consolidated group

The consolidated statements include Robert Bosch GmbH and 23 domestic as well as 109 foreign subsidiaries. For the first time, we consolidated the following newly-established companies:
– Bosch Telecom Sicherheitstechnik-Montage und -Service GmbH, Weimar
– Bosch Telecom Software-Systeme GmbH & Co KG, Backnang
as well as the following previously treated as affiliated companies:
– Bosch Telecom Danmark A/S, Pandrup (Denmark)
– Bosch Układy Hamulcowe Sp. z. oo., Twardogóra (Poland)
– Diesel Technology Company, L.P., Wyoming, Michigan (USA).
Several businesses were integrated into other companies in the consolidated group by way of legal restructuring. These were primarily, MotoMeter GmbH, Leonberg; Robert Bosch Máquinas de Embalagem Ltda, Osasco (Brazil); Bosch Braking Systems Corporation, South Bend, Indiana (USA); Robert Bosch Fluid Power Corporation, Racine, Wisconsin (USA); and Weldun International, Inc, Bridgman, Michigan (USA).
The consolidated statements of BSH Bosch und Siemens Hausgeräte GmbH were included pro rata pursuant to Section 310 of the Commercial Code.
In accordance with Section 296, Paragraph 2 of the Commercial Code, companies lacking operations or having insignificant business volume, were not included with the consolidated financial statements.
The equity valuation of specific interests in associated companies was applied in accordance with the book-value method. This valuation pertained to three domestic and seven foreign companies.

(3) Principles of classification and valuation

The financial statements of Bosch Group Worldwide include the individual statements of our subsidiaries which conform to uniform principles of classification and valuation.
We adhered to the valuation at lower of cost or market and imparity of gain or loss recognition.
Financial statements of foreign associated companies were not modified to comply with the uniform accounting principles of the consolidated group.
Intangible assets including goodwill resulting from first-time consolidations as well as tangible and financial assets were valued at acquisition cost or cost of manufacture subject to depreciation.
We applied straight-line as well as accelerated depreciation methods. Items of minor value were fully depreciated during the year of acquisition. We applied special depreciation allowances according to tax regulations in all countries.
Interest-free and low-interest loans were adjusted to reflect present values by application of a uniform discount rate domestically, and prevailing rates in foreign countries.

Additions to interests in associated companies include shares purchased as well as capital contributions and prorated profits. Retirements include prorated losses, dividends paid and shares sold.
We valued inventories at the lower of average purchase or manufacturing cost or market. Manufacturing costs include direct costs and reasonable overhead.
At domestic companies, the Lifo valuation method was used in principle. We used this method also at foreign subsidiaries when accepted by the taxing authorities.
We provided for risks inherent in warehousing and distribution through appropriate deductions. Additional write-downs were taken in cases of unfavorable returns.
Accounts receivable and other current assets were stated at face values less write-downs for individual risks and for general credit risks. Interest-free or low-interest receivables with maturities of more than one year were discounted.
We valued marketable securities included in current assets at the lower of acquisition cost or market.
Special write-downs of marketable securities of 7 million DM were taken on account of expected price fluctuations.
In determining the size of accruals we provided for all identifiable risks.
Pension accruals and similar liabilities were determined by the application of actuarial principles and were discounted to reflect present values. For domestic companies, we used a 6% discount rate in accordance with the 1998 guideline tables, while foreign subsidiaries used discount rates prevailing in their respective countries.
In determining the amounts accrued for pending transactions with expected losses, we basically took account of prices and costs expected at the time these transactions would close.
Liabilities were stated at the amounts owed.

(4) Currency translation

Accounts receivable and accounts payable stated in foreign currencies were translated to DM equivalents at the less favorable of the exchange rate at the date of origin, or at the balance-sheet date.
For the translation to DM of the financial statements in foreign currencies and the related profits and losses, we applied, in principle, average exchange rates at the balance-sheet date. Transactions pertaining to fixed assets were translated at average annual DM equivalents. Resulting differences were included with beginning balances of cost of acquisition or manufacture as well as in cumulative depreciation.
Tangible fixed assets of our subsidiaries in Brazil were valued at their original carried-forward DM equivalents of cost of acquisition or manufacture. Depreciation was based on historic values.
Income and expenses were translated at average exchange rates. Differences resulting from the application of average exchange rates versus year-end exchange rates were included with other operating expenses.

(5) Consolidation principles

For capital consolidation of companies or for newly acquired capital shares, we applied the book-value method at the date of acquisition or at the date of first-time consolidation. As far as possible, we allocated amounts subject to capitalization to the respective assets. Remaining amounts were included with goodwill. Negative goodwill resulting from capital consolidation was included with earned surplus.
Receivables and payables, sales, expenses, and income, as well as results within the consolidated group were eliminated.

Profits from sales to the consolidated group by associated companies were not eliminated since they were insignificant.
Deferred tax assets resulting from consolidation measures in the amount of 81 million DM were included with other assets.

(6) Fixed assets

Extraordinary depreciation amounting to 384 million DM pertained mostly to goodwill and to financial investments.
In accordance with tax regulations, we deducted an extra 41 million DM directly from the acquisition costs of tangible fixed assets. The depreciation was taken pursuant to Section 6b of the Income Tax Law, Section 4 of the Development Area Law, and pursuant to local tax laws at our foreign subsidiaries.
The development of fixed assets is presented on pages 44 and 45 of this report.

(7) Inventories

Included with the stated value of inventories, in the amount of 5,989 million DM, are our advance payments of 45 million DM (1997: 41 million DM). On the other hand, advance payments received in the amount of 201 million DM (1997: 302 million DM) were deducted.

(8) Accounts receivable and other assets

Million DM	**1998**	1997
Accounts receivable	**7,968**	7,522
including maturities of more than one year	**17**	30
Other receivables and assets		
Receivables from affiliated companies	**269**	247
including maturities of more than one year		15
Receivables from companies in which		
interests are held	**112**	95
including maturities of more than one year	**9**	
Other assets	**1,725**	1,534
including maturities of more than one year	**182**	166
	2,106	1,876
Receivables and other assets	**10,074**	9,398

(9) Equity capital

The subscribed capital stock of 1,800 million DM and the capital surplus of 4,630 million DM correspond to the respective balance-sheet items of Robert Bosch GmbH. Capital stock and capital surplus at Robert Bosch GmbH were increased in 1998 by 300 million and 1,735 million DM respectively by application of the "pay-out-and-reinvest" method.

Revenue surplus accounts consist of the following:

Million DM	**1998**	1997
Earned surplus of Robert Bosch GmbH	**670**	150
Other earned surplus	**4,127**	4,078
	4,797	4,228

Unappropriated earnings of the consolidated group are identical to those of Robert Bosch GmbH.

(10) Accruals with valuation reserve portion

Accruals with valuation reserve portion were formed pursuant to Section 6b of the Income Tax Law, Section R 34 of the Income Tax Regulations, Section 12 of the Reorganization Tax Law and Section 1 of the DDR Investment Law. Our foreign subsidiaries followed local regulations with respect to such items.

(11) Other accruals

Million DM	**1998**	1997
Accrued taxes	**296**	410
Other accruals	**9,019**	9,186
	9,315	9,596

(12) Liabilities

Million DM	**1998**	**Including maturities up to one year**	1997	Including maturities up to one year
Liabilities with banks	**1,979**	**564**	1,713	548
Accounts payable	**3,557**	**3,557**	3,419	3,418
Other liabilities				
Liabilities from acceptances and drafts	**216**	**216**	190	190
Liabilities with affiliated companies	**45**	**45**	53	53
Liabilities with companies in which interests are held	**114**	**114**	154	154
Other liabilities	**2,200**	**1,885**	2,079	1,752
	2,575	**2,260**	2,476	2,149
Total liabilities	**8,111**	**6,381**	7,608	6,115

Of the liabilities with banks, 58 million DM were secured by mortgages and another 49 million DM by other liens. Of other liabilities, 9 million DM were secured by mortgages.
Other liabilities contain tax liabilities in the amount of 465 million DM (1997: 515 million DM) and liabilities pertaining to social obligations in the amount of 352 million DM (1997: 373 million DM). Liabilities with shareholders in the amount of 8 million DM pertain to Robert Bosch Stiftung GmbH.
Liabilities with maturities of more than 5 years amounting to 1,179 million DM included 1,159 million DM of liabilities with banks and 20 million DM of other liabilities.

(13) Contingent liabilities

Million DM	
Contingent liabilities from the issuance or transfer of notes	**180**
including affiliated companies	**20**
Contingent liabilities from guarantees	**250**
including affiliated companies	**20**
Contingent liabilities from warranties	**87**
including affiliated companies	**6**
Contingent liabilities from collateral given for third-party liabilities	**15**
including mortgages	**7**

As a partner in two foreign private companies, we are jointly and severally liable in accordance with legal requirements.

(14) Other financial obligations

Other financial obligations of significance for an opinion on the financial condition of the company did not exist.

(15) Breakdown of sales

Million DM	**1998**	**%**	1997	%
Sales by business sectors				
Automotive equipment	**31,797**	**63.2**	28,736	61.3
Communications technology	**5,014**	**10.0**	4,964	10.6
Consumer goods	**11,357**	**22.5**	11,054	23.6
Capital goods	**2,165**	**4.3**	2,097	4.5
	50,333	**100.0**	46,851	100.0
Sales by regions				
Countries of the European Union	**34,589**	**68.7**	31,109	66.4
Rest of Europe	**2,449**	**4.9**	2,241	4.8
America	**10,183**	**20.2**	9,791	20.9
Asia, Africa, Australia	**3,112**	**6.2**	3,710	7.9
	50,333	**100.0**	46,851	100.0

(16) Changes in finished goods and work-in-progress inventories and other capitalized costs

Million DM	**1998**	1997
Change in finished goods and work-in-progress inventories	**184**	334
Other capitalized costs	**367**	319
	551	653

(17) Other operating expenses and income

Expenses resulting from additions to accruals with valuation reserve portion in the amount of 20 million DM are included in other operating expenses. Income from the reversal of accruals with valuation reserve portion in the amount of 7 million DM are included in other operating income.

(18) Costs of materials

Million DM	**1998**	1997
Cost of raw materials, supplies and merchandise	**21,940**	20,350
Purchased services	**1,757**	1,485
	23,697	21,835

(19) Personnel costs

Million DM	1998	1997
Wages and salaries	**12,125**	11,279
Social security, pension plans, and support payments	**3,450**	3,080
of which pension plans	**1,141**	877
	15,575	14,359

Average numbers of employees during the year, by region:

	1998 Total	**Including BSH (prorated)**	1997 Total	Including BSH (prorated)
Countries of the European Union	**127,568**	**11,778**	121,690	11,360
Rest of Europe	**9,369**	**2,574**	8,076	2,563
America	**32,082**	**2,598**	30,702	2,218
Asia, Africa, Australia	**18,998**	**33**	19,251	17
	188,017	**16,983**	179,719	16,158

(20) Income (– loss) from investments

Million DM	1998	1997
Income from investments	**23**	22
including affiliated companies	**10**	6
Result from associated companies	**– 1**	– 92
	22	– 70

(21) Interest income, net of expenses

Million DM	1998	1997
Interest from loans included		
with financial investments	**10**	9
including affiliated companies	**8**	6
Other interest and similar income	**584**	515
including affiliated companies	**6**	6
Interest and similar expenses	**– 288**	– 279
including affiliated companies	**– 1**	– 2
	306	245

(22) Tax expenses

Million DM	1998	1997
Taxes on income	**950**	1,136
Other taxes	**226**	288
	1,176	1,424

Other taxes are included in other operating expenses.
The impact of tax allowances on the profit for the fiscal year as well as in former years, and the size of future burdens from the resulting valuations are of secondary significance.

(23) Profit and loss of minority shareholders

Million DM	1998	1997
Profits	**84**	111
Losses	**– 18**	– 6
	66	105

(24) Compensation of the members of the Board of Management and of the Supervisory Council

During 1998, the aggregate compensation of the members of the Board of Management of Robert Bosch GmbH amounted to 8 million DM. Former members of the Board of Management and their dependents received 9 million DM, and the members of the Supervisory Council one million DM.
Accruals at Robert Bosch GmbH for pension liabilities for former members of the Board of Management and their dependents amounted to 95 million DM.
The members of the Supervisory Council and the Board of Management of Robert Bosch GmbH are listed on pages 4 and 5.

(25) Shareholdings of Bosch Group Worldwide

A listing of the shareholdings of the consolidated Bosch Group will be deposited with the commercial registry of the Stuttgart Court.

Stuttgart, March 9, 1999

Robert Bosch GmbH
The Board of Management

Auditor's opinion

The accounting and the consolidated financial statements of Robert Bosch GmbH as of December 31, 1998, which we have audited in accordance with professional standards, comply with legal provisions. With due regard to generally accepted accounting principles the consolidated financial statements give a true and fair view of the company's assets, liabilities, financial position and profit and loss. The management report to the consolidated financial statements is consistent with the contents thereof.

Stuttgart, March 9, 1999

Schitag Ernst & Young
Deutsche Allgemeine Treuhand AG
Wirtschaftsprüfungsgesellschaft

Dörner
Wirtschaftsprüfer

Dr. Pfitzer
Wirtschaftsprüfer

Major Companies of the Bosch Group Worldwide
(as of December 31, 1998)

Name	Location	Equity Capital % owned[1]	Equity Capital[2] million DM	Sales[2] million DM	Profit or loss[2] million DM
Germany					
Blaupunkt-Werke GmbH	Hildesheim	100	183	1,561	PLT[3]
BSH Bosch und Siemens Hausgeräte GmbH[4]	Munich	50	1,193	10,283	17
Bosch Telecom GmbH	Stuttgart	100	539	4,180	PLT[3]
Bosch Telecom Leipzig GmbH	Leipzig	100	44	203	PLT[3]
BT Magnet-Technologie GmbH	Herne	50	52	142	11
Hawera Probst GmbH	Ravensburg	100	40	121	9
Robert Bosch Fahrzeugelektrik Eisenach GmbH	Eisenach	100	76	737	13
VB Autobatterie GmbH	Hanover	35	97	407	– 2
Foreign Countries					
Europe					
NV Robert Bosch SA	Anderlecht/Belgium	100	44	344	4
Robert Bosch Produktie NV	Tienen/Belgium	100	111	428	34
Robert Bosch A/S	Ballerup/Denmark	100	50	200	11
Bosch Telecom Danmark A/S	Pandrup/Denmark	100	24	483	19
Robert Bosch (France) SA[4]	Saint-Ouen (Paris)/France	100	629	3,305	33
Robert Bosch Ltd	Denham/U.K.	100	209	1,118	57
Worcester Group plc[4]	Worcester/U.K.	100	59	350	18
Robert Bosch SpA[4]	Milan/Italy	100	96	649	– 23
Robert Bosch Sistemi Frenanti SpA	Crema/Italy	100	76	395	– 24
Robert Bosch BV	Hoofddorp/Netherlands	100	42	222	15
Van Doorne's Transmissie BV	Tilburg/Netherlands	100	25	66	1
Robert Bosch A/S	Trollaasen (Oslo)/Norway	100	23	108	2
Robert Bosch AG	Vienna/Austria	100	110	604	24
Blaupunkt Auto-Rádio Portugal Lda	Braga/Portugal	100	54	450	8
Vulcano Termo-Domésticos SA	Aveiro/Portugal	100	126	276	28
Robert Bosch AB	Kista (Stockholm)/Sweden	100	15	151	5
Robert Bosch Internationale Beteiligungen AG	Zurich/Switzerland	90	708		73
Robert Bosch AG	Zurich/Switzerland	100	25	239	5
Scintilla AG	Solothurn/Switzerland	85	543	1,093	62
Robert Bosch España SA[4]	Madrid/Spain	100	387	2,200	18
Robert Bosch spol. s r.o.	České Budějovice/Czech Republic	100	63	224	12
Bosch Diesel spol. s r.o.	Jihlava/Czech Republic	100	39	162	16
Bosch Sanayi ve Ticaret AS	Bursa/Turkey	100	111	317	47

Name	Location	Equity Capital % owned[1]	Equity Capital[2] million DM	Sales[2] million DM	Profit or loss[2] million DM
America					
Robert Bosch Ltda[4]	Campinas/Brazil	100	500	1,821	37
Robert Bosch SA de CV	Toluca/Mexico	100	144	583	– 17
Robert Bosch Corporation[4]	Broadview (Chicago)/USA	100	1,700	6,353	– 22
S-B Power Tool Company[4]	Chicago/USA	100	338	1,376	113
Vermont American Corporation[4]	Louisville/USA	50	327	733	30
Asia, Australia					
Motor Industries Co Ltd	Bangalore/India	51	162	554	28
Bosch KK	Yokohama/Japan	100	114	536	1
Nippon ABS Ltd	Yokosuka-shi/Japan	50	224	518	11
Nippon Injector Corporation	Odawara-shi/Japan	35	62	157	5
Zexel Corporation	Shibuya-ku (Tokyo)/Japan	32	1,195	3,241	25
Doowon Precision Industry Co Ltd	Seoul/Korea	20	22	153	– 12
KEFICO Corporation	Kunpo-Si/Korea	25	79	148	1
Robert Bosch (Malaysia) Sdn Bhd	Penang/Malaysia	100	37	170	11
Robert Bosch (South East Asia) Pte Ltd	Singapore/Singapore	100	37	197	2
Robert Bosch (Australia) Pty Ltd[4]	Clayton (Melbourne)/Australia	100	116	631	12

1 Shares held directly and indirectly by Robert Bosch GmbH
2 Translation of foreign currencies pertaining to equity capital and profit and loss stated at average exchange rates at the balance-sheet date; sales stated at average exchange rates of the year
3 Profit and loss transfer agreement (PLT)
4 Represents a consolidated sub-group

Financial Statements of Robert Bosch GmbH

Balance Sheet as of December 31, 1998

Assets

	December 31, 1998 million DM	December 31, 1997 million DM
Fixed assets		
Intangible fixed assets	**–**	–
Tangible fixed assets	**3,112**	2,497
Financial investments	**4,076**	4,233
	7,188	6,730
Current assets		
Inventories	**2,035**	1,890
Accounts receivable and other assets		
Accounts receivable	**2,999**	2,547
Other receivables and assets	**2,635**	2,189
Marketable securities	**4,786**	5,072
Liquid assets	**318**	659
	12,773	12,357
Deferred expenses	**8**	7
	19,969	19,094

Liabilities

Equity capital		
Capital stock	**1,800**	1,500
Capital surplus	**4,630**	2,895
Earned surplus	**670**	150
Unappropriated earnings	**80**	2,209
	7,180	6,754
Accruals with valuation reserve portion	**16**	1
Accruals		
Accruals for pensions and similar obligations	**4,333**	4,100
Other accruals	**5,296**	5,472
	9,629	9,572
Liabilities		
Liabilities with banks	**4**	7
Accounts payable	**994**	849
Other liabilities	**2,146**	1,911
	3,144	2,767
Deferred income		
	19,969	19,094

Financial Statements of Robert Bosch GmbH

Statement of Income for the period from January 1 to December 31, 1998

	1998 million DM	1997 million DM
Sales	**26,473**	23,174
Changes in finished goods and work-in-progress inventories and other capitalized costs	**209**	185
Total operating performance	**26,682**	23,359
Other operating income	**1,841**	2,278
Costs of materials	**–15,737**	–13,215
Personnel costs	**–6,351**	–5,800
Depreciation of intangible and tangible fixed assets	**–1,249**	–871
Other operating expenses	**–4,432**	–3,978
Income from investments	**300**	398
Amortization of financial investments and securities included with current assets	**–316**	–363
Interest income, net of expenses	**374**	280
Income from ordinary business activities	**1,112**	2,088
Taxes on income	**– 512**	–679
Net income for the year	**600**	1,409
Removals from surplus accounts		800
Additions to surplus accounts	**–520**	
Unappropriated earnings	**80**	2,209

Ten Year Statistics Bosch Group Worldwide

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Sales	30,588	31,824	33,600	34,432	32,469	34,478	35,844	41,146	46,851	50,333
Foreign share as a percentage of sales	52	51	48	47	49	54	56	61	65	65
Research and development expense	1,803	2,042	2,144	2,302	2,215	2,255	2,474	2,887	3,257	3,478
as a percentage of sales	5.9	6.4	6.4	6.7	6.8	6.5	6.9	7.0	7.0	6.9
Investments in tangible fixed assets	2,064	2,790	2,273	2,038	1,552	1,578	2,056	2,419	2,905	3,773
including domestic	1,259	1,708	1,464	1,347	990	960	1,255	1,270	1,376	1,930
including foreign	805	1,082	809	691	562	618	801	1,149	1,529	1,843
as a percentage of sales	6.7	8.8	6.8	5.9	4.8	4.6	5.7	5.9	6.2	7.5
as a percentage of depreciation	128	162	126	103	85	90	117	117	125	148
Depreciation on tangible fixed assets	1,607	1,725	1,799	1,976	1,836	1,747	1,757	2,059	2,321	2,546
Employees – annual average –										
(000 omitted)	175	180	181	177	165	156	158	172	180	188
including domestic	117	118	117	113	104	95	92	91	91	94
including foreign	58	62	64	64	61	61	66	81	89	94
as of January 1 of following year	178	181	177	170	157	154	157	176	181	190
Personnel costs	10,202	10,718	11,403	11,838	11,692	11,439	11,476	13,017	14,359	15,575
Total assets	22,205	23,544	24,247	24,452	25,447	27,373	28,504	32,273	34,906	36,343
Fixed assets	6,064	7,147	7,467	7,769	7,003	6,650	6,957	10,784	12,013	12,703
as a percentage of total assets	27	30	31	32	27	24	24	33	34	35
Equity capital	6,668	7,050	7,471	7,859	8,304	8,563	9,038	9,527	11,377	11,869
as a percentage of total assets	30	30	31	32	33	31	32	30	33	33
Cash flow	3,433	3,104	3,267	3,501	3,717	3,765	3,245	3,539	5,219	4,904
as a percentage of sales	11.2	9.8	9.7	10.2	11.4	10.9	9.1	8.6	11.1	9.7
Net income for the year	626	560	540	512	426	512	550	500	1,659	850
Unappropriated earnings										
(Dividends of Robert Bosch GmbH)	43	43	43	60	60	60	68	68	2,209	80

Values in million DM